

An Introduction to the
SCIENCE OF PSYCHOLOGY

Jeffry Philip Ricker

Scottsdale Community College

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For my parents, who first gave me life; and for Elizabeth and Katherine, who
continue to give me life.

Preface

How do we know what we think we know? At all times, we profess beliefs and take actions based on our beliefs. These beliefs represent what we think we know about the world. Much of this knowledge is based upon personal experience—our interpretations of everyday events, which often involve "feelings" and intuitions. The conclusions that we reach based upon our personal experience also often are based on a framework of cultural beliefs. Does personal experience generally lead to valid beliefs—beliefs that accurately reflect the way the world really is? In many cases, it probably does. But when the questions we want answered become complex, our personal experience, which may be based on faulty intuitions and inaccurate cultural beliefs, can lead us astray. As you will see in the following chapters, this is particularly true of the questions asked by psychologists. Psychologists study the minds and behaviors of individuals. I will try to show you that the "way of knowing" referred to as the "scientific approach" is the best one we have for answering complex questions about the mind and behavior.

Why is it important to get accurate answers to our questions about psychology? Since the goal of psychology is to understand human nature—our natures—and since the beliefs we have about ourselves and others are a major influence on the actions we take in any situation, these beliefs need to be as accurate as possible. For example, if I assume that the undesirable actions of another are caused by demon possession, I may kill ("smite") him in order to force the demon out of him. On the other hand, if there is no good scientific evidence that his undesirable actions are caused by demon possession, then any actions influenced by this belief will be inappropriate. It is far better to approach our attempts at understanding mind and behavior by trying to eliminate sources of error that lead us to incorrect conclusions. This is what science attempts to do. Thus, claims about the mind and behavior need to be subjected to rigorous scientific research if we are to use these claims to guide our actions.

There are some people whose help made this book much better than it would have been otherwise. First and foremost, I would like to acknowledge the invaluable assistance of Nicholas Bacon. His technical knowledge and attention to detail helped this relatively computer-ignorant author immeasurably. I also would like to thank the psychology faculty at Scottsdale Community College—Bernard Combs, Richard Keefe, Michael Morgan, and Eugene Schmidt—for their encouragement, conversation, and criticisms. And last, but definitely not least, I would like to thank my students for their comments on earlier drafts of this book and for teaching me how to be a better teacher.

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CHAPTER 1

PSYCHOLOGY AS A SCIENCE: THE STUDY OF SLEEPING AND DREAMING

Beware of those people who give simple and certain answers to hard questions! Although all of us have a strong desire to know with absolute certainty the truth about important matters, the world is a very complex place—so complex that, in order to understand even a small piece of it, we often must engage in a great deal of hard work. Even after all this effort, we still may be confused or uncertain about the correct answer to a hard question. Science is a set of procedures and a set of attitudes that help us to answer such hard questions about the universe. Scientific procedures and attitudes rarely give us certain answers, but they can reduce the amount of uncertainty we have about a question. In short, science is the best way we have to find probable (although rarely certain) answers to important questions about the universe. Let me explain why I say this. In our everyday lives, we sometimes are convinced by answers (beliefs) for which there is little or no evidence. Sometimes we are convinced simply because we would like a particular belief to be true. But an equally important reason is that, in many cases, we are not very good at evaluating the evidence for or against a belief. For example, many people who pay attention to professional sports such as basketball or baseball believe that individual players have streaks in which they sink more baskets or get more hits than at other times (that is, that the players have a “hot hand” or a “hot bat”). For those of you who watch or play these two sports, this belief might seem to be so obviously true based on your “experience” that you cannot believe that anyone would question it. Nevertheless, the psychologist, Thomas Gilovich, and his colleagues did just that. In a series of studies, they investigated whether or not streaks actually occur for individual basketball players. These psychologists found that streaks do not occur. In other words, a basketball player is not more likely to sink a basket after he/she has just done so (or even after the player has just made a series of say two, three, or four baskets). The likelihood that the player will make each basket seems to be determined only by his/her overall percentage of baskets. In other words, if the player sinks 65% of his/her shots, then he/she has a 65% chance of making each basket regardless of what has just happened with the previous shot. So this belief—a belief that seems to be just “common sense”—is not true after all.

Why then do people tend to believe in the reality of shooting streaks in basketball? Gilovich (1991) argued that humans have a general tendency to find relationships even when no relationship exists. In other words, he claimed that people organize their experiences in such a way that they often find order even when there is only confusion. Gilovich stated this idea in the following way:

In 1677, Baruch Spinoza wrote his famous words, “Nature abhors a vacuum,” to describe a host of physical phenomena. Three hundred years later, it seems that his statement applies as well to human nature, for it too abhors a vacuum. We are predisposed to see order, pattern, and meaning in the world, and we find randomness, chaos, and meaninglessness unsatisfying. Human nature abhors a lack of predictability and the absence of meaning. As a consequence, we tend to “see” order where there is none, and we spot meaningful patterns where only the vagaries of chance are operating. (p. 9)

Not only do we tend to find order when there is none, but there also are many things that we would like to be true (especially about ourselves) which predispose us to look at information in biased ways. For example, if you do not do well on a test, you are more likely to remember that the teacher gave a confusing lecture on a particularly important topic than you are to remember that you studied only two hours for the test. Thus, if we do not do well on a task, we often search for information that indicates that it really wasn’t our fault, and we tend to ignore or distort information that indicates that it was. For reasons such as these, **it can be very difficult for us to evaluate accurately the evidence of our everyday experience to determine whether or not a particular belief is true.** Because of such biased ways of analyzing information, we sometimes believe something fervently which is not true (such as the “fact” that basketball players have streaks of good or bad shooting). As I hope you will see in this book, the procedures and attitudes of science attempt to control for our tendency to look at evidence in these biased ways. Although scientific procedures and attitudes are not always successful at accomplishing this goal, they usually are much better than relying on our intuitions.

The advantage of the scientific approach is that we attempt to look below the surface characteristics of a phenomenon (a **phenomenon is anything that we observe or measure in some way**) to the reality that underlies it. In science, we try to do this without regard to what we would like to be true about it. **Science is based fundamentally on the idea that our everyday human judgement is not to be trusted completely:** our desires, intellectual biases, lack of attention, and other irrational processes can prevent us from knowing reality accurately. In order to think scientifically, therefore, you must have one thought constantly in mind: “I believe that this may be true, but I might be wrong.” Practice saying this several times while thinking about a belief that is very important to you. You might feel very uncomfortable while doing this. It is very difficult to question one’s beliefs. In order to think scientifically, however, you must train yourself to always doubt your beliefs, to look for more evidence to support what you believe, and to be ready to refashion those beliefs if the evidence doesn’t hold up. Psychologists are scientists who try to understand the causes of the thoughts, emotions, and

behaviors of individuals. Because there are so many things that we would like to be true about ourselves, and because we have been taught many incorrect beliefs, psychology can be a very difficult science to perform well. There are many things we think we know about ourselves that simply are not true. For example, what percentage of your brain do you use? If you said anything less than 100%, you have just proved my point.

In order to begin to understand better what is meant by the word “science,” let’s take an example of something a psychologist might study. Hypnosis is something all of you are familiar with and about which you all have many beliefs. Let’s say that a friend of yours has told you about a demonstration of hypnosis she has just seen. The hypnotist selected about ten volunteers from the audience, who then came up on stage. He didn’t have any one stare at a shiny watch or into his eyes, as you sometimes see in old movies. Instead, he simply talked. After a few minutes, several of them seemed to have fallen asleep. He made various suggestions to them and they started to do all kinds of strange things. For example, he told them that they were at their fifth birthday party, and they started acting like they were only five years old. They acted as if they were blowing out candles, opening presents, playing “pin-the-tail-on-the-donkey,” eating cake, and crying when an imaginary child took their imaginary party hat. The strangest part came near the end of the show when the hypnotist woke them up and had them go back to their seats in the audience. Just before he did this, however, he told them that, whenever they heard the word “hypnosis,” they would have an uncontrollable urge to go to the bathroom. As he supposedly was ending the show, he said, “*hypnosis* is a powerful force and is not something to be toyed with,” and about eight people got up and ran toward the exit. The others stayed in their seats but began to squirm all over with their legs tightly crossed. The hypnotist had them all come back to the stage and really “unhypnotized” them this time. Your friend (who knows that you are taking a psychology class) asked you what is going on with hypnosis. “Were they acting,” she asked, “or did they really not know what they were doing?” She argued that the people must have been under the hypnotist’s control because, “how could they act so stupid in front of a bunch of strangers if they knew what they were doing?”

How would you have answered her? Was the hypnotist really forcing them to have certain thoughts, emotions, and behaviors? Did these people really have no control over their experiences? If the hypnotist was controlling them, how was he doing it? On the other hand, if he was not actually controlling their experiences, why were they acting as if he was? Answers to these questions are not easy to come by, and there is still controversy among psychologists over the answers to many questions about hypnosis. Nevertheless, during the past century or so, psychologists have attempted to answer these (and many other) questions using a set of procedures

and general attitudes that we refer to as the “scientific method.” What seems to be happening when we look at some phenomenon superficially (as your friend was doing when she was trying to understand hypnosis after watching just one stage show), and what actually is happening when we investigate that phenomenon more carefully, often turn out to be two very different things. Science involves the attempt to investigate phenomena much more carefully than we usually are able to do in everyday life. We need to use more care in scientific work because the various biases of which I spoke above are most likely to affect our conclusions when we look at something superficially. With **science**, we attempt to go beyond what appears to be true on the surface, and beyond what we might desire to be true—we **try to discover the reality that often is not apparent upon a superficial examination**. Because of the care used in scientific investigations, the conclusions made can be very surprising and, sometimes, upsetting because these seem to contradict what we had thought or had wanted to be true. It is the goal of this book to introduce you to the science of psychology and to help you to answer for yourself difficult questions about the human mind and behavior.

STUDY QUESTION (SQ) 1-1: What are possible problems with trusting our everyday beliefs about the world? Describe the major goal of science and how it tries to overcome these everyday problems. (Note: Throughout this book, I will emphasize certain words by putting them in bold type. Please make certain that you understand these terms thoroughly by rewriting the definitions in your own words and thinking of examples for each of them.)

The Scientific Method in Psychology

Our modern word “science” derives from a Latin word meaning “knowledge.” Modern science, which emerged in Europe during the seventeenth century, was seen by its originators as the best way to gain knowledge about the universe. These early scientists wanted to discover reality—to discover how the universe really worked. For example, they believed that, if we made direct observations of phenomena instead of relying upon philosophical speculations or upon the beliefs of authorities, we eventually would gain certain knowledge about the basic components and processes of the universe. We refer to **the set of scientific attitudes about how knowledge is to be gained and the general procedures used to gain such knowledge** as the **scientific method**. Throughout this book, we will discuss several of the procedures used by scientists to develop their knowledge. But first, I want to introduce briefly some of the more important attitudes that scientists typically hold. I have just mentioned **the belief that knowledge about a phenomenon can result only from direct observations**—a belief that is known as **empiricism**. If we want to understand what is

happening with hypnosis, for example, we might watch hypnotists inducing hypnosis in someone and then observe the behaviors of the hypnotized person. Observing closely the interactions between the hypnotist and the hypnotized person, as well as what goes on in the environment around them is essential, empiricists would say, for understanding hypnosis itself. Another example can be seen in the work of Theodor Bischoff, a nineteenth-century scientist, who wanted to empirically demonstrate a claim made by Pierre Cabanis. In 1795, Cabanis had stated that consciousness ends when the brain is separated from the rest of the body: a decapitated head would have no awareness of what was occurring around it. According to Hothersall (1995), Cabanis believed that:

Observed actions [of a decapitated body]...were no more indicative of continued consciousness than is a headless chicken's flight around a farmyard. A German physiologist, Theodor Bischoff..., arranged a macabre, even ghoulish, test of Cabanis's assertion on the head of a newly executed criminal [executed by guillotine]. Even intense stimuli, including the shouted word Pardon! elicited no reaction...after decapitation. Cabanis...was correct. (p. 81)

Although you might not accept this as an adequate demonstration of Cabanis's claim (for example, the decapitated head of the criminal may have heard Bischoff's voice but might not have been able to respond), it does indicate a concern with empiricism in checking knowledge claims.

A second tenet (a "tenet" is a belief that is thought to be true) of the scientific method is **skepticism**, which is **the belief that no claim to knowledge is ever final and, therefore, that all knowledge can be doubted**. In other words, one must have evidence for a claim to knowledge, and even then, one can question whether or not the knowledge is true. For example, your imaginary friend in the hypnosis example seemed to be claiming that hypnotists put people into a trance state in which they have no will of their own. Her evidence was that the people she observed performed all sorts of "stupid" actions in front of a group of strangers—actions that she believed no person would have performed if the person had been in control of his/her behavior. How might you question her claim that people will not do stupid things in front of strangers unless they have no control over their behavior? Think about this for a minute. My first thought would be to ask the following question: Do people ever *deliberately* perform stupid actions in front of strangers? I think that most of us have done this at some point in our lives. But if we need a good example, how about the actions performed by some stand-up comedians? Some of them act in very "stupid" ways in front of strangers in order to make them laugh. Are these comedians in a trance state when they do this? It is obvious, I think, that they are not. So, we can

conclude that people sometimes deliberately perform stupid actions in front of others and, thus, can doubt your friend's conclusion that the people she observed were in a trance state. This does not mean that your friend was wrong about her belief that hypnotized people are in a trance state, only that she needs more evidence to support the claim.

A skeptical attitude, therefore, requires that we assume that all knowledge claims are "tentative" (that is, it is uncertain that they are true, although we might accept them for now). In other words, skepticism involves a consistent open-mindedness to new ideas and new evidence. Nevertheless, being open-minded does not mean that one can never reach a firmly held conclusion. As Richard Dawkins (1998) has advised: "By all means let's be open-minded, but not so open-minded that our brains drop out" (p. 32). What he meant by this was that we should accept a particular claim to knowledge as being true if the evidence is overwhelmingly in favor of it. In other words, although all knowledge claims can be doubted, eventually so much evidence may be accumulated in favor of a particular claim that, for all practical purposes, we believe it to be true. For example, do you know of anyone who doubts that the Earth is round, or that it rotates on its axis once every 24 hours (approximately), or that it revolves around the sun once every 365 days (approximately)? If you met such an extreme skeptic, you might think that he/she was "crazy": there is so much evidence in favor of these knowledge claims that no reasonable person can question them any longer. Nevertheless, it is important to remember that, at one time, these claims could be doubted by reasonable people and, therefore, that adequate evidence first needed to be gathered. There is a related point to be made here: there are certain possibilities that we can rule out right away in a scientific investigation because, based on what we now know, it is very unlikely that they are true. For example, if we were completely open-minded, we might want to investigate the claim that hypnotized people are controlled by "pixies" who actually are responding to the hypnotist's suggestions. This is a possibility that we can reject immediately because nothing in our experience suggests that it is likely to be true. We can better spend our time investigating more likely possibilities. So, someone who quickly rejects your suggestions about what might be true might still be an open-minded person: it just may be that your suggestion was so far outside the boundaries of what seems possible that the other person will not waste time considering it. Of course, you still might be correct, but you first will need to show that your suggestion is possible.

A third tenet of the scientific method is **naturalism**, which is **the belief that all knowledge can be derived from the study of natural processes**. In other words, someone believing in naturalism would reject supernatural explanations for the phenomenon being studied. For example, in trying to explain hypnosis, someone believing in naturalism would reject the possibility that the "soul" of the person being hypnotized has temporarily left his/her body,

thereby leaving the hypnotist in control of the person's actions. The naturalist would reject this possibility because the concept of the soul, at present, is defined in supernatural terms. Instead, a "natural scientist" would try to find a natural explanation (perhaps involving changes in particular mental processes) for the behaviors and experiences of the hypnotized person. Why do scientists need to assume naturalism in their research? The most important reason is that supernatural events, by definition, are not of the natural world and, therefore, they cannot be observed directly by the scientist. If we allowed supernatural events into our claims for knowledge, then we would have to reject the tenet of empiricism that, as we saw above, is an essential component of the scientific method. The tenet of naturalism causes the most problems for individual scientists because many of them have spiritual beliefs that involve supernatural entities and processes. In this case, many scientists assume that these supernatural entities and processes do not typically have effects in the natural world (at least at the present time). In this manner, many scientists can assume naturalism in their research yet also hold supernatural beliefs concerning the fundamental order of the universe. (In fact, many scientists over the past several hundred years have believed that, if we can understand the natural workings of the natural world, we may gain some insight into the workings of a supernatural order that encompasses this natural world.)

SQ 1-2: Discuss the scientific method in as much detail as you can. In your answer, describe the three major attitudes that are necessary for a scientific researcher to have.

The scientific method has evolved from the seventeenth century to the present day through the everyday work of individual scientists. Over this time, scientists have kept what seemed to help them in understanding the workings of the universe and have thrown out what seemed to lead them astray. The major sciences of the seventeenth century were physics (the study of the properties of matter and energy), physiology (the study of bodily processes), and chemistry (the study of the composition and properties of chemical substances). From this small beginning, science has grown tremendously, especially during the nineteenth and twentieth centuries. Today, there are many more fields of science than there were at its beginning. The **behavioral sciences**—an area made up of psychology, sociology, anthropology, and related sciences—emerged between 1850 and 1900. In the behavioral sciences, we **study the activity of humans and other animals in order to better understand human behavior**. The ultimate goal of the science known as **psychology is the development of comprehensive explanations of changes in the behaviors, thoughts, and emotions of individuals**. Psychologists try to accomplish this goal by studying both human and nonhuman animals (for example, rats, sea slugs, fruit flies, pigeons); but, even when they study nonhuman animals, most psychologists want their results ultimately to say something about humans. In this chapter, I will introduce the general goals of

psychological research. In later chapters, I will become much more specific about how these general goals are accomplished.

SQ 1-3: Describe the ultimate goal of the behavioral sciences and discuss the place of psychology within the behavioral sciences (that is, describe its ultimate goal).

Goals of Psychological Research

In their everyday work, psychologists have two general research goals—the **description** and the **explanation** of the behaviors and mental events (thoughts and emotions) of individuals. In accomplishing the goal of **description**, psychologists attempt to **summarize their direct observations** of changes in the behaviors and mental events of individuals as well as anything in the situation that might help later to explain these changes. For example, in studying hypnosis, psychologists would want to describe the specific procedures used in hypnotic inductions, the typical behaviors exhibited by a hypnotized person, the thoughts and feelings typically experienced by a hypnotized person, and anything else that might be of importance in the hypnotic situation. If we are to make adequate observations of something, we must make precise measurements of it. For example, you would not want to describe the typical behaviors of a hypnotized person by saying simply that she looks like she is asleep or she looks like she is being controlled by the hypnotist. Instead, you would want to measure how tense or relaxed her muscles are, how active or inactive her brain is, and exactly what she says about her experiences during hypnosis. In order to get an adequate description of a phenomenon, researchers must devote a great amount of time and effort to making detailed and precise observations.

In accomplishing the goal of **explanation**, psychologists try to **discover the causes of changes in behaviors and mental events** by making inferences from their observations (an **inference** is a **conclusion based upon careful reasoning**). In trying to find the causes of changes in behaviors and mental events, scientists make use of various procedures (in Chapter 2, I will give an introduction to some of these procedures). These procedures help us to discover two major kinds of causes: **proximate causes** and **ultimate causes**. A **proximate cause** is one **that occurs immediately before its effects on the phenomenon being studied**. For example, the proximate cause of a dent in a car might be another car that backed into it; or the proximate cause of a fire might be a lit match that was thrown into a pile of paper. An **ultimate cause** is one **that occurs farther away in time from its effects on the phenomenon being studied**. An ultimate cause of a dent in a car might be the fact that one of the drivers had been fired from her job earlier in the day. This caused her to go to a bar and get drunk, which caused her to not look carefully when she backed out of her parking space at the bar. An ultimate

cause of a burning pile of paper might be that the person who set the fire was having financial difficulties. This caused him to take out a large insurance policy on the building in which he had his business and then go there one night in order to burn it down so that he could collect the insurance money. **The greater the number of intervening causes one can place between the phenomenon being studied and the particular cause you are investigating, the more ultimate (the less proximate) is the cause.**

It should be obvious to you that one can keep going backwards in time to find ever more ultimate causes. For example, the woman got fired from her job because she made a mistake that cost the company a great deal of money. She made this mistake because she had been suffering from insomnia. She was suffering from insomnia because she was worried about her mother's health. So, one could say that the cause of the dent in the car was the fact that one of the drivers had a mother who was ill! This probably would not be useful information for explaining how cars typically get dents, but other ultimate explanations (such as that speed limits are set too high in some locations) might have more generality. Some psychologists focus on ultimate causation in their research, others focus on proximate causation, and still others look at both. The type of causation on which a psychologist focuses depends upon the phenomenon being studied and his/her interests. Examples of some important proximate and ultimate causes studied by psychologists are presented in the following:

More Proximate Causes

brain activity
hormonal levels
environmental stimuli
physiological processes

More Ultimate Causes

social influences
cultural influences
evolutionary influences
genetic influences

Much of psychology traditionally has focused on causes that occur closely in time to their effects—that is, on proximate causation. Nevertheless, there have always been areas of psychology that have focused most on ultimate causation. For example, many clinical psychologists prefer to find causes of present behavior in the early childhood experiences of their clients. More recently, some areas of psychology that historically had focused on proximate causes have become more interested in ultimate causes of behaviors and mental events. For example, some psychologists who study learning have become very interested in how human evolution might help us to understand why humans learn some things very easily (such as our native language) whereas other things are more difficult for us to learn (such as, perhaps, this textbook material). When we are talking about

evolutionary influences, we sometimes are talking about events that occurred on other continents hundreds of thousands or even millions of years ago—a very ultimate cause indeed.

Let's look at proximate and ultimate causation with regard to our hypnosis example. In trying to find the proximate causes of hypnosis, we first need to ask the following question: what are the specific events that occur just before the phenomenon itself occurs? For example, we might focus on the behaviors of the hypnotist that we think may be inducing a trance state in others. In this case, we might focus on the tone of his voice or what he says or the movements of his body. We also could focus on what the hypnotic subjects are doing: perhaps it is the subjects themselves who actually cause hypnosis by doing something such as relaxing themselves, or thinking the same thought over and over, or imagining a particular scene. When we are concerned with the issue of ultimate causation, on the other hand, we usually are asking, "what are the more general reasons for the occurrence of the phenomenon?" Ultimate causes are the set of "background" causes for the phenomenon we are studying: they occur too far away in time to be an immediate cause of that phenomenon. In order to understand the important ultimate causes in our hypnosis example, we might focus on why some humans are very easily hypnotized whereas others are almost impossible to hypnotize. In this case, there may be differences between the two groups of people in their childhood experiences that make them different now in terms of hypnotizability. These differences in experiences would be ultimate causes of what is happening right now as the hypnotist is trying to hypnotize them. Or there may be cultural factors that serve as ultimate causes of hypnosis. For example, it may be that people from another culture in which hypnosis is not practiced could not become hypnotized. This might be because one has to have a set of cultural beliefs that tell you what you need to do when you are in a hypnotic situation. In fact, there is evidence (which we will talk about in another chapter) that suggests that people may be acting out the role of a hypnotic subject according to rules they have learned from their social surroundings. In this case, people would not be in a trance state at all. Instead, they would be "making believe" that they are hypnotized (perhaps even fooling themselves).

SQ 1-4: List and describe in detail the two major research goals of psychologists. Discuss proximate and ultimate causation and show how they are different from one another. Think of some of your own examples of proximate and ultimate causation.

I now would like to help you become more familiar with how psychologists accomplish their general research goals by looking at a particular example. My students often find the related topics of sleeping and dreaming to be very interesting. Thus, I will describe in some detail psychological research on sleeping and dreaming. I first will summarize the observations that make

up the basic **description** of normal sleeping and dreaming. I then will sketch out the **explanations** involving proximate and ultimate causes that have been offered in trying to understand these observations.

Descriptions of Sleeping and Dreaming

What happens to you when you go to sleep? What happens, for example, in your mind? Do you stop thinking; do you simply think less; or do you perhaps just think differently? Do thoughts and emotions in unconscious parts of your mind enter more easily into consciousness? Is sleep somewhat like entering another plane of existence; or perhaps even like death? And why do we spend so much of our lives (a little over a third of it, on average) sleeping? Does it help us to survive longer? Does it help our minds to run more smoothly? Does it help us to conserve energy, or perhaps to create new energy? Can we do with less sleep and still function adequately? Can we perhaps train ourselves to do without sleep at all?

There are many, many questions we can ask about sleep. I think that you probably have asked yourself at least some of these questions and probably different ones as well. How can we begin to answer them? Should we consult psychics or others who we think might have special insight into this subject? Should we look at what philosophers or other thinkers have to say about the matter? It may be that these people could be of some help to us in trying to answer our questions. Perhaps a psychic might tell us that dreams are messages from a spiritual plane of existence, and that we should pay attention to them since these messages come from entities trying to help us. Perhaps a philosopher might tell us that dreams are expressions of basic issues that derive from our unconscious minds—issues about life, death, and the meaning of our existence. These are extremely interesting claims about dreams. Nevertheless, you might wonder how to be certain that these people know what they are talking about. That is, if we are to be good skeptics, we need to ask the following question: what evidence do these people have for their claims about sleep and its purposes? Did they perhaps learn their claims from other authorities? Did they test their claims directly? In fact, some people say that they have obtained their information from supernatural sources. Should we trust such evidence? What I am asking you to do is answer the following question: what would be the best evidence for showing the truth or falsity of claims about sleep and dreams? The discussion presented earlier in this chapter indicated the sort of evidence preferred by scientific researchers. First, they are empirical in their approach. Therefore, they would want to observe people while they slept and ask them about their dreams when they woke up. Second, they are skeptical. A person with a skeptical attitude believes that we should

always closely examine the evidence supporting any claim to knowledge and that answers to a research questions are rarely final: new evidence may show that an answer was wrong. Therefore, our claims about sleep must have sufficient evidence to support them. Finally, a scientific researcher is a naturalist. Therefore, our claims about sleep must suppose that sleep is the result of natural processes. Because of this last attitude, we would reject descriptions and explanations based in supernatural concepts and principles. For example, we would not even consider the possibility that our souls leave our bodies and travel around to different places when we dream. If such a thing does happen, we are not able to study it scientifically. A person making such a claim could do so based only upon faith and not upon rational, scientific thinking.

But, even accepting the scientific approach as our starting point, a major problem arises. What exactly should psychologists observe in order to find out something important about sleep? Should they observe bodily movements during the night; changes in blood pressure and digestion; changes in heart rate; changes in brain activity; changes in what goes on in the mind of the sleeping person; or something else? Because there are so many phenomena one could observe, it is difficult to know where to start. It turns out that **what we choose to observe depends upon what we think might be the important proximate or ultimate causes of the phenomenon we are studying**. For example, if you want to understand why your car isn't working, what observations are you going to make? It depends upon what you believe to be the proximate cause(s) of the normal functioning of the car. If you think that a car runs because of invisible elves living in the glove compartment who, when you turn the key, travel into the engine and make the parts move, then you'll probably make detailed observations of the glove compartment to see if you can detect them. We know, however, that the normal functioning of a car is caused most importantly by the combustion of fuel in your engine (it still might be that invisible elves do live in your glove compartment, but we don't have to try to observe them to get the car running again). Therefore, you will make careful observations of the activity of different engine parts with regard to these combusive events.

In the case of sleep and dreams, observations have been made of the following: (a) the electrical activity of the brain at different points during sleep; (b) the movements of people while they are sleeping; and (c) the experiences had by people while they were asleep. The reasons for observing people while they are asleep and asking them what they have experienced during sleep are probably obvious to you—such observations are essential if we are going to understand anything about sleep. The reasons for observing the electrical activity of the brain may not be as obvious, so I will explain this in the next section. After deciding on what to observe and making the observations, a second problem arises—how should these observations be explained? The

explanation of a set of observations is typically an even more difficult problem for the scientist than observing and describing the phenomenon itself. As for sleep, we will see that several different kinds of explanation have been developed depending upon what the researcher was trying to understand about sleep.

Changes in Brain Activity During Sleep

In order to describe the changes that occur during sleep, two researchers—Eugene Aserinsky and Nathaniel Kleitman—began, during the early 1950s, to look at fluctuations of electrical activity in the brain. Why did they make observations of brain activity? I am sure you already realize that, in some way, electrical activity in your brain is involved in your behavior and in the way your mind works. For example, if a part of your brain is damaged, you might have difficulty with moving or talking because the normal activity of the brain would be disrupted by the damage. If you drink alcohol, the activity in your brain is affected in such a way that your emotions may become extreme, your thinking may become less efficient, or your movements may become slowed and disorganized. Virtually all psychologists assume that electrical activity in our brains *causes* our behaviors, thoughts, and emotions (an assumption that I will discuss in detail in Chapter 2). Assuming that this belief is correct, we can infer that there must have been changes in the activity of a person's brain if we observe changes in that person's behaviors and mental events. Before the 1950s, scientists interested in sleep realized that brain activity must be changing during sleep since there were obvious changes in behavior and mental events; and a few had even measured some of these changes. However, until Aserinsky and Kleitman came along, they hadn't understood all of the changes occurring during sleep, nor did they know how interesting these changes would be once they were described completely.

What do you think might happen to the brain's activity during sleep? Well, since thinking seems to slow down and become more illogical during sleep, it might be that the brain is becoming less active as we fall more deeply asleep. Have we now proved that the brain is becoming less active as we sleep? No, of course not. As I hope you remember, the scientific method requires an empirical attitude—we must *observe* whether or not this prediction is true by observing brain activity during sleep. With our reasoning about what might be occurring in the brain, we have developed a plausible **prediction about the relationship between two events**. In this case, you have predicted that activity in the brain decreases during sleep ("brain activity" is one event and "sleep" is the other event that we predict will be related) and doesn't increase again until we wake up in the morning. Before beginning their research on sleep, Aserinsky and Kleitman already believed this prediction to be true and, thus, they did not think that studying changes in brain activity during sleep would be very interesting. What they noticed, however, was that, several

times during the night, the eyes of sleeping subjects moved about very rapidly, and that this movement was associated with increased brain activity. They had not expected this finding and, so, they began a research program to develop a better understanding of what was happening in these very active sleep periods.

To measure brain activity, Aserinsky and Kleitman used a device called an **electroencephalograph** (abbreviated as **EEG**), a machine that **measures changes in the electrical activity of the brain**. In general, the greater the electrical activity, the harder your brain is working. Right now, for example, you are working relatively hard in trying to figure out the meaning of this sentence. If you were hooked up to an EEG machine, you would show a high level of electrical activity in your brain. If you were in a coma, on the other hand (a person in a coma responds very little, if at all, to external stimulation), you would show a low level of electrical activity in your brain. The electrical activity is traced onto a piece of paper in the form of waves—in fact, we often refer to these tracings as “brain waves.” There are four major kinds of brain wave associated with changes in your mental state as you go from being wide awake to deeply asleep (see Figure 1.1). (1) **Beta** waves show that your mind is actively awake (that is, you are exerting mental effort by attending to things) and, thus, you are aware of what is happening around you. (2) **Alpha** waves show that your mind is awake but relaxed (that is, you are not trying to pay attention to anything in particular). (3) **Theta** waves show that you have just fallen into a light sleep from which you can be awakened easily. (4) **Delta** waves show that you are deeply asleep and, therefore, cannot easily be awakened. By looking for waves such as these, Kleitman and his colleagues were able to distinguish several different subdivisions of sleep, a topic that I will discuss after we have looked at an important issue concerning the nature of psychological data—the issue of the difference between group averages and variances.

SQ 1-5: Describe briefly how the brain affects our behaviors, thoughts, and emotions. List the initial prediction that Aserinsky and Kleitman made about brain activity during sleep and discuss how their observations showed this prediction to be incorrect. Explain what the EEG is and describe the state of consciousness a person is in when he/she is exhibiting beta, alpha, theta, and delta waves.

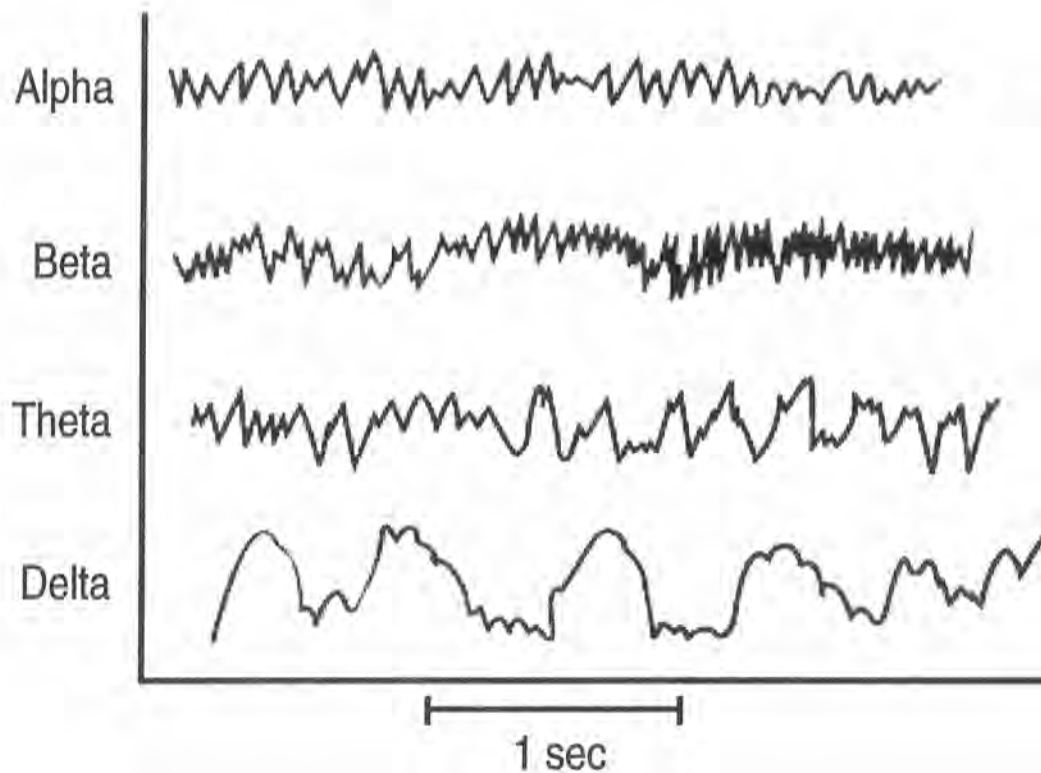


Figure 1.1 Major types of electrical activity as recorded by the EEG (from Tortora & Grabowski, 1996; p. 414)

Group Averages and Variances

As I describe the subdivisions of sleep in the next section, you may not feel that I am describing very well how you sleep from one night to the next. You need to be aware, however, that there is a distinction between what is true for a group of people, *on average*, and what is true for an individual *in particular*. Throughout this book, I often will say things such as, “there was a *tendency* for people with this trait to...” or, “*on average*, men will...” People (including some psychologists, I am sorry to say) often misunderstand what the italicized words mean. Let me illustrate the problem for you by taking an example from the classroom. Often, when I am handing back tests, someone will ask me, “how did we do on the test”? My answer almost always is, “that depends on who you are.” The student is asking me about the average performance of the group of students who took the test whereas I am referring to the specific performance of each individual included in this group of students. I might have answered the student’s question by saying, “on average, people in here got a 65%”; or, “there was a tendency for people in here to score in the low-C range.” These answers, however, probably are not what students want when they ask the question. Instead, each person in the class wants to know the answer to a different question: “How

did I do on the test”? But, because they don’t want me to announce their specific grades to the rest of the class, most people will ask about the class average instead. The grade of each individual typically will vary from this average to some extent, with all of the individual grades scattered at various points around the average. This shows the difference between a “group average,” on the one hand, and “variance,” on the other. **A group average is the summation of individual measurements divided by the number of measurements.** For example, we might have the following 10 test scores on the first test (out of 50 points): 35, 26, 45, 48, 23, 18, 39, 44, 33, and 49. If I add these 10 scores together, I get 360. If I divide 360 by the number of individual scores (10), I get 36. The average score on the first test, then, would be a 36, which means that the average person in the class was correct on 72% of his/her answers. Based on this average score, I would conclude that introductory-psychology students in my classes get, *on average*, a 72% on the first test. Another way to say this is that introductory-psychology students in my classes have a *tendency* to get 72% on the first test. This is useful information for someone who wants to compare, say, this average score with the average scores of other instructors. But it will not tell the person what he/she, in particular, will get on my first test.

Now, what about the “variance” of the test? After each test, I always post the scores obtained by each student in the class. Students will often spend a long time looking carefully at this distribution because they want to know how they did in relation to everyone else in the class. They are concerned here with **variance**, a term which refers to **the amount of difference among individuals (the “spread” of measurements) in a group.** In the present example, one measure of variance is to look at the lowest (18) and highest (49) scores. There are other measures of variance that you will learn if you take a statistics class in the future. The most important point for us to remember for the purposes of this course is that a measure of variance is not the same thing as a measure of group average. In other words, **knowing a group average tells us nothing about the performance of a particular individual from that group or how much the performance of that individual differs from those of others.** In this course, we almost always will be talking about group averages. Because of this, you must keep in mind that many individual members of a group may not have scored anywhere near the average for that group. For example, although the average height for American men is about 5’ 9”, many men are much smaller or taller than this average. Knowing that American men, on average, tend to be 5’ 9” does not tell you how tall the next man you see will be. This is why you should always be wary of people who say things such as, “men have trouble expressing their feelings whereas women express their feelings very easily.” Do you see what the problem is here? The person saying this is taking what might (or might not) be true *on average* and extending it to all males and all females. What this person is doing is similar to saying that all men are taller than all women because their

average heights differ; or that you will get a C on the first test because this was the average grade for my previous students. A psychologist who speaks in this way should not be trusted (even if you see him/her on television).

SQ 1-6: Explain the distinction between averages and variances. Why did I say that you are able to conclude nothing about an individual based on an average?

As one last example of the difference between group averages and variance, let's try to answer the following question: how much sleep do you need each night? Well, on average, American adults (young to middle-aged) get about 7-8 hours of sleep per night. So, if I were appearing on a talk show, I might answer with confidence: "Each of you needs about 7.5 hours of sleep per night." What is the problem with this answer? The problem is that we are confusing the amount of sleep people get, on average, with the amount each individual needs to get: the group average gives no indication of the amount of sleep each person needs. Moorcroft (1993) answered in this way the question of how much sleep is needed by each person:

"Sleep as much as necessary so you do not feel tired the next day,".... This is probably not the kind of answer you expected, but it is the best answer. While 7 1/2 hours per night is the average amount of sleep required for young adults, there are wide individual differences.... Some people do well with 6 hours or less per night, while others cannot live comfortably with less than 10 or 11 hours of sleep (Webb, 1975). Only you can determine how much sleep you require, since only you know when you feel good the next day. (p. 94)

So, go to sleep at a certain time each night for a few nights in a row and see what time you wake up on your own in the morning. This is how much time you need for sleeping. For most of you, this will be between six and nine hours, but some of you will lie outside of this range (see Figure 1.2). The least amount of sleep needed by a person was reported for an elderly woman: she required only one hour of sleep each night. Another person needed only three hours per night. But almost all of us need much more than this. If you need more than the average amount of sleep per night, try to arrange your daily schedule so that you can get this much sleep. As we will see later in this chapter, sleep seems to involve a very complex set of biological processes that undoubtedly has some very important functions. Some have even argued that, if you do not get enough sleep over long periods of time, there eventually may be a price to pay in terms of your health (see Coren, 1996, for this research).

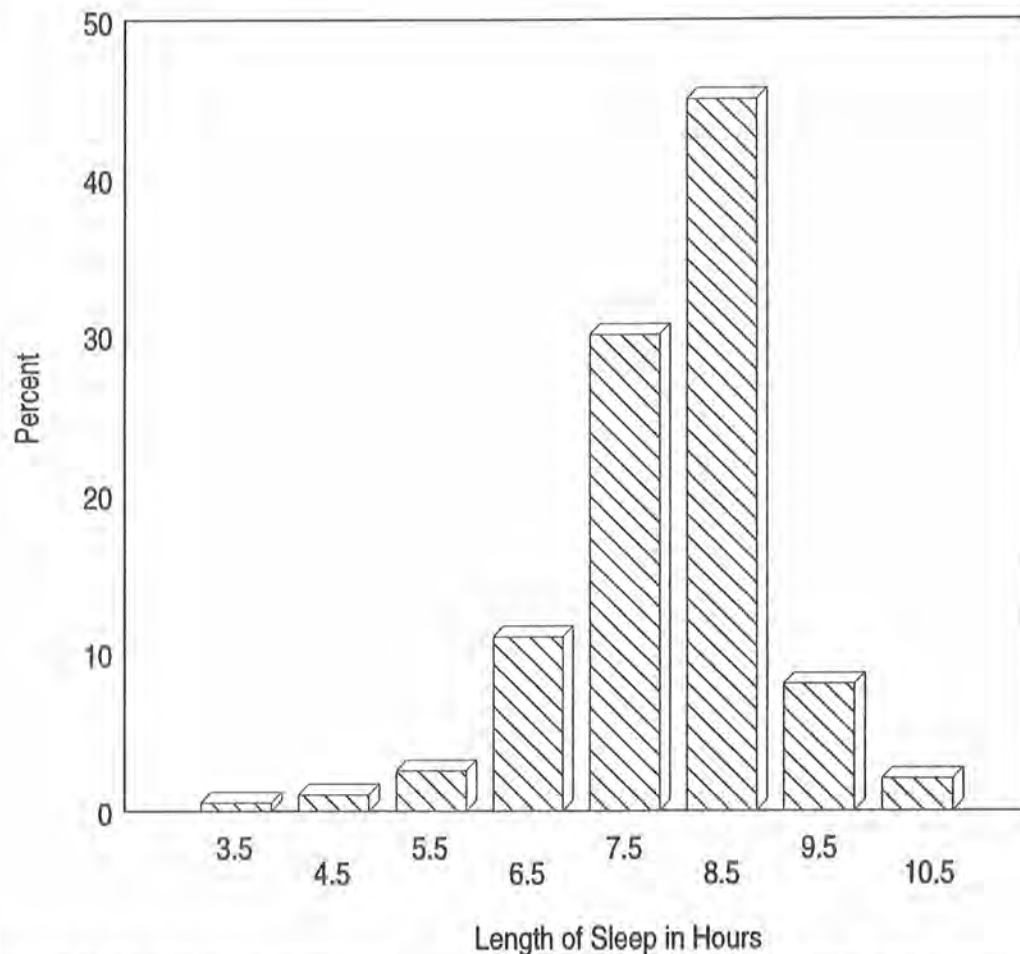


Figure 1.2 Distribution of the number of hours typically spent sleeping for adults (from Moorcroft, 1993; p. 96)

In the next section, I will describe the main characteristics of several subdivisions of sleep. Keep in mind that what I am describing is true for the average young adult (people aged 20 to 40 years). You might find that you do not fit this average very well. Just as with height, we expect that you will deviate to some extent from these averages (in psychology, a **deviation** is simply a **difference from some average**). If you do deviate, this does not mean that you are abnormal in the sense that something is wrong with you. The very difficult issue of what constitutes a mental disorder will be dealt with in Chapter 7. If you become concerned about a problem you are experiencing with sleep, you always should first talk with a professional before becoming too distressed over it.

Stages of Sleep

In humans beyond the age of 5-6 months, there are five subdivisions, or **stages**, of sleep. When we first fall to sleep, we are in stage 1. From there, we progress through stages 2, 3, and 4,

and then, finally, enter a stage known as REM sleep. Each stage has two major characteristics: (a) **a particular pattern of electrical activity in the brain**, and (b) **a particular cluster of mental and behavioral events**. As we will see later, we experience each of these five stages several times during the night; and the lengths of some of them change as the night progresses. Just before you fall to sleep, your mind is relaxed and your thoughts drift but your muscles still show a great deal of tension. Your EEG would show predominantly alpha waves at this time. This waking period just before sleep-onset is referred to as Stage 0 (zero is used because this period of relaxed wakefulness is not considered one of the five stages of sleep). You probably will spend about ten minutes or so in this stage before drifting into sleep. The point at which you first fall to sleep can be measured by sounding a soft tone and having you press a button each time the tone occurs. People who show brain activity suggesting that they are sleeping usually will stop pressing the button. Therefore, when you stop pressing the button, we can conclude that you probably are asleep. You may go back and forth between stage 0 and this stage of light sleep a few times before you stay asleep for good.

Stage 1—Light Sleep. At the onset of sleep, a person shows brain activity made up predominantly of theta waves. During this stage of sleep, the person can be awakened easily by quietly saying his/her name. Stage-1 sleep lasts about five minutes. A person in this stage often does not know that he/she is sleeping and, instead, may claim that he/she was just about to “fall to sleep.” In fact, if awakened from stage-1 sleep, people often deny that they were just sleeping even though they were heard to be snoring or breathing deeply. In fact, you probably have had experiences where you thought that you might have been sleeping but were not sure: you probably had just been in Stage-1 sleep. Such subjective experiences suggest that a good way to think of stage-1 sleep is as a transition between a waking state and a sleeping state. People often feel as if they are awake during this stage, but they also experience floating sensations and, sometimes, hallucinatory sounds or visual images. These are referred to as **hypnagogic** phenomena—a term that refers to **experiences that a person has as he/she is going from a waking to a sleeping state**. (I remember the term by associating the “GO” in “hypnaGOgic” with the phrase “GOing to sleep.”) In fact, some have used the occurrence of hypnagogic and other sleep-related hallucinations to explain reports of ghosts and alien abductions.

A common hypnagogic experience is a sinking feeling in the stomach (as if one were falling) coupled with jerking awake. Just before and during the muscle contractions, the person often experiences a vivid visual image. People are more likely to have such experiences when they are under stress or when they have changed their sleep schedules, but they can happen at other times as well. It is not known why people have such experiences, but one possibility is that the

person begins to dream and is responding to an image in the dream by moving his/her body. Some people believe that if you experience a falling feeling and dream that you hit bottom before waking up, that you will die. Of course, a skeptical empiricist would criticize this belief by pointing to the difficulty of evaluating the claim: if it is true, then everyone who has hit the bottom is now dead and could not tell us what happened. When people are awakened from stage-1 sleep, some studies have shown that a little over half report that they were just dreaming. Whether or not this is true is a matter of some controversy. Some researchers believe that most (perhaps all) of our dreams occur in a different stage of sleep known as rapid-eye-movement (REM) sleep. These researchers claim that, when we are very careful about how we define dreaming, most people awakened from stage 1 report that they had simply been experiencing images and thoughts during this stage—that they were not really having a dream in which a “story” was unfolding. Nevertheless, it is undoubtedly true that some people awakened from stage 1 have just been dreaming. In fact, some researchers believe that complex dreams occur in all stages of sleep. Later in this chapter, I will discuss this controversy in a little more detail.

Stage 2—Moderately Light Sleep. This stage of sleep is characterized by the first appearance of two types of brain activity that have not yet been mentioned—sleep spindles and K-complexes. A **sleep-spindle** is a rapid but short burst of electrical activity; a **K-complex** is a large fluctuation in voltage that has a high peak and a deep valley (see Figure 1.3). Although some people awakened during stage-2 sleep still are not aware that they have just been sleeping, it is a little harder to awaken a person in this stage than in the previous stage of sleep. Stage-2 sleep generally lasts between 10 and 25 minutes.

Stage 3—Transitional Sleep. This stage of sleep is characterized by an increasing frequency of delta waves—waves that indicate a mental state in which the body is becoming deeply relaxed, the brain is becoming relatively inactive, and the person is becoming very difficult to awaken. Delta waves have a very low frequency (about one cycle every two seconds) and, hence, are sometimes referred to as **slow waves**. Delta waves first appear during stage-2 sleep. Not until they make up about 20% of the electrical activity in the EEG, however, do we say that the person has entered stage 3. This stage lasts about five minutes early in the night but typically disappears during the second half of the night.

Stage 4—Deep Sleep. Beginning with the onset of stage-3 sleep, the proportion of delta waves gradually rises until they become the predominant wave (that is, they occur more than 50% of the time). When this happens, the person is said to be in stage-4 sleep. **Stages 3 and 4 together** are referred to as **slow-wave sleep** because they both are characterized by delta

waves. As I stated above, we experience several episodes of each of the sleep stages several times during the night. The first episode of stage-4 sleep generally lasts about 20 to 40 minutes. As the night progresses, the duration of each episode of stage-4 sleep decreases. By the second half of the night, slow-wave sleep usually has disappeared.

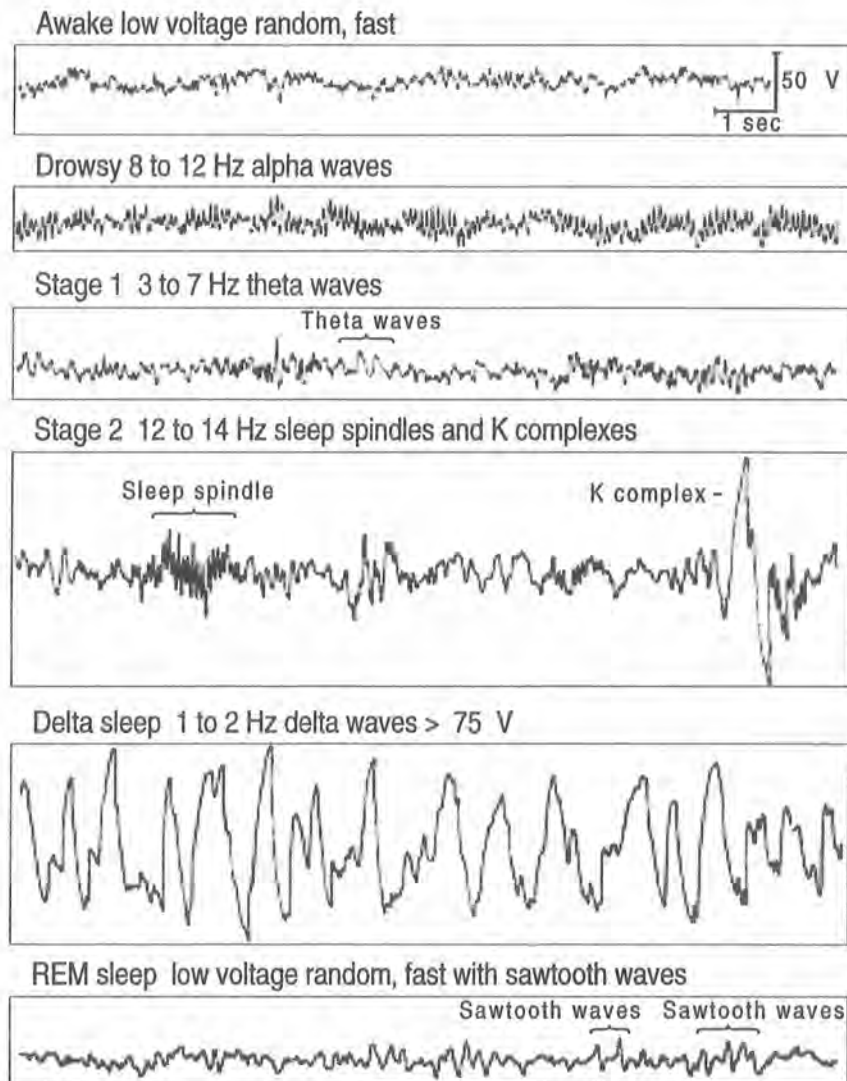


Figure 1.3 Electrical activity as recorded by the EEG within the major stages of sleep (from Groves & Rebec, 1992; p. 428)

During slow-wave sleep (especially during stage 4), a person may experience “sleepwalking” or “sleep terrors.” Sleepwalking, also called **somnambulism**, is a phenomenon in which **a person makes complex movements during sleep**—movements that are more complicated than the typical movements (such as turning over) made during normal sleep. For

example, when a friend of mine slept over at my house when I was a teenager, he sat up during the night, looked at me and began moving his hand in the way that Bela Lugosi sometimes did in old movies when he was trying to hypnotize someone. As another example, a student in one of my classes told me that her boyfriend sometimes got up during the night and made himself a breakfast of “pancakes” (consisting of dinner plates) and “syrup” (consisting of peanut butter which he spread on the plates). Somnambulism is seen commonly in children but only rarely in adults. The popular belief that it is dangerous to awaken a **somnambulist** (a “sleepwalker”) is false. In fact, it is much more dangerous *not* to awaken the person: he/she has little awareness of the physical surroundings and, thus, may get hurt. There are very rare occurrences in which a person may commit violent acts (including killing others) while sleepwalking. In this case, it might be dangerous to others *not* to awaken the sleepwalker (preferably from a safe distance). A **sleep (or night) terror** is an abrupt awakening from slow-wave sleep in which a person feels and looks terrified but often seems confused about the reason for this emotion. The person may quickly go back to sleep and may be unaware of the event if asked about it the next morning. It seems that neither people who are sleepwalking nor people who are exhibiting sleep terrors typically are dreaming during the episode, although they may report that they experienced an image or a sound.

REM Sleep. At the end of stage-4 sleep, there is a relatively rapid rise through stages 3 and 2 (which takes about 5-10 minutes) into a fifth stage of sleep called **rapid-eye-movement (REM)** sleep. This is the stage of sleep in which Aserinsky and Kleitman noticed that the eyes of their subjects were moving back and forth very rapidly under the closed eyelids (these movements gave the stage its name). You can observe this stage yourself by watching a sleeping person’s eye movements about 60 minutes after they first go to sleep. When you see that person’s eyes fluttering around in short bursts, the person is in the REM stage. The first episode of REM sleep lasts only about 1-5 minutes, but, by the end of the night, a person often is spending as much as 30-40 minutes in this stage. When we look at brain activity, we often see electrical activity somewhat similar to beta or theta waves and, therefore, we might think that the person is either awake or in a light sleep. Nevertheless, the person is not awake and, in fact, it can be very difficult to awaken him/her (although the sleep during REM is not as deep as it is during stage 4). For example, if a noise occurs, such as the buzzing of an alarm clock, the person may remain asleep and incorporate the noise into a dream (perhaps the person dreams of a fire truck with its siren sounding).

Several interesting changes occur during REM sleep. (1) Physiological processes of the body (for example, blood pressure and heart rate) begin to look more like those of a person who is awake. (2) Muscle tone decreases dramatically so that the person, in essence, becomes paralyzed.

(3) Genital arousal often occurs (that is, erections occur in males and labial swelling occurs in females). (4) Dreaming often occurs. With regard to dreaming, when people are awakened during REM sleep, about 85% of them report that they were just dreaming. During stages 1-4 (referred to collectively as **non-REM** or **NREM**), many studies since the 1950s have reported that fewer dreams occur. In fact, some early research suggested that, for all intents and purposes, almost the only dreams that we have occur during REM sleep. However, as I said above, other researchers in recent years have disagreed with this conclusion. Let's look at dreaming in a little more detail, and especially at the controversy about the stages in which dreaming most often occurs.

SQ 1-7: Describe the five stages of sleep in terms of the brain activity that is characteristic of each. In addition, discuss the psychological/behavioral phenomena associated with stages 1 through 4 and with REM sleep. (Note: this should be a long answer.)

The Characteristics of Dreaming

The mental activity that occurs during sleep does not always involve dreaming. Instead, at least some of this mental activity probably is similar to what we experience during the day when we are letting our minds wander: we experience relatively isolated thoughts and images that “drift by” in an unorganized manner. On the other hand, a **dream** consists of **sequences of complex hallucinatory experiences occurring during sleep that (a) are accepted by the person as actual occurrences, and (b) change during a single episode**. In other words, a dream is a progressing story made up of imagined sights and sounds that, at the time, are believed by the person to be really happening. We know for certain that a great deal of dreaming occurs in humans during REM sleep, and that almost all mammals and many species of bird go into a stage that looks like REM sleep. Does this mean that all these animals are dreaming? You may have noticed that dogs sometimes make barking noises and paw movements during sleep. When this has happened, I'll bet you have said at least once, “he's dreaming about hunting!” Why have you concluded this? Perhaps it is because you know that you talk and move in your dreams and, if you see your dog moving and barking during sleep, you infer from your own experience that your dog is dreaming, too. But, perhaps your inference is incorrect. Think about what a skeptic might suggest about it. He or she might say that there is no good reason to infer that a dog is having dream-like images based simply on the fact that its paws are twitching and it is making noises. Instead, it could be that these movements and noises are some sort of reflex-like actions caused by the activation of certain areas in the brain during sleep. In addition, somnambulists (sleepwalkers) often report that they were not dreaming while they were engaged in their complex activities. The only way we could know for certain that an animal is dreaming would be to ask it. Of course, we cannot do this with a dog because it could not answer our questions. On the other

hand, some apes have been taught to use forms of sign language to communicate with humans. One gorilla used the phrase, “sleep pictures,” apparently in reference to the visual images that it had seen during its dreams. In addition, if we take out the structure in the brain of a cat that paralyzes its body during REM sleep, the cat will move about in its cage during REM sleep, apparently stalking and attacking objects (perhaps it is dreaming of hunting prey) that are not there. Such examples suggest that at least some other mammals dream.

Some researchers have concluded that most dreams are not very exciting—that they tend to be about “everyday” kinds of situations. For example, since you are a student, you might have a very uneventful dream in which you go to a class and listen to a teacher talk. On the other hand, it might be that the conclusions of these scientific studies are wrong. Dream reports typically are collected by having people come into a laboratory, hooking them up to machines that measure various physiological processes (such as brain activity), and then awakening them at various times to report their dreams. How might such a procedure affect dream reports? Again, think about this for a minute. One thing that might be happening is that people are reluctant to describe their dreams completely if these contain anything embarrassing (for example, they might leave that part out of their dream reports). Also, they are in a strange environment being watched by a stranger (a researcher) in the next room. This strange situation might affect what a person dreams about. In fact, people sleeping in laboratories are more likely to have dreams in which another person is harming them (for example, females tend to have more dreams of being raped) or using them in some way (for example, males tend to have more dreams of someone exploiting them). Even the laboratory itself appears frequently in the dreams of people being studied in a laboratory. This finding leads to an important point: **in trying to be empirical—in attempting to observe directly the phenomenon in which we are interested—it is possible that we may change the phenomenon.** This is a potential problem in almost every study done in psychology because people and other “higher” animals are often aware that they are being observed. As researchers, we must always try to determine if our observations are having an effect on the phenomenon we are attempting to investigate. In the present case, studies have been done which show that, in several important respects, dream reports gathered privately at home are not very different from those gathered in the laboratory. This suggests that the dreams occurring in laboratories are similar to the dreams occurring at home under normal circumstances. On the other hand, the studies performed in people’s homes used special procedures that were different from those typically used in sleep laboratories. So, the question is still an open one: it may be that the dream studies performed in laboratories are flawed because of the way in which subjects are observed. As far as I know, no one has coined a term for this problem, so we will call it the **observation effect**, which we will define as **changes that occur in the phenomenon**

being studied because subjects know that they are being observed. If such an effect is occurring, then our observations may not be telling us much about what happens out there in the “real world.”

There tend to be similarities in what people dream about from one night to the next, for at least short periods of time (say, over two weeks). At least one reason for this is the fact that our dreams often reflect the concerns and experiences we have during our day; and that, to the extent that these issues are “on our minds” for some period of time, we will tend to dream about them night after night. Sigmund Freud referred to **the everyday concerns and experiences that make up our dreams** as the **day residue**. For example, people who experience an emotionally intense event during their waking lives are likely to dream about things related to this event and to experience emotions during the dream that are consistent with the event. For instance, someone who has just experienced a divorce or the death of a family member may dream about losing something important (such as a diamond ring) and wake up feeling very sad. This idea suggests that dreams can be meaningful: to some extent, they seem to be about things that are important in our lives. On the other hand, it is not known for certain if we can gain a deep insight into our personalities by analyzing our dreams. Freud believed that dreams were useful for this purpose but, as we will see later in this chapter and in Chapter 6, Freud’s ideas about personality have been severely criticized during the last several decades.

As I have already stated, dreams seem to occur during NREM sleep. In fact, studies by several different groups of researchers have shown that dreaming may occur as much as 50% of the time during the four NREM stages. This is less than the 85% dreaming that occurs during REM sleep but it is still quite frequent. This claim may surprise you, especially if you have read or heard other discussions stating that dreams occur almost exclusively during REM sleep. In fact, many of the sleep researchers who got their start during the 1950s and 1960s still claim that dreaming occurs almost solely during REM sleep. For example, William Dement (1999), who took over the research on REM sleep from Eugene Aserinsky in the mid-1950s, has argued that very few dreams occur during NREM. As evidence for this claim, he related the following “anecdote” (an anecdote is a short account of a particular incident): “In my early days with Nathaniel Kleitman [the person who headed the laboratory in which Dement was a student], I often served as a research subject.... [I]n at least 100 awakenings from non-REM sleep, I never recalled dreaming” (p. 293). He also offered another anecdote as evidence. In 1954, he quickly trained another medical student to identify REM tracings on an EEG. Dement then served as the subject so that he could show this other student the connection between REM sleep and dreaming. The student awakened Dement five times throughout the night, but Dement was completely unable to recall any dreams. By the fifth

awakening, “I was so embarrassed and upset, I lied. I haltingly produced a phony dream fragment” (p. 293). It turned out, however, that the other student mistakenly had awakened Dement during periods of NREM, not REM sleep. Dement concluded the following from this anecdote: “If anyone wants to claim that ... bias plays a role in the REM sleep-dreaming relationship, I could not have been more biased toward recalling a dream, and I was utterly unable to dredge up even a wisp of one” (p. 294). As I will try to show at various places throughout this book, anecdotes are not good evidence for or against a claim because there usually are many ways to explain them (for example, perhaps Dement never dreams during NREM, but most other people do). In Chapter 2, I will discuss in some detail the need to perform “controlled” research—research in which we try to rule out various explanations of a phenomenon. When such research has been performed on dreaming, it has been found that dreaming occurs during NREM rather frequently and that NREM dreams do not differ from REM dreams. At this point, therefore, it seems that we no longer can equate dreaming with REM sleep. Instead, it is likely that we can dream at anytime throughout the night, although dreams probably occur most frequently during REM sleep.

David Foulkes (1999), another long-time researcher of sleep and dreams, has argued convincingly that no differences exist between REM and NREM dreams. Although the brain structures that cause dreams are presently unknown, Foulkes has stated that they must be having effects during both REM and NREM stages. He believes that dreams are simply the workings of consciousness when the brain has become activated during sleep. In this vein, Foulkes has stated that the “evidence suggests that dreaming is the form assumed by consciousness whenever there is residual ... [mind/brain] activation in the relative absence of direction either from the person’s environment or from voluntary self-control” (p. 2). In other words, Foulkes believes that we will dream whenever three conditions occur: (1) our brains become somewhat activated; (2) we are relatively unaware of the world outside of our bodies; and (3) we are unable to control the direction of our thoughts. All three of these conditions occur during sleep, whether it involves NREM or REM brain activity. Thus, according to Foulkes and several other groups of researchers, dreaming can occur at anytime during sleep, although it is most common during REM sleep (perhaps because of the greater levels of brain activity that occur). Nevertheless, there are those who disagree with this conclusion. As you will see in this book, such controversies are common in science. One reason we have such disagreements (I will talk about other reasons later in this book) is that it is very difficult to know anything with complete certainty when complex events are being investigated. For example, you have probably had car trouble in which your mechanic could not figure out with certainty what the problem was. This can happen even when the mechanic is a very good one because modern-day cars are very complex machines. Scientists also study very complex phenomena that are difficult to describe and explain with much certainty. This is not a failing of

science; it is simply a reflection of the complexity of the subject matter. I will come back to this theme often during this book.

SQ 1-8: Describe the evidence for the claim that at least some mammals other than humans dream. Criticize this evidence. Why might the studies of dreams collected in sleep laboratories have little relevance for the dreams that people have at home? Discuss the controversy concerning dreaming during REM and NREM stages. In your answer, describe a possible difference between REM and NREM dreams.

The Cycling of Sleep Stages During the Night

As I stated earlier, we normally begin our night's sleep in stage 1 and then progress through stages 2, 3, and 4. At the end of stage 4, we return quickly through stages 3 and 2 and enter REM sleep (see Figure 1.4). After a short time spent in REM, we go back through the NREM stages. During the night, we cycle through REM and the separate stages of NREM several times. Each cycle of sleep (beginning in stage 1, going down to slow-wave sleep, up into REM, and then back to stage 1) takes about 90 minutes, on average, although this varies somewhat during the night (the first cycle tends to be only about 60-75 minutes long). Because most adults sleep about seven to nine hours at a time, we go through about five or six of these sleep cycles during a single sleep period. As the night progresses, however, **two major changes occur in the cycle. (1) The duration of slow-wave sleep (stages 3 and 4) diminishes in each successive cycle** until these stages eventually disappear by the second half of the night. **(2) The duration of REM sleep in each successive cycle increases**, from about five minutes during the first REM period to about 40 minutes during the last REM period just before waking up.

The timing of the five stages as well as the characteristics of each stage differ among different people, and even over different nights for the same person. Some examples of such variation follow: (1) People who are severely depressed are likely to quickly enter REM after first falling to sleep. This is called **sleep-onset REM** and is defined as **entering REM after spending 20 minutes or less in stages 1-4**. Some people even enter REM as they fall asleep, thereby skipping stages 1-4 altogether, especially if they have been deprived of sleep for some time. (2) People who are taking sleeping pills or who have consumed too much alcohol show less REM sleep than others. In fact, if alcohol is abused over a long period of time, there may be such a severe reduction in REM sleep that the person feels fatigued and irritable much of the time. (3) Some people may show a lack of muscle paralysis during REM sleep probably because the area of the brain that paralyzes the muscles is not functioning normally. When observed during REM

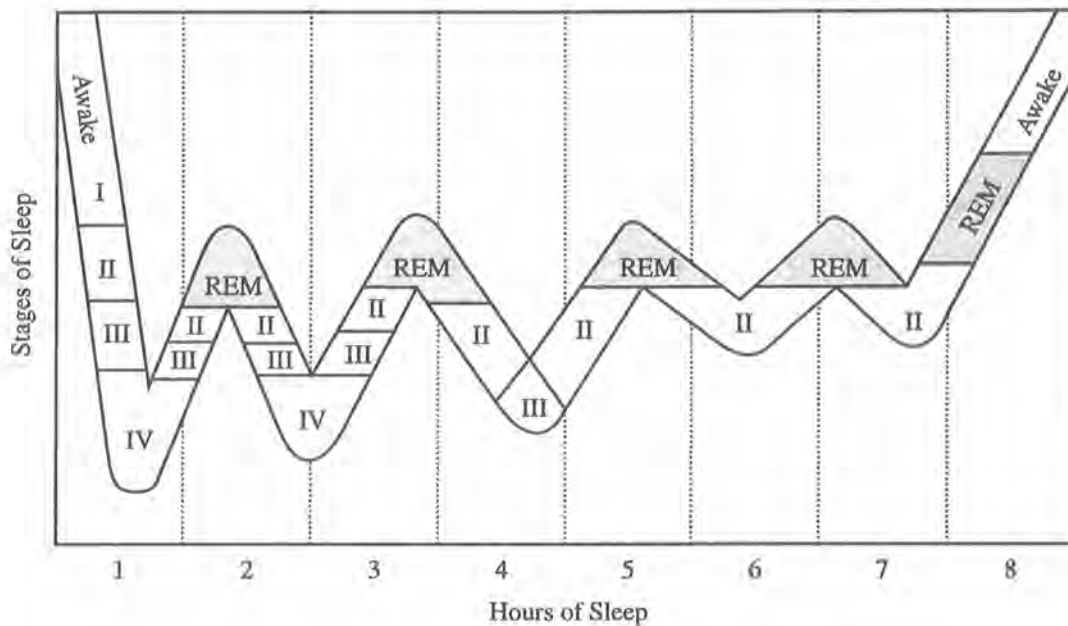


Figure 1.4 The cycling of the sleep stages through an eight-hour night for a young adult. Stages 3 and 4 are most frequent in the first half of the night whereas REM sleep is most frequent in the second half of the night (from Fernald, 1997; p. 166)

sleep, these people often get up and begin performing many complex behaviors, as if they were acting out their dreams. Anch, Browman, Mitler, & Walsh (1988) described such a case:

A 54-year-old businessman and church leader has been complaining of mild dizziness and headaches for 7 days. At 3:30 a.m., his wife is awakened from a sound sleep by his mumbling long tirades of horrid profanities. The man then sits up in bed with his eyes open, but not seeming to be focused on anything in the room. He clumsily hits at his wife three times, striking her only once in the face. He then lies down and returns to peaceful sleep. Similar events occur again at 5:00 a.m. During the following day, he is surprised to hear of his nocturnal behavior and shows no impairment in his waking activity. However, he begins to exhibit profane vocalizations and violent actions 3-4 times each night, but remembers only occasional dreams and no conscious intention to curse or do violence. (p. 87)

Another man, who also would try to hit his wife while he was sleeping, was found to be dreaming about an argument with a coworker. Because these behaviors occur during REM sleep, we do not consider them to be examples of somnambulism (sleepwalking is defined as occurring during slow-wave sleep, not REM sleep). (4) During afternoon naps, there are alterations of the timing of

the five stages. For example, when napping, people enter REM more quickly and spend more time in it than they do at nighttime. (5) The duration and timing of the five stages often change as a person ages. In the next section, I will describe some of the more common differences among the various age groups.

SQ 1-9: Discuss the cycling of the sleep stages through the night and describe the changes in REM and slow-wave sleep that occur as the night progresses. Describe some of the variations in the patterning of sleep and in the characteristics of individual sleep stages that occur in different people. What do the cases of people showing a lack of REM-sleep paralysis suggest to you about the purpose of the muscle paralysis shown in normal REM sleep?

Developmental Changes in the Sleep Cycle

There is a great amount of change in the sleep cycle from birth to old age and, hence, the general description of the timing of the stages given above is correct only for young adults. Other age groups show differences in the patterning and timing of the individual stages of sleep as well as in the total amount of time spent sleeping. Figure 1.5 illustrates the average changes in REM and NREM sleep over the life span. In describing some of these differences, please keep in mind that I am reporting only the averages for each age group and, therefore, am ignoring the many individual differences that exist within each age group.

Newborns. Newborns sleep about 16 hours per day, on average, with about six short sleep periods spread equally over the 24-hour day. During this early part of life, sleep is divided into only two stages: active sleep and quiet sleep. When newborns first fall to sleep, they enter a stage referred to as **active sleep**, during which they show a great deal of bodily activity (such as head movements, rapid eye-movements, fast and irregular respiration, and increased heart rate). The EEG shows brain waves similar to those seen during the REM sleep of adults and, thus, active sleep is thought to be the newborn infant's version of REM sleep. After about 30 minutes, newborns enter **quiet sleep**, a stage in which they move very little but may show jerks of the body that look like they have just been frightened. The EEG readings during quiet sleep show brain waves characteristic of a mixture of the four stages of NREM sleep described above and, thus, quiet sleep is thought to be the newborn infant's version of NREM sleep. The sleep of newborns shows three major differences from the sleep of adults. (a) The newborn cycles through the quiet and active stages about once every 60 minutes instead of the 90 minutes seen in adults. (b) The newborn enters sleep by going into a REM-like stage instead of a NREM stage. (c) The REM-like stage of active sleep makes up about 50 percent of all sleep instead of the 20 percent seen in adults.

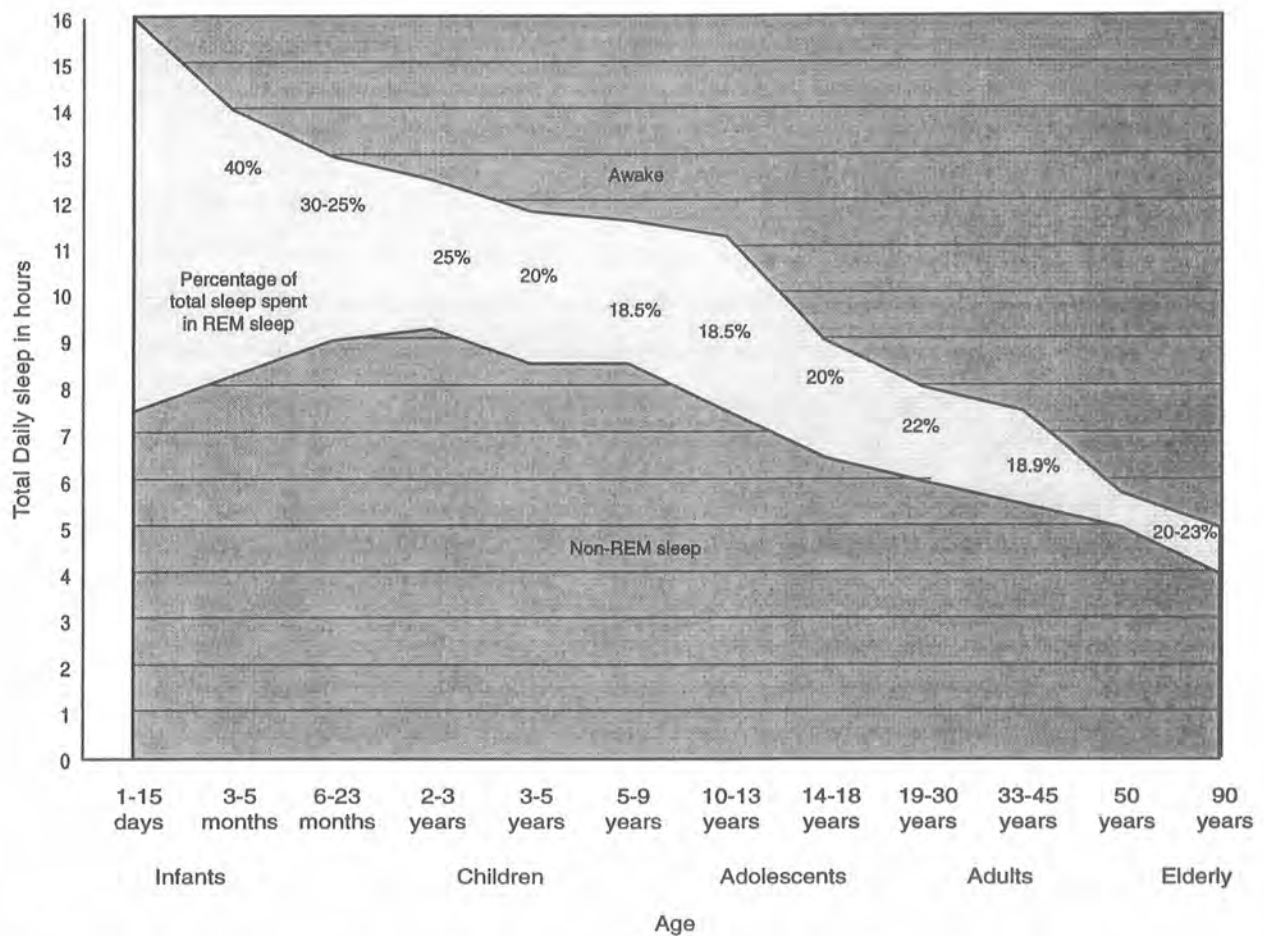


Figure 1.5 Developmental changes in the proportions of REM and NREM from birth to 90 years of age (from Peterson, 1997; p. 195)

Older Infants. Over the first year of life, the total amount of sleep per 24-hour period decreases to about 12-13 hours per day. The several sleep periods of the newborn begin to combine into fewer and longer sleep periods. By about six months of age, a large proportion of this sleep time occurs during the night (with two short sleep periods during the daytime). Within a few months after birth, characteristics of the separate NREM sleep stages begin to develop. For example, sleep spindles, which characterize stage 2 in older individuals, are first seen at about two months of age, and become more fully developed over the next several months. Characteristics of the other stages also develop gradually over the first year of life.

Toddlers and Preschoolers. The amount and rate of change occurring from about 1 to 5 years of age varies widely from one individual to another, but some average patterns can be described. Sometime between 1 and 2 years of age, the development of the five separate sleep

stages has been completed, although the duration of each stage differs from that described earlier for adults. The total amount of sleep per 24-hour period declines during this time period, from about 13 hours at one year of age to about 11 hours at five years of age. Most of the decrease in sleep time occurs through a decrease in daytime napping (by 5 years of age, less than half of children are taking such naps regularly). Perhaps the biggest change over the first five years of life is seen in the proportion of REM sleep making up the total sleep period. At birth, active (REM-like) sleep takes up about 50% of the sleep period. By two years of age, REM sleep takes up about 25-30% of the sleep period. By five years of age, REM sleep takes up only about 20% of the sleep period. The proportion of REM sleep changes very little after this time: even elderly people spend about 20% of the night in REM sleep. But keep in mind that, although the *proportion* of REM sleep does not change after about five years of age, the *absolute* amount of time spent in REM does decrease after this age because we sleep less and less as we get older (see Figure 1.5 and below). On the other hand, the proportion of sleep made up of the slow-wave stages (stages 3 and 4) is much larger in children between 3 and 5 years than in adults. In addition, compared to adults, it is very difficult (in fact, it is virtually impossible) to awaken a young child during the first slow-wave episode of the night.

At about 3 to 5 years of age, sleep disturbances, such as somnambulism and sleep terrors, may develop in some children. Although these sleep disturbances often concern parents, the problems usually decrease over time until, by about 8 years of age, few children are suffering from them any longer. **Nightmares** (which are **frightening dreams from which a person awakens fully**) also begin at about three years of age. Probably all children between the ages of 3 and 5 years have nightmares at least occasionally, and many have frequent nightmares (by “frequent,” I mean at least one nightmare per week). A nightmare is similar to a sleep terror in that the child appears to be very frightened; but nightmares differ from sleep terrors in several important ways. First, sleep terrors typically occur during periods of slow-wave sleep whereas nightmares, because they are dreams, can occur at other times (perhaps especially during REM). Second, sleep terrors do not involve dreaming (although the person sometimes may experience an isolated image at the same time that the terror occurs) whereas nightmares, by definition, are dreams. Third, because slow-wave sleep tends to occur during the first half of the night, sleep terrors are more likely at that time. Nightmares, on the other hand, can occur throughout the night and may be especially common during the second half of the night because REM is most common then.

Grade School and Adolescence. There are two major changes in sleep that occur between the ages of 6 and 17 years. (1) The total amount of sleep decreases (going from about 10 hours at 6 years of age to about 8 hours at 17 years of age). (2) The amount of stage-4 sleep decreases

dramatically (about a 40% decrease through the teenaged years). Up to at least 10 years of age, it still is almost impossible to awaken a child during the first slow-wave episode of the night. Nightmares continue to be relatively frequent during grade school but taper off through adolescence. Probably about 50% of grade-school children have frequent nightmares, whereas only about 5% of late adolescents or young adults have frequent nightmares. There is evidence that adolescents tend to get less sleep than they need: they have begun to set their own bed times (which tend to be too late at night) but still often get up early in the morning to go to school or engage in other activities. An increase in daytime napping is often the result of this sleep deficit (although they still may not be getting enough sleep, even with naps).

Adulthood. There are enormous changes in the timing of the sleep stages from early to late adulthood. The following table shows some of these changes by comparing young and elderly adults with regard to the proportion of the total sleep period spent in each stage of sleep:

	Stage of Sleep					
	0	1	2	3	4	REM
18-22 years	1%	5%	48%	7%	15%	24%
60 years	9%	12%	51%	5%	3%	21%

(from Webb, 1975)

This table indicates three major differences between these two age groups. (1) Stage 0—there is a large increase from early to late adulthood in the amount of time spent awake during the night. (2) Stage 1—there is a large increase from early to late adulthood in the amount of light sleep. (3) Stage 4—there is a large decrease from early to late adulthood in the amount of deep sleep. In fact, by 60 years of age, a person may no longer be getting any slow-wave sleep at all (something that is most likely to be seen in males). Elderly adults may also take more daytime naps than do younger adults, presumably to make up for the reduced amounts of sleep obtained during the night because of the frequent awakenings. In general, the sleep of women changes less dramatically with age than does the sleep of men. Nevertheless, it is very difficult to generalize here because, during old age, there also is an increase in the amount of variance observed in sleep patterns (that is, there are more individual differences).

There are some interesting changes in dreaming that can occur during adulthood. Pregnant women often report that they dream more as their pregnancy progresses. Elderly adults are likely to report that they dream less and that they recall fewer dreams than when they were younger. In fact,

when an elderly person develops a brain disease leading to a deterioration of functioning, the amount of REM sleep tends to decline dramatically. In addition, about 50% of adults past college age report that they never experience nightmares. On the other hand, in older adults taking medicine for Parkinson's disorder or hypertension, nightmares may become more frequent, probably because of the effects of the medications on their brain activity. In addition, adults who experience severely distressing events in their lives also report having more frequent nightmares. Some people are lifelong sufferers of frequent nightmares whether they are under stress or not, and whether they are taking medications or not. Surprisingly, the majority of such people report that they have no desire to end their frequent nightmares: they either make use of the nightmares (especially in artistic work) or feel as if the nightmares are an important part of who they are.

SQ 1-10: Compare and contrast the sleep patterns of newborns, infants, toddlers/preschoolers, grade-school children/adolescents, young adults, and elderly adults. When do nightmares first begin? What happens to the frequency of nightmares as individuals get older? Describe the differences between nightmares and sleep terrors. Describe some of the variations in dreaming that occur in adults.

So far in this chapter, I have described some of the characteristics of normal sleep through the life span. What I have not tried to answer are questions such as why we sleep or why we have nightmares. In other words, I have not discussed the various causes of sleeping and dreaming. There are two questions we can ask about the causes of normal sleep that have to do with the two major kinds of causation we talked about earlier in this chapter. (1) Proximate causation—what is happening in our bodies that causes us first to fall asleep, then to go from one stage to another, and finally to wake up. (2) Ultimate causation—why have we developed and evolved into individuals who require this particular patterning of sleep? Answers to these questions would make up our explanations for normal sleep. An explanation proposed for a phenomenon under study is called a “theory.” Before talking about specific theories of sleep, let's first look into the general topics of theory formation and theory testing.

Explanations of a Phenomenon

When there are no eyewitnesses to a crime, the evidence implicating a defendant must be “circumstantial” in nature. That is, the defendant's guilt or innocence must be inferred by examining evidence that seems to link him/her indirectly to the crime. For example, from evidence found at the scene of a murder, it might be known that the perpetrator of the crime wore size-12 shoes and extra-large gloves; and it may then be shown that the same sizes are worn by the

defendant. Other evidence may show that the perpetrator had hair and blood of certain types—types that are the same as those of the defendant. Lastly, it may be shown that the defendant had a motive for committing the crime and that his whereabouts at the time of the crime are not known. A circumstantial case, then, is based on **associations (correlations)** between the evidence found by investigators, on the one hand, and what is known about the defendant, on the other hand. Any one correlation probably will do little to convince a jury of the defendant's guilt. The prosecutors, however, try to amass such a large amount of correlational evidence that it becomes increasingly unlikely that any person other than the defendant could have committed the crime. The defense attorneys try to come up with competing explanations using the same evidence. They may argue that the evidence is not strongly associated with the defendant's characteristics. For example, they may claim that, although he is able to fit into the shoe and glove sizes of the perpetrator, he usually wears a double extra-large glove and a size-13 shoe. Or perhaps, they may question the adequacy of the evidence. For example, they may argue that the investigators did not show enough care in the collection of evidence and, thus, that the evidence was contaminated or not thoroughly collected. Sometimes the defense attorneys may even suggest that the evidence is fraudulent. For example, they may claim that investigators "planted" evidence in order to implicate falsely their client in the crime. The jury then needs to consider all of the competing explanations of the prosecuting and defense attorneys in attempting to evaluate which explanation is best—that is, which one seems most consistent with the evidence. The major implication of all of this is that, regardless of the ultimate conclusion of the court case, we will never know for certain whether or not the defendant actually committed the crime: No one saw him do it!

As scientists trying to understand nature, we typically are in much the same position as the prosecutors, defense attorneys, and jury of a circumstantial case: there are no eyewitnesses to the origins and development of most of the phenomena in which we are interested. For example, no one was around during the creation of any of the species now in existence. No one is "around" inside a person's head when a decision is being made. No one was around when the dinosaurs went extinct over 65 million years ago. No one was around to see whether or not the landmasses of the earth were in different positions 250 million years ago. No one is "around" in a person's unconscious mind to see if a repressed memory is causing that person to exhibit abnormal behavior. All of the evidence used to support different explanations of these phenomena is circumstantial in nature; and the explanations themselves are based on associations between different pieces of evidence. Scientists with different explanations use methods of argument similar to those used by the prosecuting and defense attorneys (depending upon whether they are promoting their own explanation or criticizing another explanation). In addition, scientists and others (you, for example) also act as jurors in that they must weigh the arguments of the different

sides in a “scientific court case” and decide which explanation seems to be the most probable. Regardless of the ultimate conclusion (and in this case, unlike real court cases, no decision is ever final), we will never know for certain whether or not the explanation chosen by the “scientific jury” is the correct one: No one saw Nature do it!

Most accepted explanations in science and in court cases—and in our everyday lives, for that matter—are tentative: we are more or less certain that the explanation is true, but we often are not completely certain one way or the other. A **theory is a tentative explanation of some specific phenomenon**, such as the meaning of the evidence in a criminal court case, the origins of a mental disorder, why there are more murders in the United States than in most other countries, what causes the movement of the planets, or why someone is doing so poorly in school. A theory is tentative in that, although it rarely is thought to be the final word on the phenomenon being studied, the theory is considered by its creators to be the best explanation for that phenomenon. This is true even in court cases: it is never concluded that a defendant is innocent, only “not guilty”: there was not enough evidence to show that the defendant, beyond a reasonable doubt, committed the crime. Thus, the verdicts in court cases are always tentatively made (but there is a law against retrying a defendant who has been found “not guilty,” so the decision is final in at least this sense). The theory that is the best current explanation is the one that ties together most of the accumulated evidence. This characteristic is what makes a theory different from a mere opinion. Contrary to the popular belief that a theory is merely someone’s opinion, a good theory is built upon a large amount of evidence—upon many observations of the world. An opinion, on the other hand, may have little contact with actual observations, especially when it is built almost completely on speculation.

We all make theories about what is going on in our everyday lives. That is, we are always constructing explanations for what is happening around us. For example, if you see an elderly person driving slowly down the road, you probably explain this phenomenon by inferring that the person doesn’t see well and has slow reflexes. You then pass the person and quickly drive on, satisfied by your explanation. It could be, however, that the person is sick and is about to pass out, or that his car is having engine trouble. This example shows some of the differences between the sorts of theories we all develop in our everyday lives and the theories developed by scientists. The theories of everyday life are typically very simple, often based on stereotypes and other kinds of rigid thinking, and are rarely tested by making further observations. The theories of science, on the other hand, are typically complex, often based on careful reasoning, and are generally tested by making further observations. A **scientific theory** may be defined as **a set of concepts and general principles, derived from careful reasoning about a large number of**

observations, that are designed to explain some phenomenon. A concept is a generalized idea involving a class of objects. For example, the word “desk” is a concept: it refers to the general class of objects that we use to write on and read on. The word “memory” is a concept in psychology: it refers to the particular class of mental systems that allow us to retain information in our minds. **A general principle is a statement that describes a relationship among different concepts.** The concept of memory is related to many other concepts according to certain theories I will discuss in Chapter 4. Some of these general principles, however, are probably already known to you. For example, what increases your memory for textbook material? You probably referred to concepts such as “the amount of study time,” “answering study questions,” “distributed studying” (that is, studying a little each and every day instead of all at once the night before the exam), “rewriting textbook material in one’s own words,” and so on. Each of the relationships between memory and these other concepts represent a general principle that makes up a scientific theory of memory for textbook material. The best kinds of general principles specify how concepts are causally related. For example, studying more for a test *causes* you to do better on the test. The general principles of a scientific theory are based on a large number of actual observations of the relevant phenomena: we observe them, describe them, and then see which events are related. For example, we know that distributed studying causes better memory for textbook material. We know this because we have observed that those who study for, say, an hour every day tend to do much better on tests than those who do all of their studying the night before the test. This is true even when both groups of individuals study the same number of hours overall.

In general, then, a scientific theory is **a description of the causes (proximate or ultimate) believed by the theorist (based on his/her observations) to be the most important ones for producing changes in the phenomenon being studied.** The theorist realizes that there may be other unmentioned causes, but they may seem unimportant in comparison (because they produce little change). Thus, a scientist, in constructing a theory, is not trying to describe the universe in all of its numbing complexity but only what he/she believes to be the most important pieces of it. In attempting to show the importance of these pieces, the scientist usually has to simplify the research situation. In 1942, Irving Langmuir described well this aspect of the scientific enterprise:

A scientist has to define his problem and usually has to bring about simplified conditions for his experiments which exclude undesired factors.... There is no logical scientific method for determining just how one can formulate such a problem or what factors one must exclude. *It really comes down to a matter of common sense or good judgement....*

Thus, even if scientifically logical processes are applied to the problem, the results may have no greater validity than that of the good or bad judgement involved in the original assumptions (p. 5; italics added)

As we will see in this book, one's assumptions about how the world works become important when one is defining and simplifying the research problem. If the initial assumptions are such that they inevitably lead to bad judgements, then the research is of little use. For example, if you assume initially that the relative positions of the stars and planets can affect human behaviors, thoughts, and feelings—and in simplifying the study, you focus especially on the positions of Jupiter and Mercury because you believe these to be the most important planets—it will not matter whether you follow strict scientific procedures in your studies. This is because your initial astrological assumptions make the **validity** (that is, the **meaningfulness**) of the study suspect to most practicing scientists since most do not agree with this astrological approach to psychology.

In judging the results of the studies described in this book, you will have to use your common sense and good judgement. Nonetheless, in order to evaluate properly the studies in this way, you will need to acquire much knowledge about psychology: common sense and good judgement are as much the result of the learning of relevant material as they are of inborn qualities. On the other hand, it should always be kept in mind that, when one is examining and interpreting the data from scientific research, just as when one is making interpretations of the evidence in a criminal court case, one person's good judgement may be another's absurdity. It is not obvious how we might evaluate in a general way the reasonableness of a theorist's initial assumptions about the world. In fact, it is here, as we will see later in this book, that much of the controversy in psychology and other sciences is based.

SQ 1-11: Describe what a theory is and discuss the differences between the theories of everyday life and scientific theories. Discuss specifically what is meant by a "scientific theory." In your answer, define what is meant by the terms "concept" and "general principle." Describe how common sense is important in performing scientific research.

Functions of a Theory

Because we have to simplify our initial conditions in a study and focus on those causes that we believe to be the most important ones, theories never offer a complete description of the real world. Instead, it is more like a sketch or an outline that helps us to figure out what is most likely to happen with regard to specific phenomena if certain events occur. In psychology, we have theories about many different things—theories of depression, dementia, gender-identity formation,

memory formation, hypnosis, intelligence, formation of phobias, psychotherapy, emotions, perception, and many, many others. The major reason why we develop these theories is that they help to tell us **what probably is going to happen in the future, and why it is going to happen, so that we might decide on how to change or modify this future.** For example, a good theory of schizophrenia should help us to make decisions about who is most likely to develop the disorder and how best to treat it. It does this by taking most or all of the circumstantial pieces of data and tying them together into a story that makes sense to the “scientific jury.” The best current theory is the one that does these things better than all competing theories. Thus, when constructing a theory, one must continually be testing it to determine its consistency with the available evidence and how well it predicts the future with regard to the phenomenon. In order to illustrate the general process of theory construction and theory testing, let’s go to the world of the physical sciences for a good example. Keep in mind that the following is just an example—you will not be responsible for knowing about this particular theory (since it has nothing to do with psychology other than that it is a clear example of a good theory).

Plate Tectonics. During the mid-1950’s, a curious fact was noticed when the first detailed maps of the bottom of the Atlantic Ocean were constructed. It was discovered that the mountain range that traveled down the middle of this ocean (the Mid-Atlantic Ridge) mirrored almost exactly the two continental coastlines (that is, the Americas in the west, and Europe and Africa in the east). When the coastlines curved, the mountain range curved; when the coastlines straightened out, the mountain range straightened out. We will consider this fact Exhibit #1 in our “scientific court case.” There was no obvious explanation for this fact. The predominant theory up to that time was one that asserted that all of the earth’s landmass (including the ocean floor) was part of the original crust of the earth. Therefore, it was believed that all land was formed when the hot gases that originally made up our planet cooled a few billion years ago (I will refer to this theory as the “standard theory”). However, the standard theory could not explain why the Mid-Atlantic Ridge mirrored the continental coastlines.

Since the standard theory could not explain the mirroring, it became necessary to test it further. Thus, predictions were made based on its explanatory principles and concepts. For example, if the standard theory was correct, then a large proportion of the rocks collected from the ocean floor should be several billion years old. When dredging of the Atlantic-Ocean floor was performed, however, only relatively young rocks and recently created volcanic lava were found (Exhibit #2). In fact, no rocks older than 150 million years in age were found; about 95% of the history of the earth was missing from the ocean floor! Where had those missing years gone, and why was the ocean floor so young? Around 1960, Harry Hess floated an explanation (a new

theory) that he referred to as “geopoetry” because there was little hard evidence supporting it. He postulated that the ocean floor was spreading both east and west from the Mid-Atlantic Ridge; that the spreading was caused by molten rock rising from that point which then pushed the ocean floor to each side. In this manner, Hess suggested that a completely new ocean floor could be created in perhaps about 100-200 million years (about the age of the oldest rocks found). Although this idea might be only scientific “poetry,” it was a theory that did explain these two pieces of data (that is, the mirroring and the age of the rocks) better than did the standard theory. Even more important, it could be tested by making predictions and accumulating new evidence (data) to see if the predictions were supported.

Such new data were quickly collected in the form of the magnetic orientation of rocks. As lava cools and hardens into rock, it becomes in essence a “frozen compass” with a magnetic orientation that can be measured. The orientation of such rocks will point to magnetic north. If the standard theory was true (that is, that all land was formed at the time of the earth’s cooling a few billion years ago), and if the magnetic orientation of the earth remained constant, then we can make a prediction: all rocks in the world should have the same magnetic orientation. When testing this prediction, however, it was discovered that rocks showed various orientations (Exhibit #3). There are at least two possible explanations for this finding. (1) There may be something in the rocks that causes them to change their orientation spontaneously. Or (2) the earth’s magnetic field may change its orientation at intervals (so that new rock in the form of lava would have different orientations depending upon the time period in which it had cooled into rock). It was found that the second explanation was the most likely: All rocks throughout the world had the same orientation as long as they had been formed at the same time (Exhibit #4). The new theory was consistent with this data: As new rocks were created by lava flow from the Mid-Atlantic Ridge, they would take on the magnetic orientation of the time period in which they were formed.

In fact, this discovery helped to confirm that the floor of the Atlantic Ocean was spreading because it was found that there was a matching pattern of alternating magnetic orientations on each side of the Mid-Atlantic Ridge (Exhibit #5). Furthermore, ocean-floor samples in the late 1960s showed that rocks got older the farther they were from the Ridge (Exhibit #6). From such circumstantial evidence, it was estimated that the ocean floor spread at a rate of about one inch per year. Other evidence collected in the 1970s showed that the earth’s crust was separated into about 20 huge slabs or “plates” (Exhibit #7). This fact suggested that the continents of the earth are not plowing through hard rock as they are pushed apart but, instead, are riding over a liquid layer of molten rock. The new theory—called “plate tectonics”—stated that the continents of the earth are mobile and that, at various times during the history of the earth, they have smashed

into each other. For example, at present, India is smashing into the rest of Asia thereby forming the Himalaya mountain range in Nepal. Several times in the past, all land on Earth formed a single landmass that, with further movements, eventually separated. There are still many questions about how this process occurs; but the basic phenomenon of plate movement is now widely accepted because it is consistent with much evidence and because many of its predictions have been supported. Nevertheless, the major point to remember is that no one has actually seen the plates move past each other (although this is what is believed to happen during earthquakes in areas such as California). In addition, no one has observed the continents of the earth forming a single landmass 250 million years ago. The evidence supporting the explanations that make up the theory is circumstantial; but this fact does not undermine the compelling nature of the explanations.

This example from the world of geology should help us to see the four **functions** (goals or purposes) of a good scientific theory: **(1) the organization of past and present data, (2) the prediction of future data, (3) the explanation of all data, and (4) the control of the phenomenon being explained.** The theory of plate tectonics helps us to organize all of the separate pieces of evidence collected by geologists and others around the world. It also allows us to predict where the continents may be 250 million years from now or to predict where earthquakes are most likely to occur at present. Lastly, it allows us to explain all of this as being due to the movement of the twenty or so plates, a movement that is powered by the geothermal processes occurring deep within the earth. **If these three functions of a theory are met in a particular instance, then it is a “good” theory: it describes some aspect of the universe in a realistic way.** With such good theories, the fourth function, that of control, may then be possible: we may be able to devise ways to modify the basic processes involved in producing the phenomenon. This fourth goal may seem unattainable with plate tectonics since it is difficult to see how we could modify plate movements to prevent, for example, major earthquakes. Yet, if we could predict better the occurrence of earthquakes with this theory, we could control or modify people’s behavior to avoid their injury or death. Control is an extremely important goal for psychological theories because psychology is a science that was developed in order to have applications in everyday life. It is the construction of a theory that accomplishes at least the first three basic functions (organization, prediction, and explanation) that denotes what is meant by the phrase “to understand a phenomenon scientifically” (as opposed to understanding philosophically, religiously, artistically, etc.). By understanding a phenomenon scientifically, we are attempting to construct a “story” about that phenomenon—a scientifically sound story that we hope will lead to practical consequences (that is, will lead to our being able to control the phenomenon).

As scientists, we try to develop “good theories”—theories that accomplish the functions described in the preceding paragraph. But we rarely say that a theory—even a good theory—is “true,” no matter how much evidence we have found to support it. This is a statement that often is confusing to students, but there are very good reasons for saying it. There are at least two problems with saying that a theory is true. (1) **Reality is always more complex than we can ever describe.** Think of a time when you had a disturbing dream. You may have tried to describe this dream to another person or to write it down. When you were doing this, you probably felt that you were not quite describing the experience you had—that, instead, your description of the dream was missing much of the information that was essential to communicate exactly what had happened in the dream. Your difficulty in communicating the dream involved the fact that much of the dream was nonverbal (changing visual images, emotions, intuitions, etc.) whereas you were using verbal symbols (words) to describe it. Furthermore, in using language, you were trying to describe the dream logically and sequentially (like a story that you might read) whereas the dream itself often is illogical and nonsequential. In this case, the way you described your dream (with language) was not sufficient for the reality you were trying to express (your experience of the dream). Was your description of the dream false? Since your description could not get at the full reality of the dream as you experienced it, you might have answered “yes” to this question. Yet, *for certain purposes*, your description was accurate. For the purpose of describing why the dream disturbed you, your description probably was adequate. For the purpose of getting across a basic idea of what happened in the dream, again, your description was probably accurate. Yet, you know that, if you had spent more time at it, and reworked the description over and over again, you could have made it an even better description. In the end, however, no matter how hard you might work at it, your description of the dream can never capture fully the experience you had. Thus, your description is not really a “true” one, but it is not “false” either. Instead, we can say that your description of the dream works for certain purposes but not for others. The same is true for theories. Theories can never reflect completely the reality we are trying to describe and understand. For the four purposes described above (organization, prediction, explanation, and control), however, a particular theory may be adequate, it may work well enough. And, we hope that the more we work at the theory, the better it will become at accomplishing these purposes, even though we know that, in the end, we can never hope to understand completely the phenomenon we are studying. Because of this problem, we are constantly revising our theories as we make new observations and as we think more about the concepts and principles described in the theory.

The second problem with saying that a theory is true is this: (2) **in constructing a theory, we are generalizing from a limited number of observations.** For example, if I

ask you whether or not the sun will come up tomorrow morning, you will undoubtedly say “yes.” If I ask you how you know that this is true, what would you say? You probably will say something like, “Everyone *knows* this is true because we have all seen the sun come up each morning of our lives!” If I then say that, “while this might be true for all of the other mornings up to and including today’s, this does not necessarily imply that the sun will come up tomorrow morning,” you’ll probably think I have gone insane. But I would be correct: we have not yet observed tomorrow morning so we can not say for certain what will happen then. For example, the world might stop spinning on its axis during the night and, thus, the sun could not come up tomorrow morning. In answering my question, you have made a generalization—“the sun rises each and every morning”—based on a large, but still limited, number of observations. In making this generalization, you have used a method of reasoning called **induction**, which we can define as **the making of a general conclusion about a phenomenon based on a limited number of observations**. We use induction all the time in our everyday lives as well as in scientific research. For example, because I have come to class on time for all of the classes you have attended, you might use induction to make the generalization that I always come to class on time. Nevertheless, I might be late for the next class because a student stopped me in the hall. This simple example shows that there is a major logical problem with the use of induction:

The problem is that it is both impossible to make all observations pertaining to a given situation and illogical to secure all relevant facts for all time, past, present, and future. However, only by making all relevant observations throughout all time could one say that a final valid conclusion had been made. On a personal level [such as the question about whether or not I am always on time to class], this problem is of little consequence [because our everyday inductions usually are adequate for our purposes or about trivial matters], but in science the problem is significant. Scientists formulate laws and theories that are supposed to hold true in all places and for all time, but the problem of induction makes such a guarantee impossible. “ (McComas, 1997; p. 91)

Because of this problem, we are constantly revising our scientific theories as new observations are made. Most of these revisions are minor; but sometimes, as was the case with the observations leading to the development of the theory of plate tectonics, the new observations require us to discard the theory in favor of a new one.

SQ 1-12: Why are scientists so concerned with developing theories? Discuss the four major functions of a scientific theory. What makes a theory a good one with regard to these functions?

List and describe the two reasons why it is usually incorrect ever to say that a theory is true. How is the process of induction involved in this?

Constructing Good Theories by Making and Testing Predictions

Although the preceding discussion may have seemed somewhat formal to you, let's try to bring it back down to Earth by returning to the idea that the making of theories is something you do every day of your lives. For example, perhaps you want to understand why your route to school is always so crowded in the morning. The intersection next to the school is the worst part of the trip because it often takes you about 10 minutes to get through it. When you think about it further, you recall that, on the weekends, it never takes you more than 30 seconds to get through this intersection. The phenomenon that you want to explain here is the long wait you have when trying to get through the stoplight next to school. This is a problem you would like to solve so that you can figure out what to do to eliminate it. Your explanation of this phenomenon is your theory. You might consider several possible theories. (1) Because you drive to school early in the morning, the sun is low on the horizon and it is getting in everyone's eyes which causes them to drive slower. (2) Because everyone has just gotten up, they are still groggy and are driving more slowly. (3) Because tourists like to get up early, they are more likely to clog the roads early in the morning when you drive to school. None of these theories sounds like a good one to you, however. Then it hits you—there is a large number of other people driving to their classes at the same time that you are! On the weekends, on the other hand, because no one is going to classes, the roads leading to school are less congested. This explanation seems plausible, it makes sense; but how do you *know* if it is true? What can you do to demonstrate that this is a good theory?

In order to test whether a particular theory is a good one, you need to do two things: (a) **make a prediction about what you should observe if your theory is true**, and (b) **make the relevant observations to test whether or not the prediction is true**. What should you be able to observe if your theory is true? Well, it seems obvious that, if your theory is true, the roads leading to school should become busier as the time for the next class approaches, and they should become less busy after this time has passed. Your prediction, then, might be this: there will be a larger number of cars during the 10 minutes before class has started and the five minutes after class has started than at other times. Thus, based on your theory, you are predicting that two events—or “concepts,” to use the term from above—will be related: “time” and “the number of cars.” In this case, it should be obvious to you that you don't just pull a prediction out of thin air. Instead, **a prediction is derived from the theory that is being tested**. In other words, **the theory implies that certain relationships among events should hold if the theory is true**. These implications become your predictions. You would not even have

thought that “time” and “the number of cars” might be related if you had not first developed your theory. If the theory is true, the predicted relationship between the events should be found when you make the appropriate observations. How might you make the appropriate observations? You could sit at one corner of the intersection on a weekday and also on a Sunday and see if it becomes busier at the times that classes normally start. If it does so on the weekday but not on a Sunday, then it becomes more likely that your theory is correct. If your observations contradict the prediction, then it is likely that something is wrong with your original theory.

This very simple (and silly) example of scientific research actually went through a series of very complicated steps. In fact, we can distinguish five steps involved in scientific research: (1) we **identify a problem** based on our observations of the world. For example, we noticed that the roads become clogged when we are driving to school in the morning. (2) Based on these initial observations, we **develop a theory** to explain this problem. We proposed that the roads become clogged because there is a large number of people coming to class at the same time. (3) To test whether or not this is a good theory (that is, that it can explain well the phenomenon we are trying to understand), we **derive a prediction** from the theory—a prediction about what we should observe if the theory actually is true. We predicted that we should see a large number of cars at the intersection just before and just after classes are to start, but not at other times. (4) We **test the prediction** by making relevant observations. We sat at the corner on a weekday and on a Sunday and counted the number of cars at a particular time. (5) We **make an interpretation** of the outcome of our observations. In this step, if we find that the events are related in the way that was predicted, then it becomes more likely that our theory is true. If we don’t find that relationship, then it becomes less likely that our theory is true. If we had made the observations in the example, we would have found that the roads do get crowded at the predicted times on the weekdays but not on Sunday. In this case, we would conclude that our theory is an adequate one. These five steps are necessary for an investigation to be called “scientific research.” **If any of these steps are missing, we are not performing scientific research.** As you can see, you don’t have to be a professional scientist to be engaged in scientific research: you need only follow these five steps.

SQ 1-13: Describe the two activities that are necessary for developing good theories. Where do we get the predictions used to test our theories? List and describe the five steps involved in performing scientific research.

Theories of Sleeping and Dreaming

Now that we have some background on how to construct and test a scientific theory, as well as why we should want to construct such theories in the first place, let's look at some of the theories that sleep researchers have developed to explain their observations.

Proximate Causes of Sleep

The functioning of the brain affects the functioning of the rest of the body. The brain also is affected by the functioning of the rest of the body. The brain affects the body by generating electrical activity that travels through the spinal cord and, from there, to the rest of the nervous system. The spinal cord is the part of the nervous system that runs along the middle of your back. It carries sensory information into your brain; and it also carries information from your brain out to the rest of the body. When the spinal cord enters the skull, it becomes a part of the brain called the **brain stem**. With regard to the behaviors associated with sleeping and waking, electrical activity in the brain stem is very important for making animals fall to sleep and then wake up again. For example, if we cut through the brain stem of a cat where it connects with the spinal cord, the cat will show normal sleep/wake patterns. On the other hand, if we cut through the brain stem several inches above this point in a different cat, it will look like it is in permanent slow-wave sleep. Thus, the area between these two cuts must be important for producing the daily patterns of sleeping and waking. This area is referred to as the **reticular activating system (RAS)**. The RAS is a large area of the nervous system that begins in the spinal cord and travels upward into the highest parts of the brain; but its most important route is through the brain stem. Increasing activity in the RAS can wake up an animal whereas decreasing activity may cause the animal to fall asleep. If you are daydreaming and a very loud noise occurs behind your head, you will immediately become highly alert. This is because the noise caused activity in the RAS which "woke up" the rest of the brain. Activity within a particular area of the RAS seems to be important for turning on REM sleep. All of these areas of the brain will be discussed in more detail in the next chapter.

There are many chemicals produced in the brain that induce sleep as well as its various stages. For example, there is a chemical called **serotonin** that is of particular importance for sleep. If serotonin is removed from a cat's brain (for example, by destroying the brain cells that produce this chemical), the cat will sleep very little or not at all for at least several days. Another chemical, called **melatonin**, seems to be important for making us feel sleepy. Melatonin is produced in the brain as night approaches (the increasing darkness causes an increase in melatonin production). Still other chemicals cause the onset of slow-wave sleep and REM sleep. Abnormalities involving such chemicals may be important for the development of various sleep disorders. For example,

melatonin production sometimes is reduced in people who suffer from insomnia (sleeping too little), whereas increased activity of serotonin may be associated with hypersomnia (sleeping too much).

SQ 1-14: Briefly explain how the brain stem is involved in producing our daily patterns of sleeping and waking. In your answer, describe what the reticular activating system does and some brain chemicals that are important for sleep.

Ultimate Causes of Sleep

Almost all mammals and many birds show both REM and NREM sleep. The fact that such a similar pattern of physiological activity occurs in many different species suggests that sleep and its separate stages have some very important functions that evolved in ancient ancestor species shared by these modern animals. When asking questions about the functions of sleep, we are concerned with what sleep does for us, with what its purpose is. I am sure that everyone reading this will agree that, when you get a good night's sleep, your body and mind feel rested the next morning. On the other hand, when you don't get a good night's sleep, your body and mind do not feel rested. So, one way to develop an adequate theory about the purpose of sleep might be to deprive subjects of sleep and see what happens to them. This, in fact, has been done in many different studies over the years, using both human and nonhuman animals. **Total sleep-deprivation** studies attempt to **completely prevent individuals from sleeping** for several nights in a row (generally two or three nights). **Partial sleep-deprivation** studies, on the other hand, **decrease the amount of sleep obtained by individuals on each night**, usually to only about 3-5 hours per night for up to a week (although some studies have continued the sleep deprivation for up to several months).

Total Sleep Deprivation. Several studies, done in the 1950s and 1960s, prevented people from sleeping for up to 11 days in a row. In general, these studies found that, when people are prevented from getting any sleep at all, they tend to become very sleepy (they develop a strong desire to sleep), an unsurprising finding to say the least. In addition, they can have much difficulty in concentrating on long and/or boring tasks (such as listening to a lecture), but they often have little or no difficulty in concentrating on short and/or exciting tasks (such as playing a video game). These sleep-deprived people tend to become uninterested in things that normally would interest them, and to make more mistakes on boring tasks but not on exciting ones that hold their attention. In order to continue performing at normal levels on various tasks, it seems that the bodies of sleep-deprived people must work much harder than they do when these people are well rested. Therefore, we are using up more energy during sleep deprivation than we do when we have

obtained a normal amount of sleep. Some studies suggest that a person's physical fitness decreases the longer that he/she goes without sleep. In addition, the functioning of the immune system decreases somewhat during prolonged sleep deprivation, which may cause us to become sick more easily. A common belief that you may have heard is that people deprived of sleep for several days experience hallucinations and delusions (that is, they become "psychotic"). Most studies, however, have shown that, in general, this is not true: only a small percentage of people will ever experience psychotic symptoms when completely deprived of sleep for several nights in a row. Nevertheless, people may begin to suffer more from unusual perceptions (illusions) if they don't sleep for several days. For example, an object such as a book may be mistaken for a cat and the subject may try to pet it. Other psychological changes also tend to occur: people tend to become emotional, irritable, and aggressive after a couple of nights without sleep, and to have problems with their memory.

The major problem with sleep-deprivation studies on humans is that humans cannot stay awake for very long. The longest time that anyone has gone without sleep (at least on record) was about 11 days—a feat accomplished by a 17-year-old adolescent named Randy Gardner in 1965. Even in such cases, however, the person begins to enter brief periods of what seems to be stage-1 (light) sleep increasingly over the days of deprivation even though the person appears to be awake and may even be engaged in some activity. These **short periods of light sleep in sleep-deprived individuals** are referred to as **microsleeps**. In other animals, we are able to deprive subjects of sleep for much longer periods, although we can't completely prevent short periods of light sleep. Studies performed by Allan Rechtschaffen and his colleagues involved placing rats on a disk that was floating in water. The disk was set up in such a way that, when the rat fell asleep, the disk would rotate, and the rat would have to begin walking in order to avoid falling in the water. In this way, the rat would get only about 10% of its normal sleep per day. When rats are sleep-deprived in this manner, they typically end up dying within two to four weeks. Some of the problems observed before death were weight loss (even with increased eating), sores on the paws and tail, increased expenditures of energy, and changes in hormone levels. Because a severe lack of sleep results in such problems—problems that seem to lead eventually to the death of these animals—it makes sense to conclude that sleep must have some very important functions.

Partial Sleep Deprivation. People who get less than their normal amount of sleep also exhibit some mild to moderate problems depending upon how much sleep they are getting and how long this deprivation lasts. The most consistent finding is that, when sleep is decreased to less than about six hours per night, people often report that they feel very sleepy, again a very unsurprising finding. There are few consistent effects on the performance of partially sleep-deprived subjects on various kinds of tasks, however. Tasks that require a person to pay attention for longer periods of

time are the ones most likely to show performance deficits after a couple days of reduced sleep. Nevertheless, when sleep is reduced gradually over several months so that subjects get used to less sleep, few or no effects are seen on performance measures even though subjects continue to complain about fatigue. The problem with all of these studies is that the measures used to look at the effects of sleep deprivation were limited to rough measures of performance and mood. They are not able to detect the more subtle effects that may occur with sleep deprivation. One interesting finding of long-term partial sleep-deprivation studies is that, when sleep was reduced to about five hours per night for about seven months, participants continued to sleep from one to almost three hours less per night after the study was completed compared to their previous sleep habits.

Functions of Sleep. Even given these findings on total and partial sleep deprivation, we still do not have very good answers to the question of what sleep is doing for us:

Like hunger or thirst, the drive for sleep appears to satisfy an elementary need. However, unlike eating and drinking, the purpose for sleep remains obscure. Sleep is the one major biological process whose *raison d'être* [reason for existing] has not yet been specified. Unraveling its essence constitutes a major challenge for biological research in general and for neuroscience in particular. (Borbély & Tononi, 1998; p. 167)

Several theories about the functions of sleep have been developed over the years, but we still don't have conclusive evidence supporting any of them. I will mention here only three. (1) *Restorative Theory*. This theory suggests that sleep helps to replenish bodily resources that have been depleted during the day. It states that REM sleep, in particular, helps to restore the brain whereas NREM sleep (stages 1-4) helps to restore the rest of the body. Sleep-deprivation studies support this theory: people prevented from sleeping tend to feel very fatigued. Your experience of going to bed feeling fatigued and waking up the next morning feeling reinvigorated also is partial evidence supporting this theory. Athletes who have engaged in heavy exercise spend more time sleeping on average after the exercise (especially slow-wave sleep, which may be especially important for restoring depleted bodily resources). All of this is evidence supporting the restorative theory. (2) *Energy-conservation Theory*. This theory suggests that sleep helps us to conserve energy by allowing for a period of minimal energy use sometime during each 24-hour period. Species who use higher amounts of energy during the day (such as "warm-blooded" mammals and birds) tend to spend more time sleeping. Slow-wave sleep is thought to be especially important here since the other stages (especially REM) tend to be associated with higher expenditures of energy. Certain animals with very low rates of energy use (such as many amphibians and reptiles) don't even have stages of slow-wave sleep. (3) *Predation Theory*. This theory suggests that humans sleep during

the night because this protects us from certain dangers, especially from the danger posed by predators. Humans are relatively helpless when it is dark because our eyes no longer function well and the rest of our senses are not as good as those of our potential predators. Other animals with different vulnerabilities sleep on different schedules. For example, goats and some other grazing animals sleep less than four hours per day in several very short periods of sleep, perhaps to lessen the possibility of experiencing a surprise attack by a predator in the open grasslands in which they are found. In essence, these three theories together suggest that sleep has evolved in humans and other animals as a way to promote the survival of individuals as well as to increase their reproductive success (I will talk more about evolutionary psychology in Chapter 3). All three of these theories may explain partially why we sleep; and there probably are other explanations that will be added with time. Nevertheless, there is little conclusive evidence for any particular theory, and the truth is that we simply know very little about why we sleep.

SQ 1-15: Explain why sleep researchers have used total and partial sleep-deprivation studies in their work. What have such studies told them? Discuss the three theories mentioned that attempt to explain some of the functions of sleep.

Causes of REM Sleep

Because many sleep researchers, at least in the past, believed that almost all of our dreaming occurs during REM sleep, and because the body during REM sleep appears to be partially awake, sleep researchers have been particularly interested in understanding what is going on during this stage. We spend about one to two hours per night in REM sleep (which, if we live 75 years, equals over 40,000 hours of our lives—almost five years). It seems likely that REM sleep must have some very important functions if we spend so much time engaged in it. Furthermore, a large portion of each REM episode is spent dreaming. It may be that REM sleep itself is important for various physiological processes of the body whereas dreaming (which, remember, also occurs during NREM sleep, but at a reduced frequency) is important for various psychological processes of the mind. As we will see in the next chapter, these two functions (physiological and psychological) probably are related closely to one another: the functioning of the mind is dependent upon the functioning of the body, especially the brain. Some of the early work on the functions of REM sleep and dreaming involved depriving people of REM sleep over several nights in order to see what would happen. Let's take a closer look at these studies.

REM Deprivation. Selective sleep-deprivation studies are ones in which **subjects are deprived of particular stages of sleep**, such as REM or slow-wave sleep, **while otherwise letting them get a full night's sleep**. What we hope to find with such studies is

a loss or decrease of particular functions specific to that stage. For example, it was predicted that, if people were deprived of slow-wave sleep while letting them get the full amount of the other stages, very specific problems (perhaps an inability to heal after injuries) might occur. In actuality, such hopes were never realized, but selective-deprivation studies have given us some useful information. Here, we are concerned with those studies that involve preventing people from getting REM sleep, which are referred to as **REM-deprivation studies**. In these studies, people are deprived of REM sleep by waking them up each time they begin to show rapid eye-movements but not awakening them during the other stages. In this way, they are able to get a full night's sleep that contains little REM sleep. This is done over a period of about five nights. Over these several nights, we begin to see some interesting changes. (1) Subjects begin to go into REM more and more frequently the longer they are deprived of it. (2) Subjects feel unrested and may have difficulty concentrating during the day. (3) When finally allowed to sleep undisturbed through the night, subjects often exhibit the **REM-rebound effect**, in which the amount of REM shows an enormous increase after REM-deprivation (in fact, these people may spend much of the night in REM). Such psychological and behavioral changes induced by REM-deprivation suggests that REM sleep has important functions for us. Nevertheless, as with total-deprivation studies, no drastic changes were reported for any specific mental or physical process.

Based on the findings of REM-deprivation studies, it seems obvious that REM sleep has some important functions. Over the years, several possible theories have been developed that try to explain why we spend so much time in this stage. Nevertheless, there is little evidence in favor of any of them. Perhaps the most influential has been the **activation-synthesis theory** of J. Allan Hobson and Robert McCarley. The activation-synthesis theory is based on the finding that, during REM sleep, the brain stem becomes very active—activity that “wakes up” large areas of the rest of the brain. Hobson and McCarley speculated that **the brain needs to be activated several times during the night, perhaps to help in the development and maintenance of connections in the brain** (for example, those connections that develop when we learn something new). They also believed (incorrectly, it seems) that dreaming occurs only during REM sleep. Thus, Hobson and McCarley explained dreams as being the result of the widespread brain activation that occurs during REM sleep: areas of the brain that are involved in seeing, hearing, and feeling the world become activated due to the activity in the brain stem. This activity, according to Hobson and McCarley, then causes us to “hallucinate” so that we think we are seeing, hearing, and feeling the outside world even though we are not. The problem with this idea, as we saw earlier, is that dreaming also occurs during NREM sleep. Thus, even if this theory is correct about the cause of REM dreaming (and there is little evidence at this point that it is), the theory still cannot explain the occurrence of dreams during NREM sleep when the brain is relatively inactive.

Psychoanalytic Theory of Dreaming

At present, there is no good theory for why we dream. I just discussed the activation-synthesis theory and mentioned some of its problems in this regard. Earlier in this chapter, I mentioned a theory of dreaming by David Foulkes in which he suggested that dreaming occurs when the sleeping brain is at least somewhat active but cut off from awareness of the external world. In his view, dreaming is simply the conscious mind working during sleep in a way that is different only in degree from the waking state. As with the theory of Hobson and McCarley, there is little evidence for or against Foulkes' theory. One other theory of dreaming that was very influential in psychiatry, psychology, and the wider American culture during much of the twentieth century was developed by Sigmund Freud. From about 1895 until his death, Freud developed a set of ideas and therapeutic practices known as **psychoanalysis**—an approach that assumes that **human behaviors, thoughts, and emotions are caused by unconscious conflicts among competing motivations**. I will discuss this approach in more detail in later chapters. But, if you are going to understand his theory of dreaming, I need to sketch out a few of his ideas here. Freud wanted to understand the development of personality in individuals, especially the development of abnormalities in personality. He believed that everything we did was the outcome of different desires and wishes (motivations) that were in conflict with one another. For example, I would bet that, right now, you are experiencing conflicting desires: a part of you wants to read this section carefully so that you can understand it better, and another part of you would like to be doing something else that is more fun. You are experiencing conflict. The outcome of this conflict will be different for each of you, however. Some of you will race through this section so that you can put the book down and do the other thing you desire. Some of you will force yourselves to concentrate on the material anyway and continue to read it carefully. Others of you have already put the book down and, so, are no longer reading this. And still others of you never picked the book up in the first place, and don't ever plan to. So, out of this identical conflict, different behaviors, emotions, and thoughts will arise in each person. These individual differences indicate the differences in your personalities.

For Freud, the most important conflicts between motivations are unconscious ones. These are conflicts of which we do not want to be aware because we are trying to forget them: they upset us too much. Therefore, according to Freud, we push them into the unconscious part of the mind where they can remain hidden from our awareness (in later chapters, I will refer to this process as "repression"). For example, Freud claimed that all of us, at about the age of three years or so, develop sexual feelings for our opposite-sexed parent (boys for their mothers and girls for their fathers) and aggressive feelings for our same-sexed parent (boys for their fathers and girls for their

mothers). He called this the “Oedipus Complex.” These feelings, he said, come into conflict with other motivations we have, such as our desire to be loved by the parent towards whom we are feeling aggressive. Furthermore, we eventually become aware of societal standards of behavior that prohibit such feelings towards our parents, especially the sexual ones. We become very distressed about having these desires. Thus, Freud believed that by about six years of age, we push this conflict into our unconscious. He asserted that we do this because, by becoming unaware of our oedipal urges, we no longer are upset by them. What do such unconscious conflicts have to do with dreaming? Well, Freud argued that a major function of dreams is “wish fulfillment”: he believed that dreams allow us to partially satisfy our illicit (secret and forbidden) desires through fantasy. When you are awake, you sometimes fantasize because it can be fun: these waking fantasies can be somewhat effective for satisfying a wish or desire you have. For example, you may daydream about being a rich and famous personality, and this daydream will be somewhat fulfilling while you are engaged in it. For Freud, dreams were fantasies of this kind—dreams are fantasies that partially satisfy desires. Freud believed that we especially are likely to dream about our unconscious desires because, during sleep, it is more difficult to keep them in the unconscious. The problem, however, is that even during sleep we don’t want to be aware of these unconscious desires because they still upset us. Thus, when we dream, we don’t dream directly about satisfying our unconscious desires. Instead, we dream about something similar to these desires—we transform our dreams so that the real desires remain hidden from us. For example, a man’s dream might be driven by his oedipal desires, but he will not dream about having sex with his mother and killing his father. Instead, he might dream about going out on a date with his third-grade teacher from forty years before and getting into a fight with the principal who was dining at the same restaurant. In this example, the teacher would represent the man’s mother and the principal would represent the man’s father. The man, according to Freud, can satisfy his illicit feelings for his parents while remaining unaware that he is doing so.

Thus, Freud said that, in our dreams, we transform unconscious conflicts into something else—into a story whose true meaning we don’t recognize. This serves two functions: (a) we are able to satisfy our unconscious desires and wishes to some extent by fantasizing about them; (b) we don’t become upset by becoming aware of the actual desires we are satisfying. If we were in danger of becoming aware of our actual desires, Freud claimed, we would become anxious and wake up. (In fact, this is how Freud explained the existence of nightmares—they are dreams in which we are in danger of becoming aware of our actual desires. As the actual desire threatens to break into conscious awareness, we become terrified and wake up.) In his theory of dreaming, therefore, Freud referred to two levels of the dream. (1) The **latent content** of a dream is **the set of unconscious motivations (desires) that are being expressed in symbolic form in**

the dream. The word “latent” simply means “hidden.” In other words, the latent content is the set of hidden (because they are unconscious) desires about which one is fantasizing in the dream. The latent content, thus, represents the true meaning of the dream. In the example above, the man actually is dreaming about his/her oedipal desires for his parents even though he doesn’t know it. Thus, his Oedipal desires make up the latent content of the dream. (2) The **manifest content** of a dream is **the actual narrative (story line) of a dream**—it is what you tell another person when you are describing the dream you had. The word “manifest” simply means “what is clear or obvious” to another. In the example above, the person dreamed about taking his third-grade teacher out on a date and getting into a fight with his principal. This story is the manifest content of his dream. In therapy, Freud would listen to the manifest content of his patient’s dream, and then he would interpret the dream in terms of its latent content. By interpreting “what was obvious” in terms of “what was hidden,” Freud would try to make his patient aware of the unconscious desires he believed were motivating the patient’s waking behaviors and mental events.

Is Freud’s theory of dreaming a good one? Over the years, it has been criticized severely by many psychologists, psychiatrists, and others. Its biggest problem is that much of the research designed to test the theory does not support it. How do we test a theory? As I stated above, we have to derive a prediction from the theory and then make observations to see if the prediction is true. What sorts of predictions are implied by Freud’s theory? Think about this for a minute. One thing that occurs to me is that we could see if people dream more when their unconscious conflicts have become activated. For example, with regard to the Oedipal Complex, perhaps a person will dream more when his/her parent dies, or when his/her parents divorce, or when the person is about to get married, etc. But we find that this doesn’t occur. It seems that people dream about the same amount each and every night: about 85% of the time in REM, and perhaps about 50% of the time in NREM. Probably the biggest problem with Freud’s theory is that it is just too difficult to test: we have no direct access to the unconscious desires that are thought to be the wellspring of the dream. Thus, although variants of Freud’s theory of dreaming are still very popular among some clinicians doing therapy, most scientific researchers studying sleeping and dreaming find his theory to be questionable at best.

SQ 1-16: Explain what a selective sleep-deprivation study is and describe what REM-deprivation studies have told us about the functions of REM sleep. What happens to people who are selectively deprived of REM sleep? Discuss the main ideas of the activation-synthesis theory of REM sleep and the psychoanalytic theory of dreaming. In your answer, describe the most important difficulties for these two theories. Are they good theories? Why or why not?

At this point in the chapter, you may be feeling some frustration at the lack of good theories explaining the causes of sleep and dreams. We lack good theories partly because not enough research has been done to answer some of the important questions about this topic. Nevertheless, even if more research had been done, we have seen that some of the explanations that have been proposed are very difficult or impossible to test (at least at the present time). As we will see throughout this book, there are several areas of psychology that suffer from similar problems with the testing of theories. There are many reasons for this. But perhaps the most important reason is that **the subject matter of psychology involves something that we cannot observe directly—the mind and its mental processes**. It is difficult to get adequate evidence to test various theories about mental events because the mind itself has no physical reality. That is, there is no “thing” that we can point to when we are talking about a mental event. In the next section, I am going to emphasize the difficulty of scientifically studying the mind by discussing a philosophical problem that has plagued psychology right from its beginning—the problem of the nature of the relationship between the mind and the body.

The Mind and the Body

In this chapter, I have been trying to introduce you to the science of psychology by discussing how our understanding of sleeping and dreaming can be deepened by approaching these phenomena scientifically. As you may have noticed, much of modern psychology is concerned with understanding the mind (and behavior) by understanding how it is related to the workings of the body (especially the brain). This modern concern with the relation between the mind and the body is not new. In fact, it has been present since the emergence of scientific psychology during the second half of the nineteenth century. Psychologists of the late-nineteenth century often worked within departments of philosophy. Those who were attracted to psychology used the scientific method to investigate the nature of the human mind—a topic that traditionally had been the concern of philosophers. The scientific procedures they used were borrowed from the science of physiology (the biological science that studies the physical functioning of organisms). Thus, scientific psychology originated in a blending of the methods of physiology with traditional philosophical concerns about the mind. Early psychologists studied the human mind by investigating (with physiological methods) the basic sensations and perceptions of the external world that they thought made up the mind.

The philosophical focus on the human mind that gave rise to modern scientific psychology is very ancient, however. Gardner Murphy (1949) reconstructed what he believed to

be the earliest influences on the development of modern psychology—the concern with the nature of the human soul:

While primitive [that is, ancient] cultures differ as much in their psychology as they do in their basketry and pottery,... they show a general preoccupation with one recurrent problem—the nature and attributes of the soul. The dramatic difference between a sleeping and waking man invites the thought that something has gone out and then returned. The awakening man may recount a battle in which he took part [in a dream] while...his body lay still upon the ground [in sleep]. In illness, especially in delirium or coma, something seems to disappear which may, upon recovery, reappear. The conception of a psychic entity—a detachable soul, we might say—makes sense to him. (p. 5)

This soul was thought to contain our most fundamental human nature. For the next several thousand years, many people tried to understand human nature through reflection and speculation. A problem eventually emerged: if this soul is “detachable” from the body, if it can survive our deaths, then it must be something that is different from our bodies. If we identify our minds with the workings of this soul, then our minds, too, must be different from our bodies. If this is true, then how does the mind control the movements of the body, and how does the body affect the mind? This problem is referred to as the “mind-body problem” and it arose most dramatically during the seventeenth century in the philosophical musings of Rene Descartes.

Mind-Body Dualism

Rene Descartes (1596-1650) was a French philosopher and mathematician whose ideas have had an extremely powerful impact on the history of many areas of thought. Of most importance for psychology was Descartes' sharp distinction between the mind and the body—a distinction that probably most of you accept, partly because of Descartes' pervasive influence on modern ideas about the mind. Although Descartes was not the first to separate the mind from the body, his distinction was perhaps the most explicit and extreme. His doctrine of **mind-body dualism** asserted that **the mind consists of a nonphysical (spiritual, supernatural) essence whereas the body consists of a physical essence**. In other words, the mind and the body are different “things” that exist separately from one another. Descartes argued, however, that these two separate entities influence one another in some unknown way: the mind affects the body (for example, the mind moves parts of the body) and the body affects the mind (for example, when a flame touches the skin, the mind feels pain). Although Descartes believed that the body and the mind influence one another, he also argued that they could be distinguished in several different ways:

- (1) The function of the mind was thinking, whereas the function of the body involved everything else (for example, sensory stimulation, walking, reproduction, and digestion).
- (2) The body could be understood by studying physical events and physical processes, whereas the mind could be understood by studying nonphysical events and nonphysical processes.
- (3) The workings of the body were caused by forces external to it, whereas the workings of the mind were self-caused.

In other words, **the body was conceived of as a physical machine, whereas the human mind was conceived of as a supernatural entity**—some aspect (part or feature) of the soul that was entirely separate from the physical workings of the universe. According to Descartes, the body is completely determined by forces external to it whereas the mind is characterized by “free will”—it is independent of any causal forces outside of it.

What is meant by the term “free will”? What does it mean to say that something is not caused by anything else outside of it? Think about this for a minute. You probably believe that, when a person has free will, that person’s thoughts are, in some mysterious way, self-caused: the mind causes itself. Furthermore, you probably believe that such self-caused thoughts can influence the outside world by causing your body to move. When one has free will, in other words, one can choose any course of action independently of any influence outside of one’s own mind. For example, it seems to me that I freely chose to become a psychologist. Although I can point to external factors that probably influenced this decision, there seems to have been a point at which I chose to pursue this occupation rather than others and that this final decision was not caused by anything outside of my own conscious thought processes. It feels as if such decisions are the product of my free will—that, in some important sense, they are not caused by any other factor. I am not sure how this is possible, and I do not know if I am correct (in fact, I suspect that I probably am not), but this is how it feels to me. Descartes believed that such free will is the result of having a supernatural soul and, thus, that only humans can have free will. Descartes believed that, because nonhuman animals do not have souls, they are basically bodily machines the behaviors of which are determined completely by outside forces:

Because animals did not possess souls, they were believed to be automata [that is, things which act in an automatic or mechanical way]. Thus, the difference between humans and

animals so important to the Christian religion, was preserved. Also, animals were thought [by Descartes] to be devoid of feelings. How could they have feelings if they did not have souls? Descartes dissected live animals, before anesthesia was available, and was described as “amused at their cries and yelps since these were nothing but the hydraulic hisses and vibrations of machines.” (Schultz & Schultz, 1987, p. 26)

The behaviors of animals, therefore, could be explained by the doctrine known as **determinism**, a doctrine that states that **the behavior of a thing is caused by a sequence of prior events external to it**. For example, when someone shoves you hard, you fall over. Your behavior of falling over is not the result of your free will (you didn’t choose to fall over): it was caused by an event (the shove) that was external to your will. It is obvious that human behavior can sometimes be determined in this way (as we will see, many scientists believe that human behavior is always determined). According to Descartes, the behaviors of other animals are always determined in this way. That is why he could act towards animals in ways that seem so cruel to us. The distress caused by dissecting them was, to Descartes, simply the noises and movements of a machine.

How did Descartes’ thinking influence the development of modern psychology? By distinguishing between the mind and the body as sharply as he did, the mind became a focus of investigation for philosophers. The mind was now a separate “thing” that must be understood. Nevertheless, Descartes’ sharp distinction made the mind a nonphysical “thing.” **This meant that the mind could not be studied scientifically.** One can not study a nonphysical thing with the methods of science since these methods rely upon observation and physical measurement. I stated earlier in this chapter that scientists must have the attitude of empiricism—they must observe the phenomena they want to explain. But, how can one observe something that has no physical existence? Furthermore, I also stated there that scientists must have the attitude of naturalism. But, by definition, the mind now was seen as a supernatural entity that was beyond the natural processes of the world and, thus, those natural processes could not influence it. For Descartes, the mind was characterized by free will—it was not determined. Because scientists explain the universe by looking for prior causes of something, the mind itself could not be explained: it was self-caused. The general acceptance of Descartes’ philosophy made the development of a scientific psychology impossible at that time. Thus, scientific efforts after Descartes focused on the understanding of bodily structures, states, and processes. One historian of psychology put it this way:

although man [as a physical body] was encompassed by the world of science, human nature [that is, the nature of the human mind] was not. As a purely physical system, man was subject to universal physical laws. Everything [else] about man..., however, was untouched and even implicitly negated by the physical sciences. Thinking, experiencing, and acting were events not touched by physics and chemistry, and since physical laws were universal and comprehensive, these mental events were scientifically somehow unreal. (Mackenzie, 1976; p. 332)

Mental events became “scientifically unreal” because they were considered to be a part of the metaphysical (that is, beyond the physical) areas of philosophy. What was real for science was only the physical aspects of the universe.

The widespread acceptance of Descartes’ way of distinguishing between mind and body made it impossible to develop a scientific psychology during his time and for some time thereafter. If free will is considered to be a property of a conscious mind uninfluenced by anything outside of it, then it should be obvious that a scientific psychology can neither study this part of the mind nor explain any mental event or behavior caused by it. It took another 200 years for changes to occur in how we looked at the mind in relation to the body. A large part of these changes was the result of scientific research on the nervous system, which is the topic of the next chapter. As we will see there, we are now able to explain many of our mental events and behaviors as being caused by activity in the brain and the rest of the nervous system. In other words, it seems that many (and perhaps all) of our mental events and behavior are determined by the physical processes of the body. Some have even argued that our feeling of free will is simply an illusion. They believe that our behaviors and mental events are caused completely by other factors and that we are fooled into believing that we have free will because we often are not aware of these factors actually causing our thoughts, emotions, and behaviors. Furthermore, much research on internal biological factors and on external environmental factors has progressively expanded the limits of the mental events and behaviors explainable by deterministic processes.

SQ 1-17: Discuss the distinction between mind and body made by Rene Descartes and its influence on the emergence of modern scientific psychology. Most scientific psychologists now reject this distinction between the mind and the body. What influence has this had on psychology’s views on free will versus determinism?

At this point, most scientific psychologists assume that all behaviors and all mental events are determined by other factors; and, thus, they assume that the doctrine of determinism holds for

all human thinking, feeling, and behaving. In this book, I will present some evidence supporting this assumption. What all of this evidence ultimately means for the doctrine of free will and for our own place in the universe can only be decided by each of us as we struggle individually with the deeper existential issues that confront all of us every day of our lives. The importance of scientific psychology for how we see ourselves and our place in the grand scheme of things has always been what has attracted me to its study. But, even if you are not much concerned with such “deep” issues at this time, I believe that there is still much of interest for you in the study of psychology.

I hope that the brief survey of theories of sleeping and dreaming presented in this chapter has shown you that, if we are going to understand something as fundamental as the mind and behavior, we need to understand much more about the brain, processes of memory, personality functioning, and several other psychological and biological phenomena. The rest of this book is designed to help you to develop this knowledge.

Critical Thinking in Psychology

A major goal of educators in psychology is to help their students develop the ability to reason in complex ways about everyday matters involving psychological issues. The term often used for this sort of reasoning ability is **critical thinking**, which can be defined as **a rational process of developing correct answers to complex questions**. A “rational process” is one that involves the use of reasoning based on accepted principles of logic. There are three components of critical thinking that allow our thinking to be rational in this way. Critical thinking involves **(a) gathering appropriate evidence, (b) evaluating alternative answers with respect to this evidence, and (c) provisionally choosing the answer that best fits the evidence**. In essence, critical thinking is the kind of thinking used by scientists who are trying to develop good theories: they collect and evaluate evidence in order to test their theories. By briefly discussing the main features of critical thinking, therefore, I can summarize for you the main points of this first chapter. I can do this most effectively by describing several characteristics of critical thinkers:

1. Critical Thinkers First Conceptualize the Broad outline of a Question to be Solved. In order to do this, a person must first seek and compare various points of view on the question. This allows the person to clarify issues important to answering the question and thereby to generate an initial set of plausible answers. The word “plausible” means something that seems true at first glance although there is no firm evidence in its favor at this point. This is the most important step. **If a person can generate at least two plausible answers to a question, they will be**

more likely to think more deeply about the question as they try to reason out an answer. If, on the other hand, they settle on the first answer that seems plausible, they are not thinking critically.

2. Critical Thinkers Gather Evidence Appropriate to Evaluating Possible Answers to a Question. Critical thinkers first must identify reliable sources from which evidence may be gathered. In sifting through these sources to find evidence, they need to distinguish relevant from irrelevant information. Once they find such information, they then need to determine which information is most important for answering the question.

3. In Using this Evidence to Evaluate Possible Answers, Critical Thinkers Identify Biases and Assumptions. They strive to identify their own personal biases and to control for them. They also strive to identify unstated assumptions in the various viewpoints relevant to answering the question.

4. In Using this Evidence to Evaluate Possible Answers, Critical Thinkers Use Rational Processes of Thought. They make credible (believable) inferences from the evidence based on rules of logic. They also recognize when the evidence contradicts a proposed answer.

5. Based on Their Evaluation, Critical Thinkers Choose a Provisional Answer. They provide reasons for concluding that one answer is better supported than others. They communicate in some conventional manner the reasons for their choice so that others can examine the validity of these reasons. They continue to acquire more knowledge about the broad area related to the problem in order to prepare themselves for further examination of the problem. They are flexible in modifying their provisional answer upon further examination.

You should try to keep these characteristics in mind as you go through the discussion in the rest of this book. My hope is that, by the end of this course, you will be able to think more critically about psychological matters than you are now able to. I also hope that you will have realized by then how difficult it is to reason properly about the complex questions raised in the science of psychology. In each of the following chapters, I am going to describe specific scientific procedures that are essential to thinking critically in psychology. As you gain knowledge about these procedures, you should become more adept at understanding the nature of the scientific controversies I will be discussing and at thinking critically about them. One thing that will help you to develop this knowledge and to begin to think critically is **to raise questions with your instructor concerning what you are reading in this textbook and hearing during**

lecture. In order to ask a meaningful question about the material that you are learning, you must be thinking in an active and critical way about it. Sometimes students believe that they are bothering the instructor by asking questions. But the truth is, most instructors (the good ones at least) are very happy to get questions about the material: they get to talk more about a subject that they enjoy and they are pleased that students are interested enough in the material to ask questions about it. If you commit yourself to learning the material discussed in this course by asking questions and thinking critically, you probably will find that it becomes very interesting. In fact, of all the scientific subjects you will learn during college, psychology most likely will be the one that is most meaningful to you since it is the science that attempts to understand human nature.

SQ 1-18: List and discuss the five characteristics of critical thinkers.

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Practice Test for Chapter 1

1. In general, going without sleep for several days will tend to do which of the following?
 - A: It will cause you to feel very tired.
 - B: You will be completely unable to concentrate.
 - C: You will become psychotic (experience delusions and hallucinations).
 - D: all the above
2. According to what you know about the typical characteristics of REM sleep, what is probably wrong with the following person: "During REM sleep, Jeff got out of bed and began to dance seductively because he was dreaming about his side job as an exotic dancer at nursing homes."
 - A: He is experiencing an episode of somnambulism.
 - B: He is experiencing a sleep terror.
 - C: He is experiencing insomnia.
 - D: He is experiencing a lack of the paralysis normally seen during REM.
3. All of the following are most likely to occur during NREM sleep except
 - A: genital arousal.
 - B: sleep walking.
 - C: sleep terrors.
 - D: tossing and turning in bed.
4. Dreaming probably occurs most frequently during
 - A: stage 2.
 - B: stage 4.
 - C: REM.
 - D: stage 1.
5. Active sleep and quiet sleep are two stages of sleep that typically are seen in
 - A: newborns.
 - B: people addicted to alcohol and other sedating drugs.
 - C: elderly adults.
 - D: people who are severely depressed.
6. REM sleep is characterized by all of the following except
 - A: eye movements.
 - B: the most vivid and complex dreams.
 - C: genital arousal.
 - D: muscle paralysis.
7. A person who is selectively deprived of REM sleep over five nights is most likely to
 - A: require more and more time to fall asleep as the deprivation continues.
 - B: spend much of the first night after deprivation ends in REM sleep.
 - C: sleep for twelve or more hours the first night after deprivation ends.
 - D: experience heightened emotions and a sense of well-being as the deprivation continues.

8. The French philosopher, Renes Descartes, believed that only the human mind
- A: could be studied with the methods of science.
 - B: could be characterized as having free will.
 - C: really existed: all else was an illusion.
 - D: was completely determined.
9. Which of the following is the BEST evidence for concluding that at least some animals dream?
- A: Dogs can often be seen twitching and making noises during sleep.
 - B: A gorilla who had learned some sign language once communicated the phrase "sleep pictures" in reference to the visual images she had seen during sleep.
 - C: Almost all mammals and some birds enter a stage that looks like REM.
 - D: all the above
10. Jeff dreamed that he was being chased through the solar system by alien skeletons with light sabers. Jeff's therapist believes that this dream was caused by repressed sexual urges resulting from Jeff's strict upbringing. According to Sigmund Freud, this interpretation represents the _____ content of the dream.
- A: covert
 - B: overt
 - C: latent
 - D: manifest
11. In which of the following ways did the French philosopher, Renes Descartes, importantly influence the emergence of modern psychology
- A: He was the first scientific psychologist.
 - B: He single-handedly developed the science of physics—a science which served as the Model for psychology.
 - C: He worked closely with Sigmund Freud on the development of psychoanalysis.
 - D: His view that the mind had a nonphysical essence implied that the mind could not be studied scientifically.
12. I have developed a theory about differences in the intelligence of students: students who sit in the front rows of the classroom are more intelligent than students who sit in the back rows. My evidence for this theory is that students in the front rows seem more likely to ask questions during class than students in the back rows; and they seem more likely to come up after class as well. Why might you conclude that this theory is not a scientific theory?
- A: I am obviously biased against those people who sit in the back rows.
 - B: The evidence in support of my theory is very poor.
 - C: I have not made any observations of students.
 - D: I did not first ask students their opinions about all of this.

13. Last semester, I had a bad cold. A nurse told me that I should be taking large doses of Vitamin C if I want to prevent future colds. I annoyed her by asking for the evidence to back up her claim. My tendency to look at the evidence supporting a claim is referred to as

- A: naturalism. B: dualism. C: skepticism. D: empiricism.

14. During adulthood, which of the following changes in sleep tends to occur?

- A: the percentage of the night spent in stage 1 decreases
B: the percentage of the night spent in REM increases
C: the percentage of the night spent in slow-wave sleep decreases
D: the frequency of nightmares increases

15. Which of the following is an important reason why we can never say that a theory is true?

- A: Because theories are someone else's opinion about what is true.
B: Because only facts can be true; and a theory is only a hunch, not a fact.
C: Because some people might disagree with what is said in a theory.
D: Because reality is usually more complex than we can ever fully describe.

16. Which of the following chemicals is produced by the brain as night approaches, thereby making us feel sleepy?

- A: endorphins B: ethanol C: melatonin D: dopamine

17. Which of the following terms would be closest to what is meant by the word "theory" in this course?

- A: opinion B: guess C: hunch D: explanation

18. Sleep spindles first appear during ____ sleep.

- A: REM B: stage 4 C: stage 3 D: stage 2 E: stage 1

19. Last night, I discovered a new species of fly. The five members of this species that I saw were colored blue. Therefore, I concluded that the normal body coloring of this species of fly is blue. In drawing this general conclusion from five observations that I have made, I have just made use of a type of reasoning known as

- A: induction. B: theorizing. C: prediction. D: explanation.

20. I was trying to select a student who might be a good tutor for students in introductory psychology. I had narrowed the choices down to one woman and one man, both of whom had taken a large number of psychology courses and who had obtained about the same grades. I chose the woman because of a research study I once saw that showed that women are more empathic and sensitive than men. Which of the following mistakes did I make?

A: I incorrectly used what might be true on average to say something about individuals.

B: I should have picked the man because it has been shown that men are more empathic and sensitive than women are.

C: The study I looked at did not use the scientific method.

D: I should have picked the man because it has been shown that students learn better from tutors who are demanding.

21. When someone performs complex movements during sleep, we say that they are exhibiting somnambulism (sleepwalking). Which of the following statements about somnambulism is FALSE?

A: Sleepwalking occurs during deep sleep.

B: Sleepwalkers typically are not dreaming.

C: It is dangerous for a sleepwalker to be awakened.

D: People occasionally commit violent acts while sleepwalking.

22. Last night, just as I was falling asleep, I saw flashes of light and colors swirling around my bed for a few seconds. I most likely was experiencing

A: hypnagogic phenomena.

B: REM-sleep behavior disorder.

C: a dream.

D: a sleep terror.

E: hypnopompic phenomena.

23. The most fundamental goal of psychology is to understand

A: the behaviors and mental events of individuals.

B: the nature and functioning of social groups and culture.

C: how best to treat mental disorders.

D: the evolutionary history of humans.

24. On average, children first begin to have nightmares at about ____ year(s) of age.

A: 1

B: 3

C: 8

D: 10

25. After two days without sleep, people generally will
- A: begin to feel as if they do not need sleep and will find it easier to stay awake for the next several days.
 - B: experience brief periods in which their brain waves resemble stage 1 even though they appear to be awake.
 - C: begin to suffer from anxiety and depression, and will exhibit uncontrollable crying.
 - D: fall immediately and without warning into a REM sleep from which they cannot be awakened easily.
26. Because of his work load and school, Gene has been getting only three hours of sleep per night for the last three weeks. What is the best prediction you can make based on studies of partial sleep deprivation?
- A: Gene will feel tired but will show few negative effects.
 - B: Gene eventually will become seriously ill from his lack of sleep.
 - C: When he again is able to sleep as much as he wants, Gene will be unable to sleep more than three hours.
 - D: Because Gene is not experiencing enough dreams during sleep, the dream state will begin to occur while he is awake (he will have "waking dreams").
27. Which of the following groups of people would be most likely to show sleep-onset REM?
- A: those who have just taken a sleeping pill
 - B: those who have just had a couple alcoholic drinks
 - C: those who have been deprived of REM for several nights in a row
 - D: all the above
28. From 19 years to 90 years of age,
- A: the percentage of the night spent in REM stays about the same.
 - B: the number of hours spent asleep (including naps) increases gradually.
 - C: the total number of hours spent per night in REM stays about the same.
 - D: all the above
29. If I stimulate a certain area of your brain, your right arm will move. The brain stimulation is a(n) ____ cause of the arm movement.
- A: empirical
 - B: ultimate
 - C: distal
 - D: proximate
30. Nightmares are most likely to occur
- A: immediately before or after a sleep terror.
 - B: when a person has been deprived of slow-wave sleep.
 - C: during REM sleep.
 - D: during stage 1 sleep.

31. Which of the following brain waves is most likely to characterize your EEG as you are reading and trying to understand this question?

- A: beta B: delta C: theta D: alpha

32. When a nondreaming person awakens suddenly from deep sleep in a state of extreme arousal and with such a feeling of panic that he/she screams out, that person probably is suffering from

- A: somnambulism. B: a sleep terror. C: a nightmare. D: insomnia

33. Therapeutic touch is a procedure that is thought by some to relieve symptoms of medical illnesses by placing one's hands over the patient's body. If I insisted on studying therapeutic touch by making direct observations of the number and severity of symptoms in patients who had received it versus those who had not, I would be exhibiting the scientific attitude known as

- A: naturalism. B: empiricism. C: dualism. D: skepticism.

34. Jeff dreamed that he was being chased through the solar system by alien skeletons with light sabers. According to Sigmund Freud, this represents the _____ content of the dream.

- A: latent B: manifest C: covert D: overt

35. During the second half of the night, periods of NREM sleep

- A: tend to show more beta waves.
B: are made up mostly of light stages of sleep.
C: become more common than REM sleep.
D: include more slow-wave sleep.

36. Which of the following brain waves is most likely to characterize your EEG just after you fall into a light sleep?

- A: beta B: delta C: alpha D: theta

37. Over the years, I have observed that some students in introductory psychology do not do well. I have developed a theory about this: the cause of poor performance in this course is lack of motivation to study because the student thinks the course material is boring. I develop a prediction to test this theory: if I ask all students to answer the following question—"do you think the course material is boring?"—those students who are not doing well will be more likely to answer, "yes." I thus make an interpretation: those who do poorly think the course material is boring and, so, I better find ways to make it more interesting. Why would you conclude that this theory is NOT a scientific theory?

- A: I did not develop a prediction.
B: I did not make observations to test my prediction.
C: I did not use statistics.
D: I am talking about averages, not variances.

38. If you wanted to determine whether a man's impotence (the inability to achieve an erection during sexual activity) was due to a physical or psychological problem, which stage of sleep might you want to observe?

- A: stage 1 B: stage 2 C: stage 4 D: REM

39. In the book, it was stated that science is based fundamentally on the idea that

- A: our everyday judgements cannot be completely trusted.
B: we cannot know reality because we all perceive that reality differently.
C: humans are very good at drawing accurate conclusions based on their personal experiences.
D: our intuitive side is better for finding truth than our rational side.

40. Which of the following possible differences between REM and NREM dreams is best supported by evidence?

- A: Dreams are more vivid and complex, on average, in REM than in NREM.
B: Dreams are more frequent, on average, in REM than in NREM.
C: Dreams are more exciting and bizarre, on average, in REM than in NREM.
D: all the above

41. At what age does the proportion of REM sleep obtained per night stabilize at about 20%?

- A: 14-18 years B: 3-5 years C: 39-44 years D: 19-24 years

42. According to the psychoanalytic theory of Sigmund Freud, the most important function of dreaming is

- A: to wake up the brain periodically during the night.
B: to mediate the biological processes of the body.
C: to improve a person's intellectual functioning.
D: to express unconscious conflicts and to satisfy unconscious desires.

43. The functions of a theory are

- A: the creation and application of theoretical approaches.
B: the assessment and construal of phenomena.
C: the organization, prediction, explanation, and control of data.
D: the understanding and eventual elimination of cognitive epiphenomena.

44. It seems that many of the dreams collected under laboratory conditions are mundane and unexciting. The idea referred to in the book as the observation effect, however, suggests that this conclusion may not be generally true because

- A: people's behaviors may change when they know they are being observed.
B: it is impossible to make observations of mental events.
C: observations are not the best evidence for a belief.
D: dreams are affected by observations the dreamer made while awake.

45. The activation-synthesis theory of REM sleep states that dreams
- A: are the byproduct of widespread electrical activity in the brain.
 - B: help us to resolve conflicts we have experienced during the previous day.
 - C: are involved in memory formation.
 - D: are expressions of unconscious parts of the mind.
46. In which of the following conditions would a young adult tend to dream the most?
- A: during the last half of the night
 - B: when he/she has been deprived of slow-wave sleep
 - C: after having several alcoholic drinks
 - D: after taking a normal dose of sleeping pills
47. On average, young adults sleep about eight hours per night. Heinrich, who is 25 years old, sleeps 10 hours per night. According to the discussion about averages and variances, what should we conclude with regard to Heinrich's sleep habits?
- A: Heinrich is probably suffering from a sleep disorder.
 - B: Heinrich sleeps more than the average for young adults.
 - C: Heinrich would feel just as good with two hours less sleep per night.
 - D: Heinrich is sleeping too much.
48. Which of the following brain waves is most likely to characterize your EEG as you lay back in a lounge chair while letting yourself relax with your eyes closed?
- A: delta
 - B: alpha
 - C: beta
 - D: theta
49. In general, changes in the stage of sleep
- A: occur rarely in humans.
 - B: occur occasionally in humans but often in most other mammals.
 - C: are associated with changes in the electrical activity of the brain.
 - D: happen more frequently as the night progresses.
50. If I electrically stimulate your reticular activating system while you are asleep, you most likely will
- A: enter NREM sleep.
 - B: fall into a very deep sleep from which it will be very difficult to awaken you.
 - C: have a sleep terror.
 - D: wake up.

CHAPTER 2

PROXIMATE CAUSES OF MENTAL EVENTS AND BEHAVIOR: ACTIVITY OF THE NERVOUS SYSTEM

In this chapter, we will continue learning about psychology by looking at the structure and functioning of parts of the nervous system. The nervous system is made up of the brain, the spinal cord, and the nerves leading into and away from these two structures. The guiding assumption of our discussion will be that **mental events and behaviors are caused most proximately by activity in the nervous system**. For the sake of simplicity, I will call this assumption the **brain/mind theory**, even though it involves more than just the brain and the mind (it also involves the rest of the nervous system on the “brain” side, and the behaviors of the organism on the “mind” side). In the preceding chapter, I stated that all theories must be supported by evidence. This evidence is obtained by (a) forming predictions implied by the theory being tested—predictions about the relationships between important concepts in that theory; and then (b) making observations to determine if these predicted relationships actually exist. Good theories are ones that are supported by a large amount of such evidence. What predictions can we derive from the brain/mind theory? Think about this a little. Have you witnessed anything in your everyday life that might suggest to you that the brain or any other part of the nervous system causes human behaviors, thoughts, and emotions? How about people who have suffered brain damage because of a stroke, a severe blow to the head, a lack of oxygen, or some other problem? You may have noticed that some of these people (perhaps you have suffered such damage yourself) have difficulty with movements of their bodies or with speaking; or perhaps they are very emotional or have unusual perceptual experiences. Such disruptions of behavior and mental events caused by damage to the nervous system are consistent with the brain/mind theory. In the rest of this chapter, I will try to provide you with more and better evidence for the theory. In doing this, I also will teach you about the best ways of collecting evidence.

Oliver Sacks (1995) described a man who had part of his brain destroyed by a large tumor that was removed in 1975. While it was growing and after it was removed, this man—whom Sacks referred to as “Greg”—had many problems. For example, he had become blind and obese, had lost all his hair, and would often make bizarre comments. Furthermore, Greg did not seem to know where he was or what the date was. In fact, he seemed to be living perpetually in the late 1960s—a time period during which he had been a teenager. He had been heavily involved in the “hippie” culture of that time—taking drugs and, eventually, devoting himself to the practice of an Eastern-influenced religion. Sacks first met Greg in 1977:

Lacking facial hair, and childlike in manner, he seemed younger than his twenty-five years. He was fat, Buddha-like, with a vacant, bland face, his blind eyes roving at random in their orbits, while he sat motionless in his wheelchair. If he lacked spontaneity and initiated no exchanges, he responded promptly and appropriately when I spoke to him, though odd words would sometimes catch his fancy and give rise to associative tangents or snatches of song and rhyme. Between questions, if the time was not filled, there tended to be a deepening silence; though if this lasted for more than a minute, he might fall into Hare Krishna chants or a soft muttering of mantras. (p. 45)

Greg seemed to have forgotten much of what had happened to him since about 1968. In fact, he remembered neither becoming ill nor that he had developed any problems because of his brain tumor. Sacks measured Greg's severe **amnesia** (defined as **a loss of memory greater than can be explained by normal, everyday forgetting**) in different ways:

It was easy to demonstrate the severity of his immediate amnesia. If I gave him lists of words, he was unable to recall any of them after a minute. When I told him a story and asked him to repeat it, he did so in a more and more confused way, with more and more "contaminations" and misassociations—some droll, some extremely bizarre—until within five minutes his story bore no resemblance to the one I had told him. Thus when I told him a tale about a lion and a mouse, he soon departed from the original story and had the mouse threatening to eat the lion—it had become a giant mouse and a mini-lion. Both were mutants, Greg explained when I quizzed him on his departures. Or possibly, he said, they were creatures from a dream, or "an alternative history" in which mice were indeed the lords of the jungle. Five minutes later, he had no memory of the story whatever. (p. 47)

As Greg's brain tumor grew, he had developed problems in his behaviors (he was now in a wheelchair), in his perceptions (he no longer could see), in his memories (he could not remember anything that happened to him just a few minutes before), in his emotions (he seemed indifferent to the world and rarely became excited about anything), and in his body (he became obese and hairless). Could his tumor have had anything to do with these problems? And could this then be evidence for the brain/mind theory?

At first glance, these associations between Greg's brain damage and his mental/behavioral problems might seem to you to prove that activity in the nervous system is the cause of human mental events and behaviors. You might even think that this explanation is obvious. If this is what you concluded from Greg's case, it is probably because you already accept some version of the

brain/mind theory, and Greg's problems are just one more piece of evidence for this belief. But let's pretend that you never before heard this theory, and that Greg's case is the first one you have encountered that tries to tie together activity in the nervous system with behaviors and mental events. Would you still want to accept this story as conclusive evidence for the brain/mind theory? You may be less certain now. Pretending in this way, I would argue that Greg's case, all by itself, is not enough to conclude that activity in the nervous system causes our behaviors, thoughts, and emotions. To understand why, I will need to continue the description of the "scientific method" that I began in Chapter 1. In doing this, I first will consider how we measure the concepts that make up the general principles of theories; and then I will describe different types of scientific study that allow us to construct and test general principles.

SQ 2-1: Describe the brain/mind theory. Briefly describe the kinds of evidence that might support it.

Theory Construction: Variables and Operational Definitions

As I tried to make clear in the last chapter, **scientific research** involves an attempt to **discover general relationships among concepts**—to discover general principles. In the case of the brain/mind theory, we want to discover relationships between the concepts of "brain activity," on the one hand, and some set of mental processes, such as "memory," on the other. In order to measure these concepts, we must turn them into "variables." A **variable is anything that has different values or expressions that can be measured**. For example, "intelligence" is a concept that can be measured by the variable of "IQ" scores: IQ ranges from values of 0 to 200, with higher scores indicating greater intelligence. The concept of "cancer" can be measured by the variable of the "presence or absence of a tumor"—a variable that has only two expressions (you either have a tumor or you don't). For the concept of "memory," we might give people a list of twenty words to memorize and then, at some later time, have them recall as many of these words as they can. In this case, the variable being measured is "the number of items recalled from a word list." By thinking a bit more about these examples, it should be clear to you that each concept can be measured by using variables obtained in different ways. For example, the concept of "memory" may be measured by having people recall a word list, a number list, a story they have heard, etc.; and the time we wait before having them recall the material might be one second, ten seconds, ten minutes, one day, etc. It should be obvious that each of these variables involving memory is actually measuring a different aspect of the concept. For example, some of the variables are measuring memories that last only a very short period of time, whereas others are measuring more enduring memories. **When different studies measure the same concept with**

different variables, their results are probably going to differ. This is not necessarily a problem as long as we are aware of which aspects of the concept these different variables are measuring.

When we measure the same concept in different ways, we are using different “operational definitions” of the concept. An **operational definition is the defining of a concept in terms of the specific procedures used to observe it.** In other words, an operational definition involves the set of activities we perform when we measure a variable. The best way to understand what is meant by an operational definition is to look at a simple example. Students sometimes complain to me that the classroom is too cold. They are using the concept of “temperature” to communicate that they are uncomfortable. To me, however, the room typically feels “just right.” This difference of opinion between my students and me about the temperature of the classroom shows clearly that judging temperature in this way is much too **subjective** (a word that refers to **observations that result primarily from a person’s thoughts and feelings**—observations that exist only in that person’s mind). That is, each of us judges temperature differently: each of us has a different feeling about what is hot, cold, or “just right.” An operational definition of temperature, however, can help us to overcome this subjectivity. For example, we might operationally define “temperature” by the activities involved in reading a thermometer that is calibrated in the Fahrenheit scale. In this case, the variable used in our operational definition of temperature is the readings that we take off this thermometer. We also can operationally define three temperature ranges: “cold” might refer to “any room temperature that is less than 70° F,” “just right” might be “any temperature between 70° F and 80° F,” and “hot” might be “any temperature above 80° F.” By operationally defining room temperature in this way, we have removed the personal judgements of the observers: all we need to do is consult a thermometer and our operational definitions to determine if a room is hot, cold, or “just right.” The advantage of these operational definitions should be obvious: we now will agree about the observations of hot, cold, or “just right.” One disadvantage, however, should also be obvious: the room may not feel hot to us even though the operational definition states that it is. In other words, **operational definitions may seem arbitrary if they don’t reflect the experience of most people.** This arbitrariness becomes obvious when different people use different operational definitions of the same concept. Nevertheless, this is not an insoluble disadvantage since, if we get enough people to agree with us, we could change the operational definition until it is brought into agreement with the experiences of most (but probably never all) people. On the other hand, as I have been suggesting, there is a very important advantage to using operational definitions: **operational definitions make our observations less biased by individual differences in how a situation is perceived.** This is important in psychology since what we

are trying to measure, mental events and behavior, are phenomena for which subjectivity is a major problem.

In fact, many of our judgements and observations in everyday life are plagued by problems with subjectivity. For example, students sometimes complain that the grading of a particular essay question was “not fair” (perhaps because they answered it in a way similar to their friend who obtained a higher grade). What they are saying is that the grading of essay tests is too subjective: it depends too heavily on the instructor’s personal opinion. Subjectivity is even more of a problem when we are judging art, music, the taste of pizza, and anything else in which the evaluation of our own perceptions is involved. That is why we will say to someone with whom we disagree, “well, that’s just your opinion.” We may believe that the other person is absolutely wrong, and he/she may feel the same way about our opinion. But the real problem is that, to some extent, we all experience the world—the reality around us—differently. As scientists, we want to move beyond such individual experiences so that we can reach a consensus. Operational definitions of mental concepts allow us to be more **objective** (a word that refers to **observations that are determined by processes external to individual minds**—observations that are not biased by personal feelings). For example, we would not want to measure the intelligence of our research subjects by the impression they make upon us. We all have different impressions about who is “smart” and who is not. Instead, in trying to be objective, we could operationally define (or “operationalize”) the concept of “intelligence” by using the variable of IQ scores. We might say that a person with “superior” intelligence has an IQ over 130, a person with “above average” intelligence has an IQ over 115, a person with “average” intelligence has an IQ between 85 and 115, and so on. Or we might operationalize this concept with the variable of “the number of minutes it takes to complete the New York Times crossword puzzle.” In this case, a person with “superior” intelligence completes it in less than 30 minutes, a person with “above average” intelligence completes it in 30 to 60 minutes, a person with “average” intelligence completes it in 61 to 120 minutes, and so on. Are these two operational definitions measuring the same concept of intelligence? In order to answer this question, we would have to look at the evidence. If people who were labeled as superior, above average, average, below average, or inferior with the IQ test received the same label after being tested with the puzzle, this would suggest that the two operational definitions were measuring the same thing. If they did not receive the same labels (and I suspect that, in the present example, there would be some differences), then the two operational definitions are measuring different aspects of intelligence.

Let's try to develop an operational definition of "brain damage" so that we can investigate the case of Greg. Think about a possible operational definition and then write your answer in the space provided below:

There are many ways to operationalize the concept of brain damage. We could measure brain damage by looking for abnormal EEGs (we would have to operationalize the term "abnormal" in this case). Or, we might look for areas on an X-ray that indicate missing brain tissue. Or, we could look for reduced blood flow to particular parts of the brain when certain tasks using that area are being performed. There are several other operational definitions that we also could use. If we compared these different operational definitions, we often would find that a particular person might be identified as having brain damage with one of them but not with some (or even all) of the others. This example illustrates one important lesson you should have learned from the preceding discussion of operational definitions: when you read an article or hear a news report about some new finding by researchers concerning mental concepts (such as intelligence, memory, or anorexia nervosa), especially those findings that disagree with previous knowledge, your first thought should be, "how did they operationalize the concept?" If you do this, **you will find that at least some controversies are due to the use of different operational definitions**—definitions that actually are measuring different concepts.

SQ 2-2: Describe the major goal of scientific research. Define what is meant by a "variable" and give several of your own examples of variables. What is the relationship between variables and concepts? What is the relationship between variables and operational definitions? Discuss one advantage and two disadvantages of using operational definitions to measure concepts in a theory. How can we tell whether or not different operational definitions actually are measuring the same concept?

Theory Construction: Discovering General Principles

The most important goal of scientific research is to find *general principles* involving the concepts of a theory—finding relationships that are true for entire groups of individuals. For example, with regard to the testing of the brain/mind theory, not only do we want to know if Greg's tumor caused his problems, we also want to know if a tumor growing in the same place in most people would give rise to similar problems. Specifying the variables that are to be used in our

operational definitions is the first step in accomplishing this scientific goal. The next step is to determine which type of study we are going to perform. There are three basic types of study that are used in psychological science to discover relationships among concepts: case studies, correlational studies, and experimental studies.

The Use of Case Studies

The description of Greg presented above is an example of a “case study.” A **case study** is **an intensive examination of a single individual** who exhibits a phenomenon in which we are interested. In the case study of Greg, the “phenomenon of interest” was the set of unusual behavioral and mental symptoms he expressed: we would not even be talking about Greg here if he had acted and thought normally. In a case study, we make detailed observations of various characteristics of the person described in the study—characteristics that we think may be possible causes of the phenomenon of interest. In Greg’s case study, the characteristic that we believe may be causing his behavioral/mental symptoms is the brain damage resulting from his brain tumor. Thus, we would want to make certain that we included a detailed description of his brain damage in terms of its location and its extent. But, since we are not yet certain that his problems are due to his brain damage, we also would want to include additional information. This additional information would include observations that might indicate other possible causal “factors” of his behavioral and mental symptoms (a **factor is an event or condition that causes something to happen**). Case studies, therefore, typically include a great deal of information such as medical histories, the results of neurological tests, important childhood experiences, the results of personality and intelligence tests, and descriptions of how the individual interacts with others. The most important advantage of case studies is that **they give us a large amount of potentially useful information**.

Although we often are focused on only one of the factors as the most likely cause of the phenomenon being investigated, it is very possible that one or several of the other factors are the actual cause or causes. These other possible causes are referred to as “extraneous variables.” An **extraneous variable** is defined as **any factor, other than the factor we are studying, that may cause changes in the phenomenon in which we are interested**. For example, although we are focused on the possible causal effects of Greg’s brain damage, the people in Greg’s religious cult believed that his mental/behavioral symptoms were caused by the effects of his religious practices on his “spiritual being”:

[Greg] complained that his vision was growing dim, but this was interpreted, by his swami and others, in a spiritual way: he was “an illuminate,” they told him, it was the “inner light”

growing. Greg had worried at first about his eyesight, but was reassured by the swami's spiritual explanation. His sight grew still dimmer, but he offered no further complaints. And indeed, he seemed to be becoming more spiritual by the day—an amazing new serenity had taken hold of him. He no longer showed his previous impatience or appetites [desires], and he was sometimes found in a sort of a daze, with a strange...smile on his face. It is beatitude, said his swami—he is becoming a saint. (pp. 43-44)

Thus, Greg's religious practices represent one of the extraneous variables we would need to rule out before we could conclude that Greg's brain damage is the cause of his symptoms.

Extraneous variables form the basis for alternative causal explanations of the phenomenon we are trying to understand. By comparing the case studies of different people with brain damage in the same location, we might find that, although most cases showed similar behavioral/mental symptoms, only Greg's case involved unusual religious practices. In this way, we might be able to rule out his religious practices as a cause of his symptoms. This would tell us that something else shared by all the cases is a more likely cause of the symptoms. This might be the brain damage, but it also might be something else that they share—perhaps something we have not measured. Thus, there is one major disadvantage with case studies: **we cannot, with sufficient certainty, rule out the effects of extraneous variables on the phenomenon of interest.** Because of this limitation of case studies, we are not able to rule out other causal explanations of the phenomenon that we are trying to understand.

SQ 2-3: Define what is meant by an extraneous variable and discuss how they make it difficult for us to rule out alternative explanations for a phenomenon. Discuss one advantage and one disadvantage of using case studies.

The Use of Correlational Studies

In looking at cases like that of Greg, we are trying to find a general relationship between brain damage and mental/behavioral symptoms. Case studies may suggest possible general relationships, but they are limited by the small number of cases we can study intensively. If we want to determine if a relationship is a general one, we must measure the relevant variables in a large group of individuals. If we did this, we would be performing a **correlational study**—a type of study in which researchers **observe and measure, in a large group of people, two variables as they exist at the present time.** The results of a correlational study allow us to determine if the two variables “go together” (that is, change together, on average) in this group of people. For example, early in the twentieth century, it was noticed from individual cases that children who were poor readers tended to make a large number of erratic eye movements while

reading. In these individual cases, the variable of “eye movements” seemed to change along with the variable of “reading ability” (as the number of eye movements increased, the reading ability of these children got worse). In looking at a large number of children in a correlational study, it was found that this relationship was a general one: children who made more eye movements tended to read more poorly than children who did not. This study illustrates the major advantage of correlational studies: they **allow us quickly to discover general relationships among variables**.

When we find a general relationship in a correlational study, we say that the two variables show a “correlation.” A **correlation is the estimate of the degree to which two variables are associated**—the degree to which they change together, either in the same direction, a **positive** correlation, or in opposite directions, a **negative** correlation. An example of a positive correlation is the association between height and weight: as height increases, weight tends to increase (and vice versa). The correlation between reading ability and eye movements is an example of a negative correlation: as one increases, the other decreases. Another example of a negative correlation is the association between how sleepy you feel and the amount of time it takes you to fall asleep: as you feel more sleepy, it takes less time for you to fall asleep (and vice versa). In addition to the distinction between positive and negative correlations, a correlation can be small or large. When two variables show a large correlation, they change together in the same way in most individuals observed. On the other hand, when two variables show a small correlation, they are not as likely to change together consistently from one individual to the next. An example of a small correlation is the association between a person’s IQ score and the amount of success he/she has in an occupation. Although these two variables do change together to some extent, many people with high IQ’s are not very successful in their occupations, and many people with low IQ’s are very successful in their occupations. An example of a large correlation is the association between how well a person eats as a child and that person’s height: people who eat well as children are much more likely to be taller than those who do not. Regardless of the size of the actual correlation, there is one thing that should be clear: even when there is a very large correlation between two variables, we do not always see the association in each individual. There are people who ate very well as children who are very short, and others who had poor nutrition as children who are very tall. We say that, *on average* (that is, in general, when we look at a large number of people), the relationship is true.

Finding correlations, either positive or negative and either large or small, tells us that the two variables change together, but it doesn’t tell us what is causing the variables to be correlated. For example, based on the results of the correlational study between eye movements and reading

ability, some educators decided that the poor reading ability of the children in the correlational study was caused by the fact that they made too many erratic eye movements while scanning a page of written material. Thus, these educators started programs in which they trained children to move their eyes more smoothly. These programs failed because, as it eventually was discovered, it was not that the children's erratic eye movements caused them to have reading problems but, instead, that the children's poor reading ability had caused them to make more erratic eye movements:

Slow recognition of words and difficulties with comprehension lead to erratic eye movements. When children are taught to recognize words efficiently and to comprehend better, their eye movements become smoother. Training children's eye movements, however, does nothing to improve their reading comprehension. (Stanovich, 1992; p. 74)

Thus, the two variables were correlated, but there was no way to tell at first why they were correlated in this manner. Thus, the major disadvantage of correlational studies is that **we can infer nothing about what is causing a correlation without doing other studies.**

Why do we not know what is causing a correlation between two variables? To answer this question, we need to know how correlations are discovered. When performing a correlational study, the researchers measure the variables as they already exist in nature. Thus, by the time they measure the variables, any factor that may have caused the variables to change together—to become associated—typically have already had their effects (that is, the causes occurred at some point in the past before the observations began). Because these causal factors were not observed, the researchers cannot determine their effects on the variables as they now exist. For example, eye color and hair color are correlated: people with darker hair tend to have darker eyes. When performing such a correlational study, we measure the hair color and eye color of each subject as they are now expressed. Whatever factors caused the eyes and the hair to have these colors, however, happened sometime in the past. Perhaps the hair and eye colors show a high correlation because most individuals we are measuring have dyed their hair to match the color of the contact lenses they wear. We would not know this, however, if we had only measured the correlation between the two variables because the most important causal factor had occurred in the past before we began our observations. **All that we are able to determine with a correlational study is that, at the present time, the two variables tend to change together from one individual to the next in a large group of individuals.**

Thus, when we find a correlation between two variables (such as hair color and eye color) we know that something is causing these two variables to be correlated. But, what is it? In general,

when we find a correlation between two variables, A and B, there are three possible causal relationships among the relevant variables:

- (1) Changes in Variable A may be causing changes in Variable B;
- (2) Changes in Variable B may be causing changes in Variable A;
- (3) Changes in Variable C (an unmeasured and unknown third variable) may be causing changes in both Variables A and B.

In other words, correlational studies have two major problems that make it difficult for us to infer anything about the cause of the correlation. (1) The **directionality problem** refers to the possibility that the first variable is causing changes in the second variable, or that the second variable is causing changes in the first variable. (2) The **third-variable problem** refers to the possibility that there is an unmeasured third variable that is causing changes in both the first and second variables. In other words, a **third variable** is an **extraneous variable that is causing changes in both of the correlated variables**. For example, there is a correlation between the kind of car one drives and whether or not one has cancer: people who drive sports cars get less cancer, on average, than people who drive other kinds of car. What is causing this correlation? We can't know for sure based on this correlation alone, but there are several possibilities. With regard to the directionality problem, it could be that driving a sports car causes people to get less cancer (perhaps they feel better about themselves and this positive attitude results in less cancer). On the other hand, it could be that getting cancer causes you to choose automobiles other than sports cars (perhaps their cancer treatments cost so much that these people cannot afford sports cars). With regard to the third-variable problem, it could be that there is an extraneous variable, such as age, that has causal effects on both the kind of car one buys and one's chances of getting cancer. That is, people who are older are less likely to buy a sports car and they also are more likely to get cancer.

To understand these two problems better, let's look at another example. It has been found that the existence of gum disease (Variable A) in a pregnant mother is *negatively* correlated with the birth weight (Variable B) of her baby. In other words, when the mother has more gum disease, her baby tends to have a lower birth weight; when she has less gum disease, her baby tends to have a higher birth weight. With regard to this example, how would you describe the directionality problem? Think about this for a minute and then put your answer below:

With regard to the two correlated variables, the cause may go in either direction. (a) It could be that gum disease in the mother is causing low birth weight in the baby. For example, in her body's attempt to deal with her gum disease, it could be that the mother is using more energy—energy that no longer is available to her developing fetus. This causes the baby to weigh less at birth. (b) On the other hand, it could be that problems in the developing fetus are causing the mother to develop problems of her own, such as gum disease. For example, it could be that the developing fetus is having some sort of developmental difficulty that is sapping the mother's strength, thereby leaving her more vulnerable to various diseases.

With regard to the correlation between gum disease and birth weight, how would you describe the third-variable problem? Think about this for a minute and then put your answer below:

Perhaps there is some other factor, such as extreme poverty and the resulting lack of adequate health care, that results not only in more disease in the mother, but also more developmental problems in the newborn. In this case, Variable C would be “the lack of adequate health care”—an unmeasured extraneous variable that is causing changes in the other two variables. Because of the directionality and third-variable problems, if we obtain a correlation between two variables in a correlational study, **we can say that the two variables are associated** (that is, that they tend to change together), **but we can not infer anything about the cause of this association.**

SQ 2-4: Discuss what is meant by the term “correlation” and describe the type of research study performed to discover correlations. Give your own examples of a positive and a negative correlation. Give your own examples of a large and a small correlation. Discuss the two problems that make it difficult or impossible to infer a causal relationship from a correlational study. If we cannot make causal inferences from the results of a correlational study, why do you think we bother performing them in the first place?

The Use of Experimental Studies

When developing our theories, we usually want to say something about the cause or causes of a general relationship. What do we have to do to eliminate the effects of the directionality and third-variable problems that hinder us from making causal inferences in correlational and case studies? We can eliminate their effects by **controlling** the research situation—by **setting up the research situation in such a way that we can rule out all but one of the possible causal explanations for the results we get**. For example, many family members of schizophrenic patients have noticed that, in the year or two before the symptoms of schizophrenia (Variable A) first developed, the patient began abusing various drugs (Variable B). These family members often conclude that the drugs caused the symptoms of schizophrenia (B caused A). But there are other possible causal explanations: (1) It is possible that the beginnings of schizophrenia (such as unusual thoughts and emotions of which the family members were not aware) caused the person to take drugs (that is, A caused B). This would be a possible causal explanation that emerges from the directionality problem. (2) It also is possible that there were extraneous (third) variables, such as the occurrence of highly stressful events (Variable C), that caused these people both to take drugs and to develop schizophrenia (that is C caused A and B). If we wanted to show that the ingestion of drugs caused these people to develop schizophrenia, we would need to rule out the alternative explanations involving the directionality and third-variable problems by controlling for their effects.

If we control the research situation adequately, we can infer a particular **causal relationship** between the two variables being studied. A causal relationship is one in which **changes in one variable can be shown to cause changes in a second variable**. For example, controlled research has shown that certain drugs can cause developmental problems in animals (both human and nonhuman). Such studies suggest the possibility that drug use can cause schizophrenia (but we will see in Chapter 7 that this is not a very likely cause of the disorder). The clearest way to show a causal relationship is with an **experimental study**—a type of study in which we (a) **manipulate directly a variable that we believe is causing changes in a second variable**, and (b) **further control the research situation in an attempt to eliminate other causal explanations**. Because they help us to discover causes, experimental studies are the kind of study most often preferred by psychologists.

In order to perform an experimental study, we must already have made a tentative prediction that one variable—which we will call the **causal variable**—is causing changes in a second variable—which we will call the **affected variable**. (These are not the terms actually used by scientists, but they are easier for us to understand at this point.) For example, correlational

and case studies in humans have often shown a relationship between the variables of smoking and cancer: people who smoke more tend to develop cancer more often than people who smoke less or not at all. As I stated above, we cannot infer causal relationships based on such studies because we cannot rule out alternative causal explanations. But, based on the association between smoking and cancer observed in these studies, we might tentatively predict that “smoking causes cancer.” In this case, the “causal variable” is “whether or not a person smokes,” and the “affected variable” is “whether or not the person develops cancer.” In order to test this prediction in an experimental study, **we need to bring the causal variable into the present** where we can observe both it and the effects we believe it is going to have. In doing this, we can control for the directionality problem (that is, we can control for the possibility that cancer causes smoking) by creating changes in smoking (in people who show no signs of cancer), and then observe if this change leads to changes later in cancer rates. By making certain that changes in the predicted causal variable occur first, any causal effect can go in only one direction (that is, from smoking to cancer). Thus, from a sample of people who have never smoked before, we might select one group of people to begin smoking and select another group not to smoke in order to see if people in the “smoking group” later develop more cancer than those in the “nonsmoking group.” But, we also need to control for the effects of extraneous variables—other causal factors that might create differences in cancer rates in the two groups. For example, we might find that people in the smoking group tend to drink more and to eat more unhealthy foods than do people in the nonsmoking group. It might be that one or more of these factors are causing people in the smoking group to develop more cancer, and that the smoking itself is harmless. We need to rule out such extraneous variables before we can conclude that smoking is the factor causing cancer. We can do this either by measuring possible extraneous variables (such as the tendency to engage in unhealthy habits) and then eliminating them from our study or, since we probably can’t discover *all* possible extraneous variables before beginning the study, by making sure that the effects of these extraneous variables are equal in the two groups. Thus, in order for an experimental study to be well controlled, we must do two things: **(1) we must eliminate the directionality problem by manipulating the hypothesized causal variable, and (2) we must rule out the effects of extraneous variables.**

Let’s perform an imaginary experimental study to test for the causes of Greg’s problems. As did his peers in the religious cult, we might predict that his religious practices (chanting mantras, for example) will cause the same behavioral and mental problems (his symptoms) in others. In this case, what are the predicted causal and affected variables? Write your answer below:

Predicted Causal Variable -----causes-----> Predicted Affected Variable

When you are trying to figure out which variables are being measured in an experimental study, you should always look first at the prediction being investigated because the variables are always described there. In this case, the causal variable is predicted to be his religious practices and the affected variable is predicted to be his symptoms. In order to test this causal prediction, we would need to perform an experimental study in which we manipulated the causal variable and then determined its effects on the affected variable. In doing this, we could take a group of people and have them engage in these religious practices for a year or two to see if they begin to show symptoms similar to those of Greg. We will call this group of people the **treatment group** since they **receive the level of the causal variable that we predict will cause a change in the affected variable**. We then need to compare the treatment group to people in a second group—a group similar to the first except for the fact that they do not engage in any of Greg’s religious practices. We will call this second group of people the **comparison group** since they **receive the level of the causal variable that we predict will cause no change in the affected variable**—this “level” being the fact that they don’t perform any of the practices of Greg’s religious group (they just go on with their normal lives):

	<i>Causal Variable</i>	<i>Affected Variable</i>
<i>Treatment Group</i>	religious practices	behaviors/mental events
<i>Comparison Group</i>	no religious practices	behaviors/mental events

By manipulating the causal variable, we are controlling for the directionality problem. But, we also need to control for the effects of extraneous variables. We do this by making certain that the treatment and comparison groups are as similar as possible with regard to extraneous variables before we start the experiment. **If the people in the treatment and comparison groups are different, on average, at the beginning of the experiment, then we cannot infer that any differences between them at the end of the experiment are due to the effects of the causal variable.** For example, we would want to make sure that the same number of people with brain damage are in each group; that the same number of people taking certain drugs are in each group; that the same number of people of each sex and age are in each group; etc. In this way, the only variable that differs between the two groups is the one that we

have manipulated—the religious practices. At this point, you don't have to worry about how we might accomplish this (assigning people randomly to one group or the other is the preferred method, however). When the treatment and comparison groups are similar before they experience the different levels of the causal variable, we can infer that any between-group difference in the affected variable must be due to the manipulation of the causal variable. Thus, an experimental study is able to determine causal relationships because, **by manipulating a causal variable and controlling for extraneous variables**, it eliminates the limitations of case studies and correlational studies.

SQ 2-5: Discuss the meaning of a causal relationship and describe in detail how we perform experimental studies to find these causal relationships. (In your answer, define what is meant by the treatment and comparison groups as well as by the causal and affected variables.) Discuss how experimental studies solve the two problems for inferring causation that affect correlational studies. Set up an experiment to test the following prediction: high levels of anxiety impair performance on tests in introductory psychology.

Methods for Studying the Nervous System

Case studies, correlational studies, and experimental studies have all been used to study the nervous systems of human and nonhuman animals. Case studies and correlational studies help us to locate parts of the nervous system that *might* have particular functions (the word **function** here refers to **the characteristic action of something**—what that thing does). Experimental studies, on the other hand, help us to confirm that a part of the nervous system does, in fact, have a particular function. For example, people who have had a stroke (a **stroke is a disruption of blood flow to some part of the brain**) typically develop some disturbance of brain functioning because the cells that make up the brain die at the location of the stroke. These disruptions of brain functioning are sometimes associated with various mental/behavioral problems, such as difficulties with speaking, writing, reading, and/or understanding the speech of others. A study measuring the language abilities of stroke patients would be a correlational one because the researchers have not manipulated either the functioning of the brain or the language difficulties. Instead, they have simply measured these variables as they are expressed at present in people who have had strokes versus those who have not had strokes. These correlational studies have shown that people who have damage to the outer layer of the left side of the brain are most likely to have language difficulties. But, because the researchers did not control for the limitations of correlational studies, their research can tell us nothing definite about what is causing the language difficulties.

In order to show that a disruption of the normal functioning of the brain on the left side actually causes language difficulties, we would have to perform an experimental study. In the space below, write a causal prediction and design an experimental study looking at this question:

Prediction:

	<i>Causal Variable</i>	<i>Affected Variable</i>
<i>Treatment Group</i>		
<i>Comparison Group</i>		

There are various ways that you could have filled this out. For example, you might have suggested that we should damage the left side of the brain in order to see if the participants in the study developed language difficulties. Or, you might have suggested that we remove the entire left side of the brain in order to see if they developed language difficulties. Both of these experiments would have worked; but, since we are studying humans (other animals cannot be used because they don't have language), we would need to use a method that disrupts functioning only temporarily: it would be unethical to do otherwise. There is a drug (sodium amobarbital) that, when injected into an artery supplying blood to one side of the brain, will anesthetize that side of the brain for several minutes. By using this drug, we can test experimentally the following prediction: anesthetizing the left side of the brain will cause language difficulties. With this prediction, I can fill in the table:

	<i>Causal Variable</i>	<i>Affected Variable</i>
<i>Treatment Group</i>	anesthetization of left side	measure language abilities
<i>Comparison Group</i>	anesthetization of right side	measure language abilities

You might have noticed that I have done something different here than in the earlier example of an experiment (the one testing for a causal effect of Greg's religious practices on his behavioral/mental symptoms). In that other example, the comparison group was given no special treatment. In the present example, however, the comparison group also is receiving anesthesia, but on the right side of the brain instead of the left side. Can you figure out why I have done this? Think about it for a

minute. If I had anesthetized the left side of the brain in the treatment group, given no anesthesia to the comparison group, and found that only those in the treatment group suffered from language difficulties, could I have concluded that language abilities are located in the left side of the brain? No, I would not be able to make this conclusion: it could be that the whole brain is involved in language and that, by disrupting the functioning of one side, I have caused a problem for the whole brain. Therefore, people in the comparison group must also experience anesthesia on the right side of the brain. If we performed this experiment on right-handed people (I will explain later why we must use right-handed people), we would obtain language difficulties in about 95% of people in the treatment group but in only about 5% of those in the comparison group. Therefore, we can conclude that almost all (right-handed) people have language abilities located in the left side of their brains.

As you can see from this example, correlational and experimental studies have been very useful in finding general relationships between parts of the nervous system and particular abilities. Let's now briefly go through some of the major correlational and experimental procedures used in the study of the nervous systems of human and nonhuman animals.

Correlational methods. In general, there are two types of correlational study used in investigating the functions of the nervous system. (1) In a damaged nervous system, **we measure the amount of damage to particular neural structures and correlate it with particular abnormalities of behavior and mental processes.** Greg, for example, might be included in a study correlating neural structures with behaviors or mental processes (the word **neural** is an adjective that refers to **individual parts of the nervous system or to the nervous system as a whole**). In order to use this method, we need to be able to see the structures of the nervous system. Autopsies are often performed after subjects die in order to find where the nervous system has been damaged. But there are also several techniques that allow us to get pictures of the nervous systems of living subjects. Although X-rays have often been used for this purpose, there are much better techniques now available—techniques that give much clearer pictures of the nervous system (such as magnetic resonance imaging, or MRI). (2) In an apparently undamaged nervous system, **we measure a disturbance of neural activity and correlate it with particular abnormalities of behavior and mental processes.** The functioning of the nervous system involves the electrical and biochemical activity of its parts. Later in this chapter, you will understand better the basis for this activity when we study the structure and functioning of the cells that make up the nervous system. Any changes in the electrical and biochemical activity of these cells—called **neurons**—are thought to cause changes in behaviors or mental processes. Thus, we can look at people who have developed a mental or behavioral

disorder and look for changes in the activity of neurons in various areas of their nervous systems. The EEG is one method for measuring changes in the electrical activity of the brain. There are also other techniques now used that give us much more information about brain activity (such as positron emission tomography, or PET scans).

Because it is very difficult to make causal inferences from correlational studies, you might wonder why we would ever use such studies to investigate neural functions. There is one major reason why such studies are used: **they can help us to detect associations that we then might study with other procedures**, especially experiments, **in order to show causal relationships**. Furthermore, in human research, correlational studies often are the only kind of study we can perform because ethical considerations make experimentation very difficult or impossible (that is, we cannot purposely damage the brain of a human just to see what will happen). However, we can discover causal relationships by performing experiments on other animals. There is always a question, however, about whether and to what extent we can generalize the results of studies of nonhuman animals to humans (the word **generalize** means **to apply the findings from a particular study to a wider group of individuals or situations**). In fact, we will discuss a little later in this chapter a set of studies, first performed in rats and monkeys, that was found not to generalize well to humans.

Experimental methods. There are two major methods for investigating causal effects of the nervous system on mental/behavioral events. These two methods correspond closely to those presented for correlational methods. (1) We can **damage neural structures to produce changes of behavior and mental processes**. This method involves the **lesioning** of neural structures—a technique in which **a part of the nervous system is destroyed or removed** in order to determine which functions are lost. Except for neurosurgery performed in the treatment of various disorders, such work cannot be performed on humans. (2) We can **change neural activity to produce changes of behaviors and mental processes**. We accomplish this by changing the electrical or biochemical activity of neurons. One common way of changing this activity is by **electrical stimulation** of neural structures. Another common way of changing neural activity is by **chemical stimulation** of neural structures (I mentioned this technique in the study of language abilities described above). Certain chemicals may be injected directly into the nervous system or ingested through the mouth. These chemicals find their way into neural structures, or cause the release of other chemicals that affect the neural structures, thereby changing the activity of the neurons in these structures. In fact, you use this technique to change the activity of your own nervous system whenever you drink alcohol or coffee.

SQ 2-6: Describe how correlational and experimental studies are performed in the investigation of the relationship between neural activity and mental/behavioral activity.

The Nervous System

According to the brain/mind theory, communication within the nervous system causes us to move our bodies, to think, to perceive the world, and to feel emotions. There are two major divisions of the nervous system that allow us to do this: the central nervous system and the peripheral nervous system (see Figure 2.1). The central nervous system (CNS) is made up of the brain and spinal cord. It is referred to as “central” because it is the part of the nervous system located most centrally in our bodies. It is the only part of the nervous system enclosed in bone, a fact that suggests that its functions are so important that it must be carefully protected from damage. In fact, the CNS has two very important functions: (a) **it performs a very complex processing of incoming sensory information**, and then (b) **based on this processing, it makes complex decisions that guide our responses**. For example, activity in the CNS allows you to understand class discussions and then to decide what is important enough to take notes on. The peripheral nervous system (PNS) makes up the rest of the nervous system. It is referred to as “peripheral” because it is located on the margins (or periphery) of our bodies. The PNS has two major functions: (a) **it receives sensory information from the outside world and sends it to the CNS**, and (b) **it receives motor messages (“motor” messages are ones that activate muscles and glands) from the CNS and sends them to the muscles and glands of the body**. For example, when something touches the skin on your arm, sensory receptors in the skin are activated, this information is sent down the part of the PNS in your arm, and then it enters the CNS (first entering the spinal cord and then the brain). Activity in the CNS is involved in processing this sensory information. Based on this processing, the CNS determines that something is touching the skin and may decide to move the arm in response. This decision is constructed into a motor message that exits the CNS into the PNS and travels down your arm to the appropriate muscles, thereby causing their contraction. **In this way, the PNS and the CNS work together in adjusting (or adapting) our behavior to the demands of the outside world**. Martin (1986) described the interaction between the PNS and the CNS:

The brain and spinal cord [which together make up the CNS] play a role in virtually every physiological activity—from swallowing to sweating, from listening to...music...to making love. Yet without the many millions of minute fibers of the peripheral nervous system, fibers that supply every organ, every muscle, every scaly patch of skin, there would be no communication between brain and body. The brain would languish like an

unprogrammed computer, and the body would be functionless—some marvelous machine that could never be powered up. (p. 174)

Therefore, any disruption of communication between the PNS and the CNS will lead to disturbances in our ability to sense or respond to the environment. For example, if the spinal cord is cut, motor messages from the brain can't activate the PNS, which leads to paralysis of the part of the body served by those nerves of the PNS.

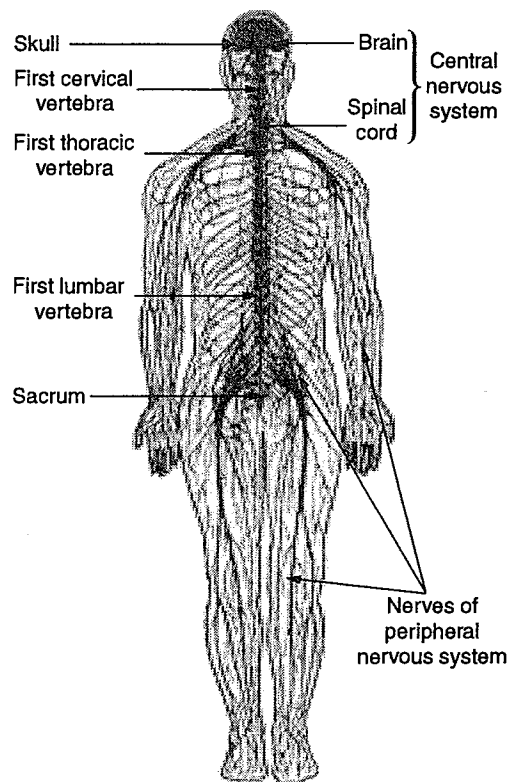


Figure 2.1 The positions of the central nervous system (CNS) and the peripheral nervous system (PNS) in the body (from Groves & Rebec, 1992; p. 162)

In this chapter, I am going to focus the discussion on the CNS. I am doing this not because the PNS is unimportant, but because the processing of information that occurs in the brain and spinal cord is of fundamental importance for the topics we are to talk about in the rest of this book. I recommend, however, that you take at least one course in neurobiology sometime during your college years, especially if you choose a behavioral science as a major, so that you can become more familiar with the entire nervous system.

SQ 2-7: Describe the major functions of the CNS and the PNS.

The Central Nervous System

The CNS is made up of the brain and the spinal cord. The **spinal cord**, a structure about 18 inches long and one inch wide that runs through the spinal column, contains two major sets of structures: (1) **sensory pathways from the PNS that travel through it towards the brain**; and (2) **motor pathways from the brain that travel through it towards the PNS**. When the spinal cord is cut in an accident, the brain is left intact, of course, but any activity that occurs in it cannot move past the cut. Because of this, the person is paralyzed in the parts of the body **innervated** (a word that means **to supply with nerves**) by the motor pathways below the cut. In addition, any sensory information that enters the spinal cord below the cut cannot move past it and, therefore, cannot be processed by the brain. Because of this, the person will not be able to sense certain parts of the body. The intact (undamaged) spinal cord, on the other hand, not only transfers information between the brain and all parts of the PNS, it also processes some of the incoming sensory information and sends out its own motor messages in response to this sensory processing. These spinal-cord-induced movements make up several of our most basic reflexes.

A reflex is a rapid and automatic response to simple sensory input. An example of a spinal reflex is the withdrawal of the hand from a hot object. If your finger touches a hot stove, the sensory information travels up your arm and into the spinal cord where it is quickly but superficially processed. If the temperature is extreme enough, your spinal cord will send out a motor message to the muscles of your hand and arm that will cause them to quickly pull away from the stove. You typically do this even before you feel any pain, and sometimes even when the temperature is very cold instead of hot. (For example, you may remember having sometimes put a finger under very cold running water and pulling it away before realizing it wasn't hot.) This is because your spinal cord does not process sensory information in such a way that you are able to consciously feel pain. That sort of processing occurs farther up in your brain. Because it takes a little longer for the information to get to the brain, you may already have begun to withdraw your hand before you feel pain. Normal walking also is controlled mostly by spinal reflexes. Once you make a decision to walk and then begin walking, your brain no longer is involved (unless some problem arises): your spinal cord controls the walking movements. This leads to automatic (unconscious) movements of the legs and arms. We can show this experimentally in cats. If we lesion the spinal cord above the part that controls the hind legs—a technique that eliminates the brain's influence on the control of these legs—the cat will be able to move its legs on a treadmill in

a normal walking pattern. If the cats are not forced to walk, however, they may simply lie on the floor. This is because the brain's decision to begin walking no longer can be transferred to the spinal cord. That is, the spinal cord does not send a walk message to the legs unless it is told to do so by the brain or it is forced to do so by outside circumstances (such as a running treadmill). The scratch reflex in dogs also is controlled by the spinal cord. When there is some sort of irritation (such as a flea) on a dog's skin, it will move a hind leg up to the source of the irritation and begin a rhythmic scratching that all of you who have a dog know very well. This is true even in dogs whose spinal cords have been experimentally lesioned above the part of the spinal cord that controls this reflex (which again removes the brain's influence on this reflex).

Much more complex processing of sensory information occurs within the brain. Long ago, it was believed that the purpose of the brain was to fill up the space inside of the skull. In the last several hundred years, however, a great deal of evidence has accumulated that confirms that the normal functioning of the brain is essential for all sorts of very complex mental processes and behavior. For the purpose of describing these neural functions, I will divide the brain into three major areas: (1) the **brain stem**, (2) the **limbic system**, and (3) the **cerebral cortex** (see Figure 2.2). The brain stem is **a set of neural structures that make up the extension of the spinal cord into the skull**. Activity within the brain stem is associated with patterns of sleeping and waking, attention, and the activation of various reflexes essential to survival. The limbic system is **a set of neural structures that surrounds the upper part of the brain stem**. Activity within the limbic system is associated with the expression of emotions, the formation of memories, and the initiation of various biological motives ("drives"). The cerebral cortex is the largest part of the human brain and is **made up of the wrinkly tissue that covers the outermost part of the brain**. Activity in the cerebral cortex is associated with many of the so-called "higher functions" of humans, such as language ability, reasoning ability, the planning of actions, and perception. We will begin our discussion of the brain with the cerebral cortex and then move down through the limbic system and into the brain stem.

SQ 2-8: Discuss the major parts of the spinal cord and the kinds of behavior that it controls. List the three major divisions of the brain and describe the major functions of each of these divisions.

The Cerebral Cortex

The cerebral cortex makes up about 75% of the human brain. It is made up of several layers of cells about 1/8th of an inch thick. This thin collection of cell layers, however, is very tightly folded, somewhat like a crumpled sheet of paper, so that a large amount of it takes up only a small

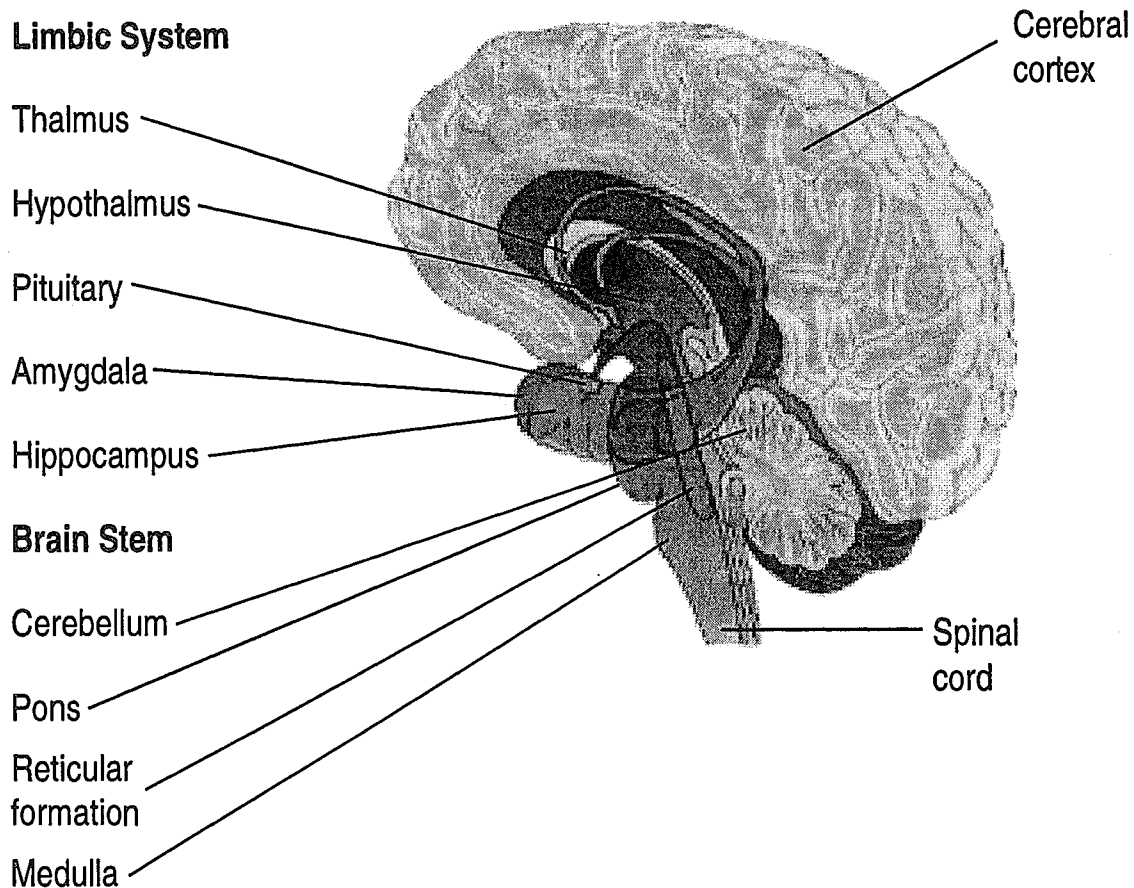


Figure 2.2 The three major divisions of the brain—the cerebral cortex, the limbic system, and the brain stem—and some of the major structures contained within each division (from Kassin, 2001; p. 55)

amount of space. Activity in the cerebral cortex is essential for many of the qualities, skills, and abilities that make humans different from all other animals. In fact, if you lost your cerebral cortex, you would lose your self-awareness, your ability to respond with foresight and deliberation to the environment, your ability to relate your past and future to the present, and your ability to speak and understand language. Humans born without much of a cerebral cortex are capable of only the most basic reflexes and emotions (and they tend not to live very long). Humans who have damage to more limited parts of the cerebral cortex show problems with the skills and abilities associated with those parts. Greg, for example, had significant amounts of damage to important parts of his cerebral cortex—damage that made him seem to be a “hollowed-out” version of a human being: he lost much of his former personality, seemed to have little awareness of himself, and tended to treat others interchangeably. These deficits resulted in Greg’s inability to engage in normal human social interactions.

The cerebral cortex (and, in fact, most of the rest of the brain) is divided into two halves or **hemispheres** (“half-spheres”), one on each side of the head. In the cerebral cortex, activity within each hemisphere is associated with different functions. This **localization of different mental and behavioral functions within each hemisphere of the cerebral cortex** is referred to as **laterality of functioning**. For example, we described above some experiments that showed that language abilities (verbal functions) in humans are associated with activity in the left hemisphere of the cerebral cortex in most people. Because we are highly social animals, the ability to use and understand language is one of our most important mental functions: it is essential for our survival and well being to communicate in very complex ways with others. Humans who have lost both their hearing and vision (so that they no longer are able to communicate through normal means) will create very novel ways to express themselves through language. For example, people with Usher’s syndrome—a disorder in which the person is born deaf and slowly becomes blind during adulthood—typically learn as children to communicate visually with sign language. As their ability to see disappears during adulthood, many people with Usher’s syndrome change how they communicate with others: by placing their hands in the hands of others, they sign by touch. We humans, as this example should make obvious, are very strongly motivated to communicate with others. Because of the necessity of communication for our survival, large parts of the cerebral cortex have been set aside for language use. Let’s therefore begin our discussion of the laterality of functioning by looking more closely at these language areas of the brain.

Language Areas. Correlational studies have shown that people who have damage to certain parts of the left hemisphere of their cerebral cortex often have various problems in using language. This set of problems is known as **aphasia**, which may be defined as **a difficulty in producing and understanding language (speaking, reading, writing, or signing) that results from damage to the brain**. Aphasia is much more than simply having difficulties with speaking due to problems in moving the muscles of the mouth and tongue. Instead, aphasia involves a difficulty in the *ability* to use language in some or all of its forms. There are different types of aphasia, each of which is characterized by a different set of language difficulties. Howard Gardner (1974) presented cases of people suffering from a few of these types. One of his patients, David Ford, was a man in his late 30’s who was a radio operator in the Coast Guard when he suffered a stroke in the left hemisphere of his cerebral cortex. After the stroke, David had a very severe aphasia that involved his ability to speak and write. When he tried to produce words, he made many mistakes. You can get an idea of some of David’s problems by listening in on a conversation he had with Gardner soon after he entered the hospital:

I asked Mr. Ford about his work before he entered the hospital.

"I'm a sig. . . no . . . man . . . uh, well, . . . again." These words were emitted slowly, and with great effort. The sounds were not clearly articulated; each syllable was uttered harshly, explosively, in a throaty voice. With practice, it was possible to understand him, but at first I encountered considerable difficulty in this.

"Let me help you," I interjected. "You were a signal . . ."

"A sig-nal man . . . right," Ford completed my phrase triumphantly.

"Were you in the Coast Guard?"

"No, er, yes, yes . . . ship . . . Massachu . . . chusetts . . . Coastguard . . . years." He raised his hands twice, indicating the number "nineteen."

"Oh, you were in the Coast Guard for nineteen years."

"Oh . . . boy . . . right . . .," he replied.

"Why are you in the hospital, Mr Ford?"

Ford looked at me a bit strangely, as if to say, Isn't it patently obvious? He pointed to his paralyzed arm and said, "Arm no good," then to his mouth and said, "Speech . . . can't say . . . talk, you see."

"What happened to make you lose your speech?"

"Head, fall, Jesus Christ, me no good, str, str . . . oh Jesus . . . stroke."

"I see. Could you tell me, Mr. Ford, what you've been doing in the hospital?"

"Yes, sure. Me go, er, uh, P.T. none o'cot, speech . . . two times . . . read . . . wr . . . ripe, er, rike, er, write . . . practice . . . get-ting better."

"And have you been going home on weekends?"

"Why, yes . . . Thursday, er, er, er, no, er, Friday . . . Bar-ba-ra . . . wife . . . and, oh, car . . . drive . . . purnpike . . . you know . . . rest and . . . tee-vee."

"Are you able to understand everything on television?"

"oh, yes, yes . . . well . . . al-most." Ford grinned a bit. (pp. 60-61)

It is obvious that David was having a great deal of trouble expressing himself. His most obvious difficulty was a large reduction in the number of words spoken, almost as if he were reading an old-fashioned telegram where, to save money, you used only the most essential words in order to get a point across. David typically had trouble getting past the first or second word of a sentence and often had to start over again. He never was able to finish even a single sentence in a grammatically correct way. He also had trouble pronouncing many words (sometimes substituting words that had a similar sound), and some words were pronounced in stages taking several seconds. Certain phrases that probably had been used very often before his stroke (such as "Jesus Christ") were said quickly and clearly, but he had enormous difficulty with almost all other words.

David was suffering from a problem known as **Broca's aphasia** (after the neurologist who first described it in 1861, Paul Broca)—a type of aphasia in which **the person has great difficulty producing language but is able to understand much of the language produced by others**. People with Broca's aphasia realize that they are having difficulty expressing themselves and can become very distressed over it, as did David in the passage above.

People who suffer from Broca's aphasia tend to have two major problems. (1) **It is very difficult for them to produce language**. The person with Broca's aphasia speaks slowly and with poor articulation (that is, he/she is unable to say words clearly). In addition, he/she leaves out a large number of words and may even use made-up words that sound similar to the correct ones (such as David's use of "purnpike" and "o'cot"). This problem typically extends to writing, gesturing, and sign language. (2) **It is very difficult for them to understand grammatical words**. People with Broca's aphasia may be able to speak slowly, but they often omit and seem not to understand "grammatical words"—words that help us to structure sentences so that our thoughts can be expressed meaningfully. These include certain classes of words such as prepositions (for example, 'by', 'in', 'on'), articles ('a', 'the'), conjunctions ('and', 'or', 'but'), helping verbs (such as 'is' or 'be'), pronouns (such as 'he', 'she', 'it'), and various kinds of endings (such as past tenses, possessives, and plurals). A person with this problem would have great difficulty understanding a sentence such as, "The ball was hit by Tom into the left-field bleachers." The only words likely to be understood by a Broca's patient would be, "... ball ... hit ... Tom ... left-field bleachers." In other words, **a person with Broca's aphasia understands nouns and verbs** but not much else. On the other hand, if the sentence had been structured differently so that there were fewer grammatical words, people with Broca's aphasia probably would have little difficulty understanding its meaning. For example, if the sentence had been, "Tom hit the ball into the left-field bleachers," a Broca's patient probably would have heard something like, "Tom hit ... ball ... left-field bleachers," an utterance that is more easily understood than the previous one. Nevertheless, although people with Broca's aphasia have some problems with the comprehension (the understanding) of words used by others, their major difficulty is with the production of language—they can understand much of what others say or write but have difficulty expressing their own thoughts in an understandable way.

Gardner (1974) described another patient, Philip Gorgan, who showed a different kind of aphasia because of a stroke involving a different part of the left cerebral cortex. Philip was a retired butcher who was 72 years of age when first interviewed by Gardner. Unlike David Ford, Philip had no trouble speaking. Instead, he had difficulty with using speech in a way that made sense. For example, in response to a question from Gardner about why he had been brought to the

hospital, Philip stated: “Boy, I’m sweating. I’m awful nervous, you know, once in a while I get caught up, I can’t mention the tarripoi, a month ago, quite a little, I’ve done a lot well, I impose a lot, while, on the other hand, you know what I mean, I have to run around, look it over, trebbin and all that sort of stuff” (p. 68). Gardner found it almost impossible to stop Philip’s surge of words. Just as he was about to ask another question, Philip said: “Oh sure, go ahead, any old think you want. If I could I would. Oh, I’m taking the word the wrong way to say, all of the barbers here whenever they stop you it’s going around and around, if you know what I mean, that is tying and tying for repucer, repuceration, well, we were trying the best that we could while another time it was with the beds over there the same thing...” (p. 68).

Philip’s speech sounds almost psychotic, as if he were suffering from very severe schizophrenia. But he is not. He has damage to a language area in his brain that makes it difficult for him to speak in a manner that makes sense to others. Philip is suffering from a language disorder called **Wernicke’s aphasia** (after the neurologist who first described it in 1873, Karl Wernicke). People who are suffering from Wernicke’s aphasia tend to have two major problems. **(1) They have difficulty with understanding the language of others and with producing understandable language themselves.** People with this kind of aphasia have little trouble getting words out, but what they are saying or writing does not make much sense. In severe cases, their language may be incomprehensible. For example, Springer and Deutsch (1993) presented the response of a Wernicke’s patient to the question, “how did you get sick?”

Eeh, oh malaty? Eeeh, favility? Abelabla tay kare. Abelabl tay to po stay here.... Aberdar yeste day.... and then abedeyes dee, aaah, yes dee, ye ship, yeste day es dalababela. Abla desee, abla detoasy, abla ley e porephee, tee arabek. Abla get sik? (p. 151)

What makes this problem different from Broca’s aphasia is that Wernicke’s patients have no trouble articulating such sounds and most of them are not even aware that there is a problem with the way they speak. In addition, they have a great deal of trouble understanding what others are saying to them. In general, they seem to confuse the different sounds that make up words—a problem that results in a sort of “word salad” in which their words come out in almost no particular order. For example, such a person might say, “Groceries at the store some go and there went Ron,” when he/she meant to say, “We went to the store to get some groceries and saw Ron there.” Many of the correct words are contained in the sentence but they are so jumbled up that, without more information, a listener cannot know what the person is trying to say. **(2) It also is difficult for them to find the correct word.** This problem is referred to specifically as **anomia** (which means **an inability to name objects**). If you show a person with Wernicke’s

aphasia a picture of an object, say a slipper, he/she may be able to describe what it is for (“it goes on a foot”) but may not be able to name it. If you tell him/her that it is a slipper, the person then will be able to say the word. However, if you show the picture again to the person a minute later, he/she probably will be unable to name it. It doesn’t matter how often you repeat this procedure. They seem to have much difficulty with searching their memories to find the proper word.

People with Broca’s aphasia tend to have damage to a portion of the cortex called **Broca’s area** whereas people with Wernicke’s aphasia tend to have damage to a different part called **Wernicke’s area** (see Figure 2.3). You may have noticed that, in the preceding sentence, I used the phrase, “tends to have damage” in these areas. This is because it has become apparent in recent years that other portions of the brain are also involved in these two aphasias. In fact, people who have damage only to Broca’s area or only to Wernicke’s area do not show the difficulties described above. Therefore, the full explanations for these two aphasias are still not known. In addition, there are more aphasias than just these two. These other aphasias seem to be associated with damage to other portions of the brain—portions that are not always in the cerebral cortex. Thus, language seems to be associated with activity in many different areas spread throughout various parts of the brain. This is consistent with the fact that language is an extremely important ability for humans, a fact that suggests that large areas of the brain should be involved. Because our understanding of all this is still very primitive, there is a great deal of controversy among researchers concerning the neural explanations of language.

Another complicating factor in localizing language to specific areas of the brain is that there are individual differences in where these areas are located. For example, some people have their Broca’s area or Wernicke’s area shifted towards the right hemisphere (either completely in the right hemisphere or partially shared between the two hemispheres). Handedness is one variable strongly correlated with these differences in the placement of the language areas. Whereas over 95% of people who are primarily right-handed have their language areas in the left hemisphere, the remainder has these areas shifted towards the right hemisphere. What I mean by this is that a small proportion of right-handed people has some or all of their language functions in the right hemisphere. On the other hand, in those people who are primarily left-handed, about 70% have their language areas in the left hemisphere whereas about 30% have these areas shifted towards the right hemisphere. In other words, although most right-handers and left-handers have their Broca’s and Wernicke’s areas in the left hemisphere, the relationship is much stronger for right-handers than it is for left-handers.

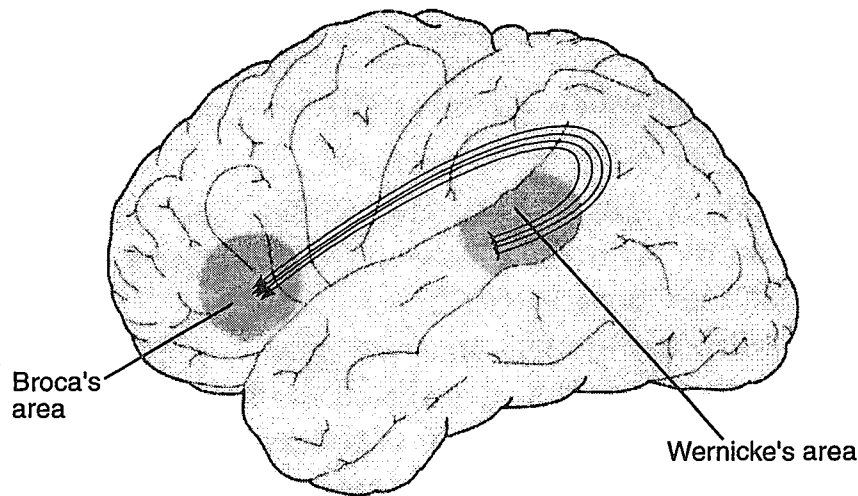


Figure 2.3 An illustration of Broca's and Wernicke's Areas and the neural connections allowing communication between them (from Kandel, Schwartz, & Jessell, 1995; p. 642)

No one knows for certain the reason or reasons for the shifting of language areas towards the right hemisphere in some people. One reason may be that, in at least some of these people, portions of the left hemisphere normally associated with language have been damaged. The shifting of the language areas to the right hemisphere in these cases would be caused by a reorganization of the brain: corresponding areas in the right hemisphere seem to take over these language abilities. Thus, if a language area in the left cerebral cortex of a young child is damaged, it is likely that the corresponding area in the right hemisphere will become modified, thereby taking on some or all of these functions. The **modifiability of the nervous system** shown in this example is referred to as **plasticity**. In general, after the nervous system has been damaged, functions that are lost because of this damage may begin to re-emerge over time. Plasticity leading to the regaining of lost functions is greatest in young children; but it seems to occur to a limited extent in adults, too. For example, when a stroke causes damage to a language area in an adult, we may observe some (or, more rarely, all) of the lost language abilities returning within several months after the stroke. It is highly unlikely, however, that a new language area will develop in the opposite hemisphere in adults because such plasticity decreases rapidly after childhood. I will talk more about plasticity in the next chapter. At that point, you will see that plasticity is a very general concept: it is a term that describes all sorts of modifications of the nervous system (for example, modifications due to experience, such as the ones that are probably occurring right now as you read this paragraph).

SQ 2-9: Describe what is meant by the phrase, “laterality of functioning,” and from where the evidence for this phenomenon has been obtained. Describe the major characteristics of Broca’s and Wernicke’s aphasia. Which part of the brain is damaged for each of these types of aphasia? Discuss the relation of handedness to the localization of language areas in the brain. How does the concept of “plasticity” help us to understand some cases of right-hemisphere localization of Broca’s and Wernicke’s areas?

Sensation and Perception. It is often stated that we have only five senses—sight, hearing, touch, taste, and smell. Although sensation is more complex than this conventional classification suggests, it is accurate enough for our purposes. All animals, of course, rely very heavily on their various senses when adjusting themselves to the environment. Humans, in particular, rely to a large extent on sight and hearing; and, as we will see, large areas of the cerebral cortex are set aside for these two senses. Sensory information enters the body through sensory receptors in the eyes, ears, skin, bodily joints, tongue, and nose. This information then travels through the PNS, which sends most of it first into the spinal cord and then up into the brain. The sensory information finally travels into the cerebral cortex where it is processed by several different areas that allow us to consciously perceive it. In looking at it in this way, we can distinguish between the process of **sensation** (which involves the activation of sensory receptors, the PNS leading away from these receptors, and parts of the CNS) and the process of **perception** (which involves the assigning of meaning to the sensory information). As an example of sensation and perception, we can look at what happens with your ability to see other people. Particles of light (photons) bounce off these people and enter your eyes. This activates the sensory receptors within your eyes and the nerves leading into the rest of the brain, as well as certain areas in the brain itself. This is the process of sensation. Sensory areas within your cerebral cortex then process this sensory information in such a way that you know that you are seeing other people. This is the process of perception.

The senses of sight, hearing, and touch are each associated primarily with activity in a particular subdivision of the cerebral cortex. Each of these subdivisions is referred to as a “lobe.” Each hemisphere of the cerebral cortex can be separated into four major lobes: the frontal, parietal, occipital, and temporal lobes (there are two of each kind of lobe, one in each of the two hemispheres). Figure 2.4 shows the location of these lobes—the frontal lobes are behind the eyes and forehead, the parietal lobes are on the top (back half) of the head, the occipital lobes are in the back of the head, and the temporal lobes are around the “temples” and ears. We can assign a set of

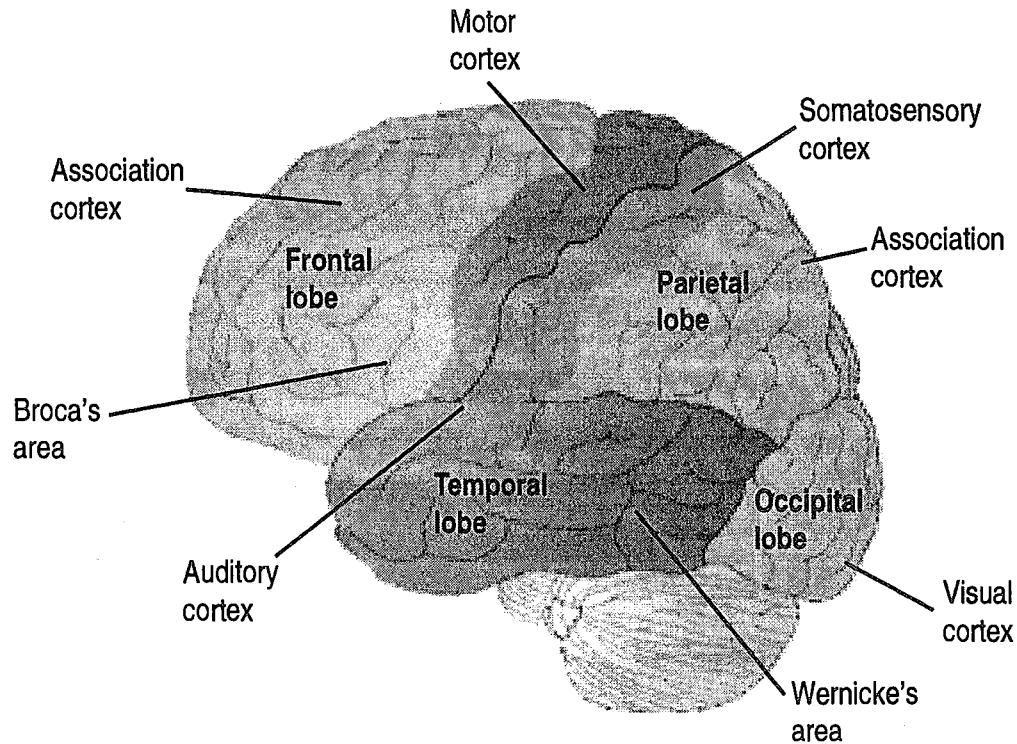


Figure 2.4 The locations of the sensory and motor areas of the cerebral cortex with respect to the four lobes of the brain (adapted from Kassir, 2001; p. 58)

perceptual functions to each of these lobes by determining which senses are disrupted by damage to a particular lobe, or by determining which senses are activated by electrical stimulation of a particular lobe. Let's examine what such techniques have shown us about the perceptual functions of each of the lobes.

Parietal Lobes. If we electrically stimulate a certain strip of tissue in the parietal lobe, the person so stimulated typically will experience tingling or burning sensations of the skin, which suggests that activity in this strip of tissue is associated with the perception of touch (tactile) information. This area within the parietal lobes is referred to as the **somatosensory cortex**. The somatosensory cortex is **associated with perceiving several different kinds of bodily information**. Among other things, the somatosensory cortex is involved in perceiving touch and bodily positions, as well as in helping you to perceive that parts of your body belong to you. When sensory receptors in the muscles and joints are activated, for example, the person will sense his/her bodily position or the stretching of various limbs. When sensory receptors in the skin are activated, the person will perceive touching, tingling, tickling, burning, or stinging sensations. Thus, in general, we can say that the somatosensory cortex is associated with the perception of the body.

Sensory information from each side of the body crosses over and activates the opposite side of the somatosensory cortex. In other words, the somatosensory cortex in the left hemisphere is important for perceiving information from the right side of the body whereas the somatosensory cortex in the right hemisphere is important for perceiving information from the left side of the body. The reason for this crossing over of tactile information is unknown (and, as we will see below, the same thing happens for some other kinds of sensory information).

If the somatosensory cortex is damaged, there typically is only a temporary loss of the sense of touch. The more permanent problem involves **a difficulty with properly interpreting tactile information**. For example, a person with damage to the somatosensory cortex will have problems identifying objects by touch and will often become clumsy. A particularly unusual set of problems is sometimes observed when the somatosensory cortex in the right hemisphere is damaged. In this case, the person may start to neglect the left side of his/her body. For example, he/she may fail to dress that side of the body, may ignore anything in the environment on that side of the body, or may feel as if parts of the body on that side do not really belong to him/her. Oliver Sacks (1987) described a case of a man who expressed symptoms of such a problem after showing up at a neurology clinic because of a “lazy” left leg:

He had felt fine all day, and fallen asleep towards evening. When he woke up he felt fine too, until he moved in the bed. Then he found, as he put it, ‘someone’s leg’ in the bed—a *severed human leg*, a horrible thing! He was stunned, at first, with amazement and disgust—he had never experienced, never imagined, such an incredible thing. He felt the leg gingerly. It seemed perfectly formed, but ‘peculiar’ and cold.... [H]e threw the damn thing out of the bed. But...*when he threw it out of bed, he somehow came after it—and now it was attached to him....* He seized it with both hands, with extraordinary violence, and tried to tear it off his body, and, failing, punched it in an access of rage. (pp. 55-56)

Even at this point, the man did not realize that the leg was his own left leg. When he was asked where his own left leg really was, the man answered: “I don’t know....I have no idea. It’s disappeared. It’s gone. It’s nowhere to be found” (p. 57). Keep in mind that such problems usually occur only after damage to the somatosensory cortex in the right hemisphere. When the somatosensory cortex in the left hemisphere is damaged, the difficulties that result seem to be much more specific to problems with the sense of touch. In general, we can conclude that **the somatosensory cortex is important for sensing our own bodies and for orienting them in the environment**.

Occipital Lobes. If we electrically stimulate parts of the occipital lobe in the back of the brain, the person so stimulated will experience colors or flashes of light. This area is referred to as the **visual cortex** and is the part of the cortex **associated with perceiving light information**. If the visual cortex is damaged, the person may develop a complete inability to see parts of the “visual field” (the **visual field is the totality of what you can see when you look straight ahead**) or may lose specific aspects of vision such as the ability to see colors. For example, Oliver Sacks (1995) described the case of a 65-year-old artist who received damage to his visual cortex as the result of a car accident. After the accident, this man saw the world entirely in shades of black and white:

It was not just that colors were missing, but that what he did see had a distasteful, “dirty” look, the whites glaring, yet discolored and off-white, the blacks cavernous—everything wrong, unnatural, stained, and impure.... He saw people’s flesh, his wife’s flesh, his own flesh, as an abhorrent grey; “flesh-colored” now appeared “rat-colored” to him.... The “wrongness” of everything was disturbing, even disgusting, and applied to every circumstance of daily life. He found foods disgusting due to their greyish, dead appearance and had to close his eyes to eat.... His own brown dog looked so strange to him now that he even considered getting a dalmation. (pp. 7-8)

Reading a case such as this, we can begin to see how important color perception is for our everyday life. In fact, compared to other animals, humans are among the best perceivers of color: we have large areas of our visual cortex devoted to this ability. It is interesting that the damage to this man’s visual cortex also was associated with an increase in the acuity (that is, with the “keenness” or sharpness) of his vision. As this man put it, “I can see a worm wriggling a block away” (p. 3). As with tactile information, the neural pathways associated with vision cross over, so that the visual cortex in the left hemisphere is important for perceiving information in the right side of the visual field, whereas the visual cortex in the right hemisphere is important for perceiving information in the left side of the visual field (see Figure 2.5).

Temporal Lobes. If we electrically stimulate parts of the temporal lobe, the person so stimulated will hear sounds. This area is referred to as the **auditory cortex** and is the part of the cortex **associated with perceiving sound information**. Unlike vision and touch, sensory information from the sensory receptors in each ear does not cross over. Instead, sensory information received by each ear goes to both the left and the right hemispheres. Nevertheless, sensory information from the right ear registers more rapidly in the left hemisphere, whereas

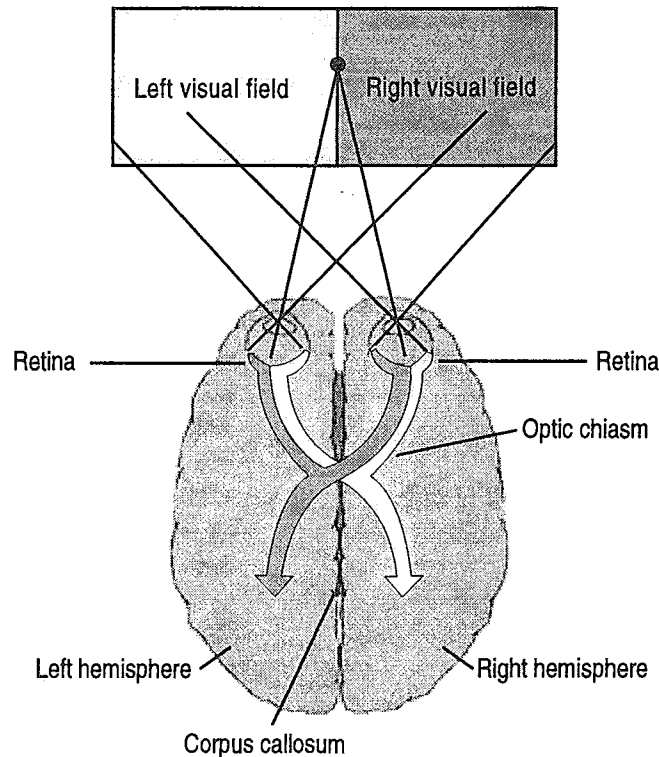


Figure 2.5 The crossing over of visual information from each side of the visual field to the opposite hemisphere. Information from the left visual field hits the right side of each eye and, from there, is sent to the right hemisphere. Information from the right visual field hits the left side of each eye and, from there, is sent to the left hemisphere (adapted from Kassir, 2001; p. 63)

sensory information from the left ear registers more rapidly in the right hemisphere. The auditory hallucinations of people with schizophrenia (they typically hear voices of imaginary people) most likely are due to abnormal activity in the auditory cortex. Abnormal electrical activity is also seen in people with epilepsy. **Epilepsy** is a disorder, characterized by seizures, in which **random electrical activity begins in a damaged part of the brain** (which we will refer to as the “focus” or “focal point” of the seizure). The random electrical activity may spread from this focal point until a large part of the brain is activated. People with epilepsy involving abnormal activity in the temporal lobes of the cerebral cortex sometimes hear sounds as their auditory cortex becomes active. For example, Sacks (1987) described the case of an elderly woman:

One night, ...she dreamt vividly, nostalgically, of her childhood in Ireland, and especially of the songs they danced to and sang. When she woke up, the music was still going, very loud and clear. ‘I must still be dreaming,’ she thought, but this was not so. She got up, roused and puzzled. It was the middle of the night. Someone, she assumed, must have left

a radio playing. But why was she the only person to be disturbed by it? She checked every radio she could find—they were all turned off. (p. 132)

She even had difficulty conversing with others because the songs were so loud. There was nothing wrong with her ears, nor was she mentally disordered. It seemed that something was wrong with her brain. When an EEG was taken, Sacks found abnormal amounts of electrical activity in her temporal lobes whenever she heard the music, but not at other times. These seizures had been caused by a small stroke she had suffered the night she had begun to hear the songs. Over the next several months, her hallucinations first became less frequent and then eventually disappeared.

The temporal lobes also seem to have several other functions. For example, although the visual cortex is in the occipital lobes, activity in the temporal lobes seems to be important for perceiving some of the visual information first processed by the occipital lobes. The recognition of people's faces is one ability that results from this additional processing of visual information by the temporal lobes. Damage to these areas of the temporal lobes, therefore, may make it impossible for a person to recognize faces (including his/her own face in the mirror). Furthermore, a tumor in the "recognition areas" of the temporal lobes may cause the person to experience very elaborate visual hallucinations. In addition to all of this, the temporal lobes process information received from the ears involving our bodily equilibrium (our sense of balance). When these areas of the brain are damaged, we tend to have difficulty keeping our balance. Lastly, Wernicke's area is contained in the left temporal (and parietal) lobes of most people. Thus, activity in the temporal lobes is important for processing information from several senses and for processing it in such a way that very complex mental events involving language, perception (auditory and visual), and equilibrium can occur. Thus, a very essential set of intellectual and perceptual functions is dependent upon activity in the temporal lobes of our cerebral cortex.

SQ 2-10: Describe in detail the major sensory areas of the cortex and where in the cortex each area is located. (In your answer, refer to the four major lobes of the brain and discuss in depth the functions of each of the sensory areas.) Describe the crossing over of sensory functions in the brain.

Frontal Lobes. The frontal lobes make up a large part of the cerebral cortex (about 20% or more) and seem to have at least two major functions: (1) **initiating voluntary movements of the body**; and (2) **holding information in mind for short periods of time and manipulating it**. Let's discuss the first function. One thing of which we are certain is that the frontal lobes are important for making movements of the body. If we electrically stimulate a thin

strip of cells at the back of the frontal lobes, the person so stimulated will move different parts of the body. This area, referred to as the **motor cortex**, is **associated with movements of many of the muscles of the body**, especially the skeletal muscles (those muscles attached to the skeleton of the body). As with vision and touch, the neural pathways associated with movement cross over so that the motor cortex in the left hemisphere controls movements primarily on the right side of the body, whereas the motor cortex in the right hemisphere controls movements primarily on the left side of the body. Thus, if any part of the motor cortex is damaged, paralysis develops on the opposite side of the body. For example, people with Broca's aphasia typically have paralysis on the right side of the body. This is because Broca's area, which usually is in the left frontal lobe, is located next to the motor cortex. When Broca's area is damaged by a stroke, the part of the motor cortex next to it often is damaged and the person exhibits a paralysis on the opposite side of the body. Left-handed people exhibiting Broca's aphasia, on the other hand, sometimes show left-side paralysis because they are more likely to have Broca's area in their right hemispheres.

The motor cortex, however, makes up only a small part of the frontal lobes. What do the rest of the frontal lobes do? It seems that the frontal lobes are not important for the immediate perception of objects: if we electrically stimulate in a person any portion of the frontal lobes outside of the motor cortex, usually no sensory experiences occur. Instead, it seems that the frontal lobes are most important for memory and various kinds of complex intellectual functioning. Nevertheless, it has been difficult to describe precisely what the frontal lobes do in this regard. For one thing, even when large areas of the frontal lobes are damaged, many intellectual functions remain relatively intact. As an illustration of this, people who have had strokes causing significant damage to the frontal lobes may still get high scores on intelligence tests. Furthermore, people who have had prefrontal lobotomies—an operation (no longer performed) which destroys large parts of the frontal lobes—often are able to function adequately in many ways. Outside of the workings of the motor cortex, therefore, it has been very difficult for researchers to specify the functions of the frontal lobes. In trying to summarize the effects of frontal-lobe damage, Howard Gardner (1974) stated that the “frontal-lobe patient”:

may completely fool the unsuspecting psychologist or the physician, who may conclude on the basis of high scores and appropriate answers that he is dealing with a competent individual. That is because the frontal-lobe patient superficially retains the major cognitive, intellectual, and sensory capacities tapped by psychological tests. His deficiencies inhere in those very judgmental capacities to *plan ahead, to assess the consequences of actions, to evaluate alternatives, to conceive of a situation in multiple ways, to detect subtle social and*

emotional cues, which are the keynotes of the highest human functions, indeed those which, according to [the Russian neurologist] Luria, “make a person human.” (p. 433; italics added)

In other words, damage to the frontal lobes results in serious personality changes even though it may be difficult to state precisely what it is that has changed in the person. Any of the tests that we typically use to test cognitive functioning (such as intelligence tests) may show little or no change, yet the frontal-lobe patient has changed: he/she seems unmotivated, impulsive, and unable to organize his/her thoughts to plan actions and accomplish goals. Clinical research on people with frontal-lobe damage suggests that, once sensory information has been received and recognized to some degree by the other lobes, the frontal lobes engage in a more complex processing of this information. As a relatively simple example, we can recall the discussion of Broca’s area, which is in the left frontal lobe of most people. Broca’s area is involved in the processing of speech that already has been recognized as speech sounds by activity in the temporal lobes. Portions of the frontal lobes outside of Broca’s area seem to be involved in even more subtle intellectual functions. This apparent importance of the frontal lobes for much of our most complex intellectual functioning has led to a great deal of interest among brain scientists. Thus, the second major function of the frontal lobes—their association with the set of mental processes involved in holding information in mind and planning actions—has been studied intensively by researchers in recent years.

The fact that the frontal lobes are connected to most other areas of the brain allows them to take in a large amount of already processed information—information that they then hold onto for a short period of time so that it can be used in developing and accomplishing goals. In fact, we might think of the frontal lobes as a sort of “central command post”: many of the higher intellectual functions that they affect require communication with sensory areas of the brain that engage in more specialized processing of information. In order to understand the nature of the complex tasks performed by this “central command post” in the frontal lobes, let’s consider an imaginary situation discussed by Kolb and Whishaw (1996):

At the last moment you have invited friends for dinner. Since you have nothing to serve, you must go shopping after you leave work at 5:00 p.m. Before leaving, you prepare a list of items to buy. You are working under a time constraint because you must return home before your guests arrive and you need time to prepare. Since the items you need are not all at the same store, you must make an efficient plan of travel. You also must not be distracted by stores selling items you do not need (such as shoes) or by extended chats with store clerks or friends that you might encounter. (p. 307)

Although such a situation might be somewhat stressful for most of us, we probably would have little trouble completing the necessary tasks successfully. We would be able to hold all the necessary information in mind, plan the necessary actions, get back to accomplishing the goals after being distracted by various events around us, and so on. People with frontal-lobe damage, on the other hand, probably would be unable to prepare dinner because they would be unable to do the following: (a) plan a sequence of actions by selecting from several possibilities; (b) ignore irrelevant events (such as a colorful sign in a store window); and (c) keep track of already completed tasks. In general, when confronted with a task, people with frontal-lobe damage are unable to hold in mind a group of options for dealing with the task, select the best one from among them, and then monitor their own behaviors in trying to accomplish the task. In other words, **frontal-lobe patients have trouble using their “internalized knowledge” of the world to plan and perform a sequence of actions designed to accomplish a goal.**

In general, the problem seems to be that, when parts of the frontal lobes are damaged, a person’s behavior is **controlled more by external events than by internalized knowledge**. Kolb and Whishaw (1996) explained this by stating that people with frontal-lobe damage have problems with their **short-term memory**—the memory system that retains information for less than about 20 or 30 seconds. As we will see in Chapter 4, the short-term memory system takes in information from the outside world and “works on it” by comparing it to your consciously held goals and to your long-term memories (those that last anywhere from several minutes to the rest of your life). In using your short-term memory in this way, you are able to plan how you are going to respond to what is going on around you. Without an adequately functioning short-term memory, however, it becomes very difficult for frontal-lobe patients to hold important information in mind: they tend to get distracted easily by what is going on around them, and they have much difficulty in getting back on track once the distracting events are over:

People whose temporal [short-term] memory is defective become dependent upon environmental cues to determine their behavior. That is, behavior is not under the control of internalized knowledge but is controlled directly by external cues [events]. One effect of this condition is that people with frontal lobe injuries have difficulty inhibiting behavior directed to external stimuli. (p. 309).

By responding to distracting environmental events, frontal-lobe patients typically forget what they were trying to do and, therefore, fail to accomplish the tasks necessary for achieving their original goal. In fact, we all experience similar problems to a limited degree every day when we are about

to do something and then get distracted briefly by some irrelevant event: we sometimes find that we can't remember what we were just about to do. This is due to the fact that short-term memory normally holds information only briefly. Such problems, even though they occur in everyday life, are much more severe with frontal-lobe damage because short-term memory is often severely affected by the damage. Such problems also occur in some elderly people whose frontal lobes are beginning to degenerate with age—a difficulty that often causes much distress in these people.

The difficulty that frontal-lobe patients have with using internalized knowledge to plan actions and guide behavior can lead to some disturbing personality problems. Perhaps most disturbing is their tendency to engage in highly maladaptive or socially inappropriate behavior because of their inability to inhibit responses to external events. In general, people with frontal-lobe damage tend to act very impulsively and to show highly emotional behavior. Phineas Gage is a famous case from the history of neurology who had such a problem. In 1848, Gage had a large part of his frontal lobes destroyed by a metal rod which, because of an explosion, entered his skull under one eye and exited through the top of his head. Before the accident, he had normal intelligence, and had been industrious and conscientious. After the accident, a complete change in his personality was observed. He often cursed, was very impolite to others, was easily frustrated, gave in immediately to his desires, and was unable to complete a course of action. On the other hand, some people with frontal-lobe damage lose the motivation to engage in any complex actions at all. Unlike Phineas Gage, these people seem to become withdrawn, indifferent, and passive. An example of such a case can be seen with a 46-year-old salesman whose left frontal lobe was removed after a traffic accident. Although several months after the accident, this man showed above-average intelligence, could move most of his right side easily, showed no aphasia, and had normal memory, he showed a large change in personality:

Prior to the accident, the patient had been garrulous [talkative], enjoyed people, had many friends and talked freely. He was active in community affairs, including Little League, church activities, men's clubs, and so forth. It was stated by one acquaintance that the patient had a true charisma, "whenever he entered a room there was a change in the atmosphere, everything became more animated, happy and friendly." Following the head injury, he was quiet and remote. He would speak when spoken to and made sensible replies but would then lapse into silence. He made no friends on the ward, spent most of his time sitting alone smoking. He was frequently incontinent of urine, occasionally of stool. He remained unconcerned about either and was frequently found soaking wet, calmly sitting and smoking.... He was totally unconcerned about his wife and children. Formerly a warm and loving father, he did not seem to care about his family. Eventually

the family ceased visiting because of his indifference and unconcern (Blumer & Benson, 1975; quoted in Kolb & Wishaw, 1996; pp. 324-325)

It seems that whether someone becomes apathetic and withdrawn or active and impulsive depends partly upon which part of the frontal lobes is damaged. In general, however, we can conclude that a good deal of one's personality, especially how one interacts with others, seems to depend upon the proper functioning of the frontal lobes.

Many of the problems associated with frontal-lobe damage—difficulty with holding an idea in mind, being easily distracted, acting impulsively, being unable to plan actions effectively, being unable to work towards a goal—may sound oddly familiar to you if you have ever raised a child. In a sense, young children are “frontal-lobe patients” because it takes several years after birth for the frontal lobes to develop completely. Children less than five years of age, and especially those less than two years, have incompletely developed frontal lobes and, thus, they tend to show many of the intellectual and personality characteristics of frontal-lobe patients. For example, they often have trouble using their internalized knowledge to guide their actions (such as having difficulty holding in mind what you told them to do fifteen seconds ago). In general, children less than two years of age are unable to form and use “mental representations” adequately. A **mental representation is any mental image of, or thought about, an external event.** For example, if I ask you how you put on your jeans in the morning, and I don't let you act it out, you will have to go through a series of mental representations before you can answer my question. Mental representations are one important form of “internalized knowledge.” If we want to perform any action in the world, the use of mental representations to plan the action beforehand is very useful: we will make fewer mistakes and perform the action more efficiently. For example, when someone asks you for directions, you mentally go through the turns they will have to take, the intersections they will have to go through, and so on, if they are going to arrive at their destination. By communicating this sequence of mental representations to the other person, you are helping the person to build for him-/herself the mental representations needed to drive directly to the destination. Children less than two years of age show their difficulties with mental representations when they are unable to recognize themselves in a mirror (they have not yet formed a mental representation of their own faces), to use much language (they have not yet formed mental representations of many words), and to engage in “pretend play” (they have not yet formed mental representations of the required roles and objects). After they have reached about two years of age, their frontal lobes usually have developed sufficiently to allow them to more easily form mental representations. This change is associated with the very rapid development of all sorts of abilities

and skills: they can readily recognize themselves in mirrors, their use of language explodes, and they begin to engage in pretend play.

SQ 2-11: Describe the major functions of the frontal lobes of the cerebral cortex. In your answer, discuss the motor, language, and intellectual functions of the frontal lobes. Describe the two personality types that result from frontal-lobe damage. Discuss what is meant by a “mental representation” and how mental representations are used in our intellectual functioning.

Split-brain Patients. One last topic that I need to discuss if you are to have a good understanding of the laterality of functioning in the cerebral cortex is what might happen if the two cerebral hemispheres were unable to communicate with one another. We can begin to understand the problems that might develop by looking at a case study. In 1961, a 41-year-old policeman complained of headaches, nausea, and vomiting. At the time, family members noticed that he had become forgetful, confused, apathetic, and seemed to provoke others to anger. When tested by neurologists, he was found to have a tumor, which was immediately removed. His troubles, however, continued after the operation: he showed a variety of behavioral and intellectual problems. Doctors also noticed that he was completely unable to write with his left hand:

Asked to write with his right hand, he performed quite normally. Letters, words, numbers, and sentences were correctly written to dictation, and he was able to copy printed material, converting it (as do most individuals) to script in the process. His performance with his left hand, however, offered the sharpest possible contrast: His letters were either incorrect or completely unrecognizable; when requested to write particular words or sentences, he would produce an altogether illegible scrawl. He could copy printed materials, but instead of converting to script, he would faithfully imitate each detail of the block letters. When allowed to view these error-laden productions, he was quite astonished. Yet he could not spontaneously correct his errors as long as he was using his left hand. (Gardner, 1974; p. 260)

There was obviously something wrong here: although most people are right-handed when they write letters and numbers, they also are able to write legibly with their left hands when they put some effort into the task. Why was this man unable to do so? Upon further testing, it was found that he also could not name objects that were placed into his left hand (but only when he was not allowed to look at them). Nevertheless, he was able with his left hand to draw an object (such as a toothbrush) placed into that hand, as well as to show others how to use the object. This showed

that he had recognized the object but, for some reason, was unable to indicate with language what he had experienced. How can we understand this patient's difficulties?

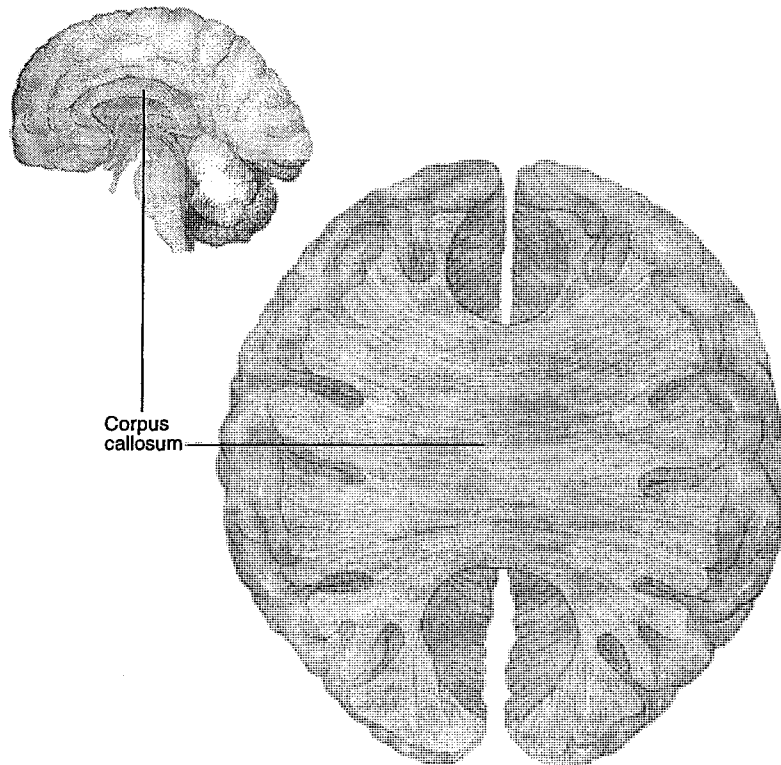


Figure 2.6 The corpus callosum is a structure that sends information from one hemisphere of the cerebral cortex to the other. When this structure is lesioned, information transfer is disturbed.
(from Kalat, 1999; p. 97)

In order to make sense of this case, we have to remember what we learned above about the “crossing over” of neural connections from one side of the body to the other side of the cerebral cortex. The right hemisphere of the cerebral cortex first receives visual and tactile information from the left side of the body, whereas the left hemisphere of the cerebral cortex first receives this information from the right side of the body. Furthermore, movements of the left side of the body are initiated by activity in the right hemisphere of the cerebral cortex, whereas movements of the right side of the body are initiated by activity in the left hemisphere of the cerebral cortex. Although each hemisphere receives sensory information from the opposite side of the body, each hemisphere is able to communicate this information to the other hemisphere by transferring it across a structure

called the corpus callosum. The **corpus callosum is a structure made up of a large number of neural fibers running between the two hemispheres** (see Figure 2.6)—fibers that allow communication between the two hemispheres of the cerebral cortex. This means that, when the corpus callosum is damaged, information in one hemisphere will not be able to get to the other hemisphere. Why should this be a problem? Well, think about it for a minute. Let's say that your corpus callosum has been damaged. If we place a key in your right hand and ask you to name it, what will happen to the tactile information that is sent from that hand? It will go up your right arm to your spinal cord. From there, it will go up into your brain where it will be sent to the left hemisphere of your cerebral cortex. Will you be able to name that object? For most of you, the answer will be, "yes": almost all of you have your verbal functions controlled by activity in the language areas of your left hemispheres. What if the key is placed in your left hand? Will you be able to name it? If your corpus callosum has been cut, it is very unlikely that you will be able to do this. The tactile information will go to the right hemisphere of your cerebral cortex where it will be processed; but this processed information can not get across the damaged corpus callosum to activate the language areas in your left hemisphere. The processing that is done in your right hemisphere probably will allow you to indicate nonverbally with your left hand what you have touched (by drawing, pointing, or showing what the object is used for). If we ask you, however, to indicate with your right hand what your left hand has touched, you will not be able to do so correctly because the right hand is controlled by the left hemisphere and that hemisphere did not receive the sensory information.

The policeman in the case study described above had received damage to his corpus callosum from the tumor. Because his two hemispheres no longer could communicate, he showed peculiarities in his behavior that made it seem as if he had two independent brains in his head:

This surmise was strengthened by a demonstration that objects placed in either hand could not be identified by the other hand, and that a task learned by one hand (such as a simple maze) had to be completely relearned by the other—whereas normal individuals routinely "transfer" learning across limbs and across cerebral hemispheres. Carrying out [verbal] commands with the right hand [which is controlled by the language-dominant left hemisphere], such as drawing a square, waving goodbye, or pretending to brush his teeth, posed no problems; these same commands, however, could not be executed with the left hand [because its controlling hemisphere, the right, could not understand the verbal commands]. Asked to draw a square with that hand, he drew a circle. Instructed to point to the examiner with his left index finger, he pointed to his own eye with his left index and middle finger. Commanded to pretend to brush his teeth with his left hand, he on one

occasion pretended to lather his face, and on another, mimed combing his hair. (Gardner, 1974; p. 261)

But, as you probably remember from the discussion earlier in this chapter, we cannot rule out the effects of extraneous variables with case studies such as this one. In the present instance, the major problem with inferring that the damage to the corpus callosum is the cause of these problems is that he also received damage to other areas of his brain. It could be that damage to one of these other areas is the cause of his peculiar responses. The best way to show that damage to a particular area is causing a loss of a function is to experimentally lesion it so that we can be certain that no other brain areas are involved. In doing this, we would be manipulating the predicted causal variable (the causal variable is an intact versus a damaged corpus callosum) and looking for any effects on the affected variable (the affected variable is the set of responses to various environmental events that occur on one or the other side of the body).

Such an experiment has been performed with a small group of people who had severe cases of epilepsy. How could this be ethical? Didn't I say earlier that we couldn't purposely damage the nervous systems of humans? Well, there are some cases in which lesioning the brains of humans is acceptable. When removing a part of the brain will help reduce symptoms of a severely disabling disorder, and when there are no other treatments that could possibly help, then lesioning usually is considered to be ethical. In the case of severe epilepsy, the random electrical activity of an epileptic episode typically spreads from its focal point and may travel across the corpus callosum so that both hemispheres of the brain become involved. Because this electrical activity is uncoordinated, the person becomes unable to function, often loses awareness of the external world, and may convulse if the motor cortex becomes involved. These seizures may last for several minutes and the after-effects may last for some time after this. Although these problems often can be controlled through anti-convulsant medications, some people with very severe and frequent seizures have not been helped by these medications. It seems that cutting the corpus callosum reduces the severity and frequency of seizures in many of these otherwise untreatable epileptics. People who have had their **corpus callosums surgically cut** are referred to as **split-brain patients**. By studying such cases, we have been able to find out much more about the independent functions of the two sides of the brain. Although there are individual differences, in general we see that, after the corpus callosum has been cut, a person will show particular types of difficulty depending upon which hemisphere is being activated by stimuli. For example, we often see problems such as the following. (1) With their right hemispheres, split-brain patients often are unable to name (either through speaking or writing) objects, letters, and numbers. (2) With their left hemispheres, split-brain patients often are unable to draw objects accurately, copy a particular design using blocks, or

recognize faces and other complex visual objects (various tasks that measure **spatial ability**, which is the **ability to visualize and relate objects in space**). Furthermore, people who have received damage to one or the other hemisphere also tend to show similar problems (that is, these problems are not limited to split-brain patients). So, it seems that such functions tend to be localized in one or the other hemisphere.

Individual differences make such findings on laterality even more complex. For example, I stated earlier that about 30% of left-handers have language abilities shifted towards their right hemispheres. In one case, the speech of a left-handed split-brain patient was associated with activity in her left hemisphere, whereas her ability to write was associated with activity in her right hemisphere! Different aspects of language, therefore, may be located in different hemispheres in the same patient. There is no reason to think that other functions, such as spatial ability, may not also show similar variations among different individuals (in this case, being shifted towards the left hemisphere in some people). Furthermore, the plasticity of the nervous system may allow for changes after the brain is damaged. Michael Gazzaniga (1998) reported that one split-brain patient “developed the capacity to speak out of the right hemisphere—13 years after surgery” (p. 53). In fact, can you use findings such as this to criticize the use of split-brain patients as subjects in studies designed to show the typical localization of functions in humans? Think about this for a minute. Why might split-brain patients lead us astray in our desire to show which hemisphere contains which functions? The following thoughts occur to me. Epilepsy is the result of damage to the brain—damage that occurs most often during childhood. Because the brain has been damaged, it may reorganize itself to some extent, thereby making the localization of functions in these people different from those of most humans. Therefore, we need to be careful about extending findings from split-brain patients to humans in general. The reason that we feel confident that much of the split-brain work has relevance for humans more generally is that research with other subjects (such as victims of strokes and those who have received electrical stimulation of the brain) has tended to support the split-brain findings. The point that should be remembered from all of this is that **we always need several kinds of evidence before we can make valid (logically sound) conclusions from any particular line of research**. You should keep in mind that any one kind of evidence (such as split-brain research) always has limitations that can be controlled for only by considering other kinds of evidence (such as electrical-stimulation research).

A fascinating problem that has been observed in many split-brain patients during the first few months after surgery is their **apparent inability to control the left hand**—a problem that is sometimes referred to as **alien-hand syndrome**. Preilowski (1975) presented some examples:

In one case the patient (W. J.) would repeatedly pick up a newspaper with his right hand and lay it down with his left hand. This would be performed several times until finally the left hand threw the newspaper on the floor. Another patient (R. Y.) was described by a physiotherapist: “He was buttoning his shirt with his right hand and the left hand was coming along just behind it undoing the buttons just as quickly as he could fasten them.” ...It is of interest that the same patients...were able to use their left hand in a purposeful and cooperative manner “when not thinking of what they were doing.” For example, they could pour coffee out of a pot held in the right hand into a cup held by its handle with the left hand. (quoted in Kolb & Whishaw, 1996; pp. 344-45)

For almost all patients, **this antagonistic behavior between the two hands disappears within a few months after the operation.** After this time, they are able to engage in virtually all the behaviors that anyone else can perform (in fact, it takes special procedures to detect that they have had their corpus callosus cut at all). For a small minority of split-brain patients, however, the left hand continues to perform actions that they claim they cannot control. Sometimes these actions involve violence towards others (for example, grabbing a cat and trying to strangle it) or towards oneself (grabbing the steering wheel of a car and turning it into oncoming traffic). It seems very unusual that these people would state that they couldn’t control their left hands. How might you explain their claim? Can they actually not control their own left hands? The best way to explain their statements is to remember that language functions are, for most people, associated with activity in the left hemisphere. The left hemisphere controls the movements of the right hand. It is the nonverbal hemisphere—the right hemisphere—that controls the left hand. Thus, when these people are claiming that they cannot control their own left hands, they are only half correct: the hemisphere that is making this claim (the left) cannot control the left hand; but the hemisphere that typically cannot speak (the right) can, and is, controlling the left hand. Again, it is as if there are two brains inside the person, each processing environmental information in its own way and controlling different sets of behavior.

SQ 2-12: Discuss the meaning and purpose of “split-brain” operations. What have we learned from the people who have undergone this operation? How can the presence of individual differences and the effects of plasticity make it difficult to draw firm conclusions about cerebral laterality? Why do we need evidence from different kinds of research before we can conclude that a particular area of the brain has a particular function? Describe the “alien-hand syndrome” in terms of its major symptoms and its causes. Why do people with alien-hand syndrome say that they cannot control their left hand?

The Limbic System

The limbic system is an area of the brain that is made up of structures associated with motivations and emotions (e.g., eating, drinking, sex, anxiety, aggression) as well as with the formation of new memories (see Figure 2.7). For example, if one removes the entire cerebral cortex in cats but leaves the limbic system intact, the animals will exhibit exaggerated aggressive behaviors and postures in response to various stimuli. Based on work such as this, researchers have argued that structures in the limbic system are responsible for emotions in mammals. In humans, some of the relevant evidence includes people who have epilepsy involving the limbic system. During epileptic episodes, these people sometimes exhibit strong aggressive impulses, strong fear responses, uncontrollable laughter, strong sexual arousal, or a feeling of bliss (a feeling of “oneness” with the universe). In the case of Greg, it seems that parts of his limbic system were destroyed by his tumor. It is probably this damage that caused his lack of emotionality and desires as well as his severe amnesia (since the limbic system also is important for memory). It is obvious from such reports that the limbic system is involved in many different and complex functions—functions that involve (as we will see) biological drives, the formation of memories, perception, and emotional responsiveness. I next will discuss some of the structures in the limbic system that are of particular importance for us in this course.

Amygdala. The amygdala seems to be important for the ability to experience emotional responses to perceptions and memories. For example, the fear you feel when you are watching a horror film or remembering it later depends upon activity in the amygdala. Damage to various parts of the amygdala can make an animal excessively tame, unaggressive, or emotionally unresponsive. In research with monkeys and cats, for instance, those with damage to the amygdala may attempt to eat burning matches, their own feces, and other objects that they would normally reject in disgust or fear. This suggests that they no longer are responding emotionally to these objects. In fact, monkeys that, before having their amygdalas removed, responded with terror to snakes would show no fear of snakes at all after the lesioning of these structures. Some monkeys even placed the snakes inside their mouths! Electrical stimulation of the amygdala, on the other hand, can lead to vigorous attacks on other animals or objects. In humans, electrical stimulation causes feelings of fear and apprehension. In fact, individuals with epileptic seizures involving the amygdala sometimes show increases in aggressiveness or fear. For example, a 34-year-old engineer suffered a ruptured peptic ulcer, which caused him to develop epileptic seizures involving the region in which the amygdala is located. During these seizures, he would sometimes become violent towards others, including his wife. He might interpret something she said as an insult and brutally attack her for several minutes. After doing this, he would fall asleep for about 30 minutes

and then wake up feeling refreshed. After other treatments had failed, he agreed to undergo neurosurgery to have a small part on each of his two amygdalas destroyed. After the operation, there were no further attacks of rage.

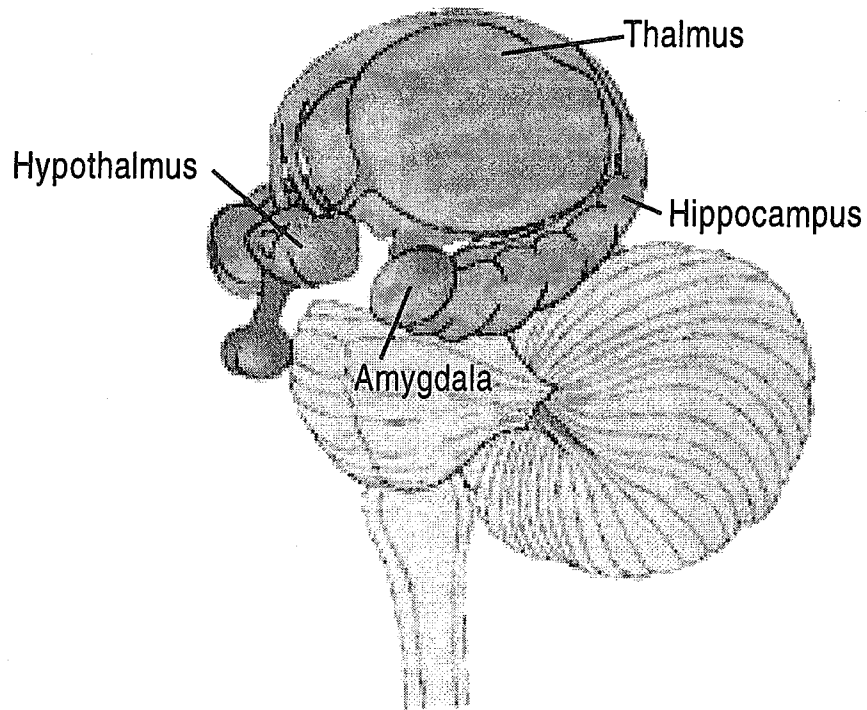


Figure 2.7 The limbic system is made up of a set of structures that are important for emotional expression, drives, and memory formation. (from Kassir, 2001; p. 56)

Because of its association with emotional responsiveness, the amygdala is thought to be very important for memory formation. Without our amygdalas, each event in the world is basically the same lifeless experience. The emotional “charge” that is associated with various events seems to be necessary for us to learn and remember something about these events. We will talk more about this in Chapter 3.

Hippocampus. Damage to the hippocampus on each side of the brain has been thought to have a major impact on memory formation. Greg, for instance, whose hippocampi had been destroyed by his tumor, had very severe amnesia. Some of the earliest evidence for the role of the hippocampus in memory formation was presented in the case study of Henry M. In 1953, Henry’s hippocampus (as well as the amygdala and some neighboring structures) on each side of his brain were removed because of very severe epilepsy that had not responded to medication. The

operation, which changed his personality and intelligence very little (in fact, his IQ score increased slightly), seemed to cause some reduction in the frequency and severity of these seizures. The operation, however, was not a complete success. In fact, it had tragic consequences: Henry exhibited a very severe amnesia as soon as he woke up from the operation. He now could remember events for only about 30 seconds after they occurred. For example, he was unable to learn his way around the hospital. Soon after reading something, he could not remember what he had read or even that he had read it. After the operation, Henry M. moved with his parents to a new house. It took him eight years to learn how to get from one room to another, but he never was able to find his way home from a distance of more than two blocks. In 1980, he moved to a nursing home but has been unable to learn where he lives or who cares for him:

Blind to time, Henry is ever contained inside the bubble of the present.... Whenever you dress him up, he thinks he is twenty-five years old and is being taken to a clinic in Boston for tests. When he hears rock music he thinks it's swing. His mind was sealed off before man flew into space, before the term astronaut was coined; when shown pictures of astronauts he calls them by their 1940s name, rocketeers. Shown a photo of Muhammed Ali in a crouch, he says without hesitation, "That's Joe Louis." In old photos he instantly recognizes faces that the young scientists testing him do not recognize. Alf Landon, Calvin Coolidge, and Hermann Goering. (Hilts, 1995; p. 152)

Thus, Henry has memories for information he learned prior to the operation that removed his hippocampi. But he can recall only a few fragments from events that have occurred since then:

For example, Henry seems to remember something about a President Kennedy and an assassination, even though the killing occurred ten years after Henry's surgery. But on a closer reading of what Henry says when questioned about this at different times, you couldn't say he remembers the assassination of John Kennedy exactly, though he can sometimes answer questions correctly about it. If asked about an assassinated president he will remember McKinley, and recall an attempt on Franklin Roosevelt's life. If Dallas is mentioned, he may say, "Kennedy!" Asked for a first name, he may say Ted. Then, asked to reconstruct the Kennedy assassination, he will speak of an assassin who was trying to shoot the president but someone else got in the way; this is a description of the killing of Chicago mayor Anton Cermak, who was killed in 1933 by a bullet intended for Franklin Roosevelt—an attempt Mr. M. might remember from childhood. It seems as if there is some leakage from the world into his memory, some vague impressions which have become something like memories. (Hilts, 1995; p. 113)

Henry's memory problems seem to involve mainly **the ability to remember new facts about the world, but he has little trouble learning new behaviors and skills**. For example, Henry learned to read words written backwards (as if they were reflected in a mirror) and to solve particular puzzles; but he did not remember the *fact* that he knew how to perform these tasks. When being led to the testing room in a hospital in which he was periodically evaluated, he seemed to remember the route to the room although, when asked, he stated that he did not know why he was walking in that particular direction or where he was going. Sacks (1995) mentioned an example of this kind of memory problem in his discussion of a case described by the neurologist, Edouard Claparède, in 1911. Claparède was showing his students a patient with amnesia like Henry's: "when shaking hands with...[this] patient..., [Claparède] stuck a pin in his hand. Although the patient had no explicit memory of this, he refused, thereafter, to shake hands with him" (p. 53). Henry and Claparède's patient both seemed to have trouble forming new long-term memories for facts, but they showed no difficulty forming new long-term memories for skills and actions. I will come back to this distinction between different kinds of long-term memory in Chapter 4.

What exactly does the hippocampus do? There is some controversy about this. The conventional explanation is that the hippocampus is essential for forming new long-term memories. Some believe that memories are somehow stored in the hippocampus for up to several months while they are slowly being transferred to the cerebral cortex. That is why Henry has long-term memories for events before the surgery: his intact hippocampus held these memories until they could be transferred more permanently to his undamaged cortex. Because his hippocampi are no longer there to hold new memories, however, there can be no transfer of these new memories to the cortex, which makes it impossible for him to form new long-term memories. Although this seems like a plausible explanation, the evidence supporting it has never been precisely replicated when experimental lesionings of the hippocampi have been performed in mammals other than humans. When the hippocampi are removed in other mammals, they seem to have one major kind of memory difficulty—a **difficulty in forming memories for relations among objects in space**. That is, they seem to have a great deal of difficulty remembering the locations of objects that they have experienced previously. For example, if you remove the hippocampi of a monkey, show it the location of a treat and then, a few minutes later, allow it to try to remember where the treat is hidden, the monkey probably will fail at this task. Another function of the hippocampus seems to involve **finding memories already stored in our brains**. For example, when you are searching for an answer to a question on a test, the hippocampus may be important for "finding your way around in your brain" until you get to the information you want. In this case, you can

think of the hippocampus as a sort of “knowledge guide” that leads you to the information you want:

If we need the name of a bird we search in restricted parts of neural space for birds [sic] names, pushing incorrect bird names and even the names of other flying creatures out of the way as we go. The idea that we have a structure dedicated to finding things in our brain provides an explanation for curious slips of the tongue, such as when we are thinking of the name of one person but accidentally and inappropriately blurt out the name of another. It might also account for the curious symptoms of deep dyslexics; when given a word like “bird” to read, they may say “butterfly.” Possibly these errors indicate that the finding system has made a mistake. (Kolb & Whishaw, 1996; p. 445).

Perhaps problems in the hippocampus or related structures might also help to explain the anomia often seen in patients with Wernicke’s aphasia. In Henry’s case, it might even be that he has stored new memories for facts, but that the damage to his hippocampi makes it difficult or impossible for him to get to this information. For example, he seemed to know something about the Kennedy assassination, as if this knowledge had been stored somewhere in his brain, but he was not able to locate it completely. At this point, we just do not know precisely what the hippocampus does. We only know that, **in general, it influences the formation or retrieval of memories for new facts, especially (perhaps) those facts that involve spatial relationships among objects.**

Pleasure Centers. Several areas within the limbic system, when stimulated electrically, seem to be associated with feelings of pleasure in mammals. In the 1950s, James Olds and Peter Milner discovered the first evidence for what was to become known as “pleasure centers” in the brain. They had accidentally placed an electrode in a particular area of a rat’s limbic system and noticed that the rat seemed to enjoy electrical stimulation of this area. When they implanted electrodes in this same area in other rats, they found that electrical stimulation served as a reward for the learning of new behaviors. In fact, they allowed rats to press a lever in order to stimulate electrically their own brains. They found that these rats would stimulate this area of the brain as much as 2000 times an hour (an average of one lever press every 1-2 seconds). They sometimes would continue pressing until they dropped from exhaustion. In 1962, James Olds repeated these experiments with monkeys and obtained similar results (sometimes with lever presses as high as 8000 times per hour—about two presses every second). Other studies have found pleasure centers in cats, dogs, and dolphins. It seems that activity in these areas of the limbic system is associated with the rewarding effects of particular behaviors, such as those that occur with eating and sexual

behavior. Some research has shown that certain drugs may be addictive because of their effects on pleasure centers. In fact, rats seem to act as if they are addicted to brain stimulation of the pleasure centers: they often choose stimulation over food even when they are being kept on a starvation diet; and rat mothers often will abandon their newborn pups in order to receive brain stimulation. There are many pleasure centers scattered throughout the limbic system that seem to give pleasurable feelings under different conditions.

In humans, stimulation of these areas is often associated with pleasure and even euphoria, but the feelings generally are not as intense as they are with rats and monkeys. The evidence for this claim was accumulated during the early 1960s by a group of researchers who worked with depressed patients and with patients suffering from severe pain. It was thought that stimulation of the pleasure centers would reduce or eliminate the negative effects of these problems. These researchers found that people often experienced pleasant sensations, sometimes sexual in nature, when certain areas of the limbic system were electrically stimulated. For example, a 36-year-old woman experienced the feelings as sexual arousal and would flirt with her therapist when she received brain stimulation. Another patient experienced the stimulation as being “almost orgasm.” When he was allowed to press a button to receive stimulation, he continued to press it hoping to achieve orgasm. One person kept pressing the button several hundred times an hour for up to several hours in a row. An 11-year-old boy stated simply, “Hey, you can keep me here longer when you give me these [stimulations]; I like those!” It seemed that those people who were most depressed or who were feeling the most pain had the most pleasurable feelings associated with stimulation. People who were not experiencing as many difficulties reported that the stimulation gave them only mild amounts of pleasure. In fact, in some people, brain stimulation produced little emotional response at all or even negative feelings. For example, the man described as having pre-orgasmic sensations did not like the stimulation because he was unable to achieve orgasm. Others felt as if they had a word on the “tip of their tongues,” and would keep pressing the button in order to get at the word. Of course, there was no word to retrieve and, so, they tended to become very frustrated. **In general, it seems that any pleasure associated with brain stimulation is milder for humans than it is for rats and monkeys.**

Thalamus. Sensory pathways from the body converge on the thalamus, which then sends this information up to the various sensory areas of the cerebral cortex. The thalamus also does some processing of this sensory information. For example, the thalamus is important for the perception of pain and may also allow us to perceive pressure and temperature to some extent. Formation of long-term memories may also involve activity of the thalamus: people who have damage to certain parts of the thalamus sometimes have difficulty with memory. Probably because

of its sensory functions, activity in the thalamus seems to be important for self-awareness and awareness of the world. In fact, people who have severe damage to the thalamus may show normal arousal (sleep/wake) cycles but have no apparent awareness of themselves or their worlds (that is, they exhibit no evidence of thinking or emotions).

SQ 2-13: List the major structures of the limbic system discussed in this section and describe the major functions of each structure.

The Brain Stem

The brain stem basically is the extension of the spinal cord after it enters the bottom of the skull (see Figure 2.8). Activity in the brain stem is important for (a) **bodily activities essential to survival** (such as changes in heartbeat and breathing, and the initiation of certain reflexes), (b) **the focusing of attention**, and (c) **patterns of arousal** (that is sleeping versus waking states). If the brain stem is damaged, the person may lapse into a coma or even die because of its control of functions essential to survival. The brain stem is made up of several different structures that I will describe next.

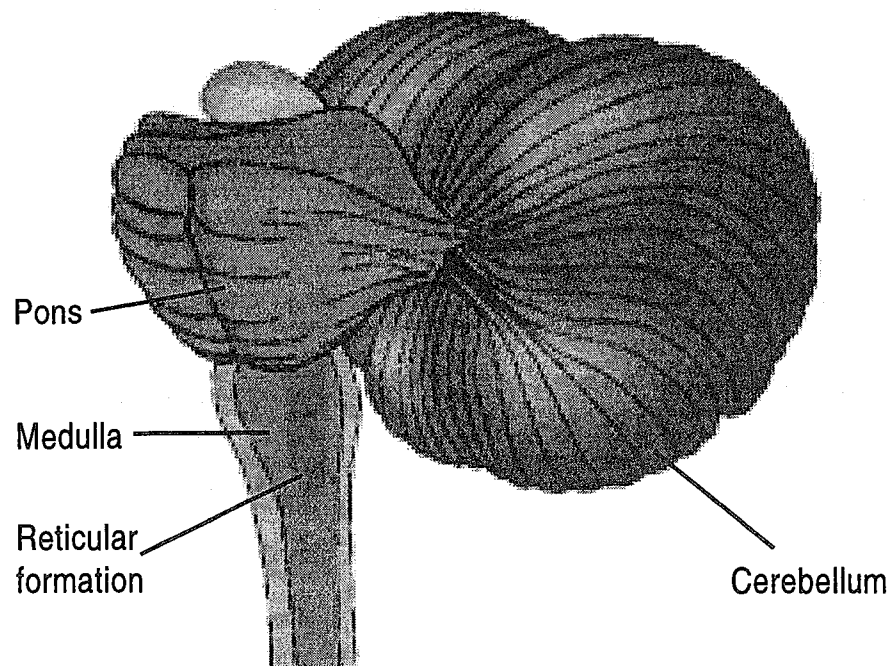


Figure 2.8 The brain stem is made up of a set of structures that are important for automatic survival function, arousal, and attention. (from Kassir, 2001; p. 55)

Medulla Oblongata. This is a part of the brain stem just above the spinal cord and is less than 1.5 inches in length. Its small size, however, should not mislead you: it regulates a number of vital processes such as breathing, heart rate, and the diameter of the blood vessels, as well as important reflexes such as swallowing, vomiting, salivation, coughing, and sneezing. Most of the sensory and motor pathways cross over in the medulla. This crossing over is what allows, for example, the left hemisphere of the cerebral cortex to control muscles on the right side of the body, and vice versa. Damage to the medulla caused by hitting the back of the neck can be fatal. Large doses of morphine (and other opiates), cocaine, or amphetamines also can disrupt activity in the medulla and cause death by interrupting breathing or the beating of the heart.

Pons. The pons is right above the medulla. Activity within the pons is important for the rapid-eye movements of REM sleep and may even be important for turning REM sleep on and off. If the pons is lesioned in cats, certain characteristics of REM sleep are lost (such as the eye movements). The medulla and pons seem to work together in various processes associated with sleep and wakefulness.

Cerebellum. Activity in the cerebellum is essential for orientation and movement of the body. It is important in the control of functions such as walking, the ability to maintain an upright posture, and fine-muscle coordination and control. The largest part of the cerebellum in humans is important for the coordination and control of the separate movements of learned habits. A **habit** is an old term that is defined as **a set of learned automatic movements that are performed rapidly because they are well practiced**. When performing the separate movements of a habit (such as shifting gears in a car with a manual transmission), we generally are not aware of the separate movements involved. It is almost impossible to become aware of the separate movements because they happen so quickly. In fact, when we try to focus attention on them, the movements may become uncoordinated, thereby causing us to make mistakes. For example, if you focus attention on the separate movements involved in writing the letters of your signature, you might notice that the signature now looks different from the way it normally looks. Habits typically are developed as the result of slow and deliberate practice (such as long hours spent in practicing a musical instrument or in sports training). This practice causes changes in the cerebellum and several other areas of the brain (such as the motor cortex)—changes that underlie the development of the habit. Thus, the cerebellum is a structure that is very important for learning new movements of the body. Damage to the cerebellum often makes it difficult or impossible to learn new movements. I will talk more about learning and habit formation in Chapter 3.

The role of the cerebellum in the production of habitual movements involves the **fine-tuning of movements and the adjustment of these movements to the specifics of a particular**

situation. For example, it is impossible to learn precisely how one should always move in order to hit a baseball so that it will always sail over the left-field wall. This is because the required movements and bodily positions change each time a person steps up to the plate: the pitcher is throwing different pitches, the wind is blowing differently, the batter is using a different bat, etc. Each time someone steps up to the plate and gets ready to bat, he/she must adjust the stance, the grip on the bat, body posture, etc., to the particular circumstances in order to swing correctly. Even while swinging, the batter must be adjusting his/her movements if something in the situation changes (for example, if the ball begins to curve). Furthermore, these separate adjustments must all come off in a highly coordinated fashion or else the person will be unable to hit the ball well. Over many repeated experiences with a particular situation (for example, if the batter faces a particular pitcher again and again), the batter eventually may learn to adjust his/her movements and bodily positions more adequately. This set of complex adjustments to a particular situation and the coordination of these adjustments—the “fine-tuning” of the habit—requires a great deal of activity in the cerebellum. Damage to the cerebellum, therefore, tends to cause people to be unable to coordinate their habitual movements in such a way that they can adjust themselves to the specifics of a situation. This is why alcohol, which affects the cerebellum very quickly, can cause intoxicated people to appear so clumsy. In fact, people with damage to particular areas of the cerebellum may appear to be drunk.

The cerebellum may also be involved in some higher mental functions: **people with damage to the cerebellum may show severe decreases in intellectual functioning.** For example, they are more likely to have difficulty with planning actions and using language. A part of this decrease in intellectual functioning is the result of difficulties in the ability to shift attention to new information. For example, most of us, while driving a car, would be able easily to shift our attention from a song on the radio to a car ahead of us that keeps weaving over lane markings. Someone with damage to the cerebellum, however, tends to have trouble doing this. For example, the cerebellums of people with autism tend to show damage that is correlated with difficulties in attending to changes in situations, especially social situations. In considering all of this, we might think of the cerebellum as being important not only for the coordination of movements in constantly changing situations but also for the coordination of attention in constantly changing situations. There are other intellectual deficits that occur after damage to the cerebellum that probably have nothing to do with attention. For example, there often are difficulties with using language. In fact, language deficits following damage to the cerebellum can look similar to Broca’s aphasia. It should be obvious that the cerebellum is involved in a large number of very complex but poorly understood functions.

Reticular Formation. During the 1940s and 1950s, researchers discovered that a large portion of the brain stem, called the “reticular formation,” seemed to make animals more alert. For

example, electrical stimulation of the reticular formation of a lightly sleeping cat would cause it to wake up. Electrical stimulation of an awake animal would seem to “energize” the animal. It was found that the cerebral cortex (and, in fact, every major system of the brain) connects to the reticular formation. In this case, incoming sensory information activates the reticular formation which then “energizes” the cerebral cortex thereby causing animals to become more alert. This is why your alarm clock is able to wake you up: the sound of the alarm activates your reticular formation which then activates your cerebral cortex. When your cerebral cortex becomes active, you are awake. You probably also have noticed that, when you begin to get drowsy, getting up and walking around wakes you up. This is because the contraction of your muscles causes sensations in these muscles which then travel to the reticular formation, thereby causing it to become activated. Sensations from splashing water into your face also activates the reticular formation when you are drowsy. The reticular formation, thus, seems to be (at least in part) an “energizing system” of the brain. Because of this energizing effect, the reticular formation is also often referred to as the “reticular activating system,” which is what I called it in Chapter 1.

The reticular formation forms the central core, and extends the entire length, of the brain stem (it runs through the medulla, the pons, and up into the thalamus). It is very important for **patterns of arousal as well as for attention and alertness when awake** (the cerebellum, which also seems to be involved in attention, has connections to it). As for arousal, if we separate the reticular formation from the rest of the brain, an animal will show brain waves that indicate a state of sleep. If we make a cut farther down at the point where the brain stem connects to the spinal cord, a cut that leaves the reticular formation in contact with the rest of the brain, normal patterns of sleeping and waking are observed. Thus, it appears that activity of the reticular formation is important for causing us to fall asleep and to wake up, although there are also other areas of the brain important for patterns of arousal. In fact, lesioning the reticular formation may not lead to a permanent state of sleep: over time, the animal may again show alternations between sleeping and waking. This is probably due to the influence on arousal of these other brain structures. This also suggests one way the brain may reorganize itself after damage (“plasticity”): intact structures with related functions may begin to take over the functions of the lost structure.

SQ 2-14: List the major structures of the brain stem and describe the major functions of each.

The Functioning of Neurons

As I have tried to make clear in this chapter, neural activity causes all of our mental events and behavior. This is accomplished through the communication of neural activity in one part of the

nervous system to other parts of the nervous system. For example, activity in my motor cortex is communicated through the brain stem, down my spinal cord, and finally to the muscles of my arms and hands so that I can type these words. Such communication depends most directly upon the adequate functioning of **neurons**, the major kind of cell making up the nervous system (see Figure 2.9). It is the functioning of and communication between neurons that is the basis for our thoughts, our emotions, and the movements of our bodies. If patterns of communication among our neurons are changed (for example, by ingesting a drug), our mental events or behaviors are going to change in some manner. In fact, it is thought that many mental disorders are caused by problems in neuronal communication. For example, obsessive-compulsive disorder (abbreviated as OCD), which is thought to be caused by a disturbance in communication among neurons of the brain, is a mental disorder in which the person experiences intrusive thoughts that he/she knows are irrational (obsessions) or behaviors that he/she feels compelled to perform (compulsions). In the following passage, a person with OCD describes an episode of obsessive thinking and compulsive behavior:

I'm driving down the highway doing 55 MPH. I'm on my way to take a final exam. My seat belt is buckled and I'm vigilantly following all the rules of the road. No one is on the highway—not a living soul.... While in reality no one is on the road, I'm [suddenly] intruded with the heinous thought that I *might* have hit someone.... I think about this for a second and then say to myself, "That's ridiculous. I didn't hit anybody." Nonetheless, a gnawing anxiety is born.... I start ruminating, "Maybe I did hit someone and didn't realize it.... I have to go back and check." Checking is the only way to calm the anxiety.... I pray this outrageous act of negligence never happened. My fantasies run wild. I desperately hope the jury will be merciful. I'm particularly concerned about whether my parents will be understanding. After all, I'm now a criminal.... I turn the car around and head back to the scene of the mythical mishap. I return to the spot on the road where I "think" it "might" have occurred. Naturally, nothing is there. No police car and no bloodied body. Relieved, I turn around again to get to my exam on time. (Rapoport, 1989; pp. 23-25)

Nevertheless, his irrational thoughts about having run over someone and his attempts to make sure that he hadn't were not over yet. They quickly returned and he spent a great deal of time going back down the road to check for a body that he "knew" was not there, but which he felt compelled to check for anyway. What is the evidence that a problem in neuronal communication is the cause of such symptoms? Some of this evidence consists of the fact that medications taken to control obsessional thinking are known to influence communication among neurons in parts of the brain. Such evidence makes plain the need for you to acquire some basic knowledge about neuronal

communication if you want to understand psychological theories about mental events and behavior. The remainder of this chapter should help you to develop this knowledge.

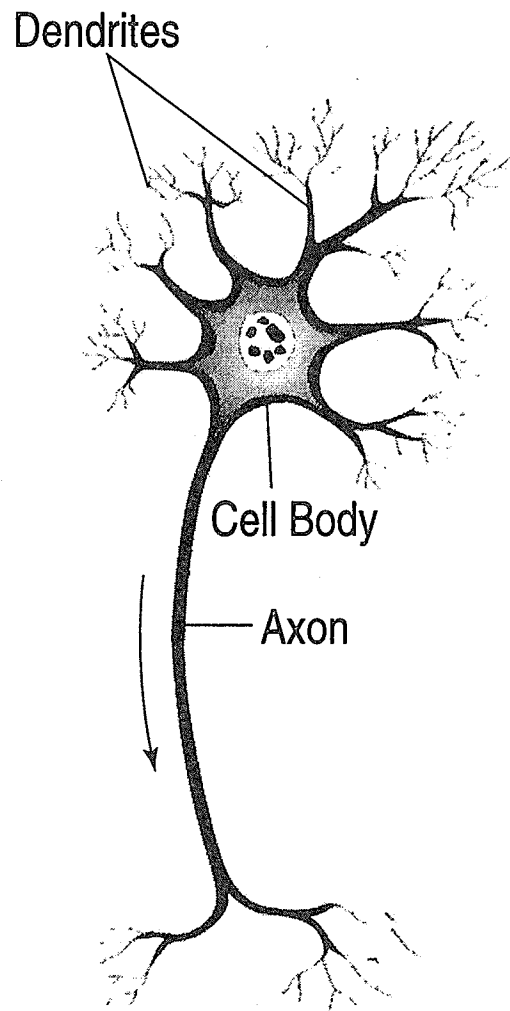


Figure 2.9 The neuron is made up of the dendrites (a structure that receives messages from other neurons), the cell body (a structure that sums these messages from other neurons), and the axon (the long extension down which a neural impulse is generated). (from Fernald, 1997; p. 69)

What allows neurons to communicate with one another? In trying to understand neuronal communication, it is essential to know that neurons are somewhat like very weak batteries: each neuron has a very small voltage associated with it. We might even think of each neuron as having both a “positive terminal” on the outside of the cell and a “negative terminal” on the inside of the cell. When an electrode is placed inside a neuron and another one is placed outside of it, a very small “electrical potential” (another name for voltage)—much smaller than that of the smallest

battery—can be measured across the **cell membrane**. The cell membrane is **the outer boundary of the cell**, somewhat like the “skin” of a cell, that prevents many substances from entering or leaving the cell. When a neuron is not being affected by outside influences, its electrical potential is only about -70 mV (mV stands for “millivolt,” which is a thousandth of a volt). This very small voltage is known as the neuron’s **resting potential**. As we will see, the electrical potential of a neuron can change when it is affected by certain factors in its environment. This change in electrical potential is an essential part of neuronal communication.

But what allows a neuron to have an electrical potential in the first place? There are **electrically charged atoms**, called **ions**, distributed throughout the inside and outside of each neuron. An ion has either a positive charge or a negative charge. The positively charged ions are much more common on the outside of the cell and the negatively charged ions are much more common on the inside of the cell (see Figure 2.10). Because of this uneven distribution of positively and negatively charged ions, the neuron has a measurable electrical potential. You might be wondering why the positively and negatively charged ions don’t travel across the cell membrane, thereby evening out the ion distribution? They don’t because the cell membrane is **selectively permeable** (the word “permeable” means “to be open to passage or penetration by something”). What this means is that only certain substances—substances that the cell membrane “selects”—can pass through it. The ions most important for maintaining the resting potential of the neuron typically do not pass through the cell membrane very easily; and some cannot pass through at all. There are several different kinds of ion involved in creating the resting potential of a neuron, but we need to know only about two of these—sodium ions (abbreviated as Na^+), which have a positive charge, and chloride ions (abbreviated as Cl^-) which have a negative charge. When the neuron is at rest, sodium ions are much more common on the outside of each neuron and chloride ions are much more common on the inside of each neuron. Chloride ions are unable to get across the cell membrane. Sodium ions are able to leak slowly across the cell membrane, but they are quickly returned to the outside of the cell before their concentration inside the cell becomes too great.

The permeability of the cell membrane sometimes will change, however. When this happens, sodium ions begin to pass through the membrane, which changes the electrical potential of the neuron. What causes the permeability of a cell membrane to change? Changes in the permeability of a cell membrane are caused by chemicals released from other neurons. The released chemicals, called **neurotransmitters**, are sometimes referred to as “chemical messengers,” since they represent the “message” sent from one neuron to another in neuronal

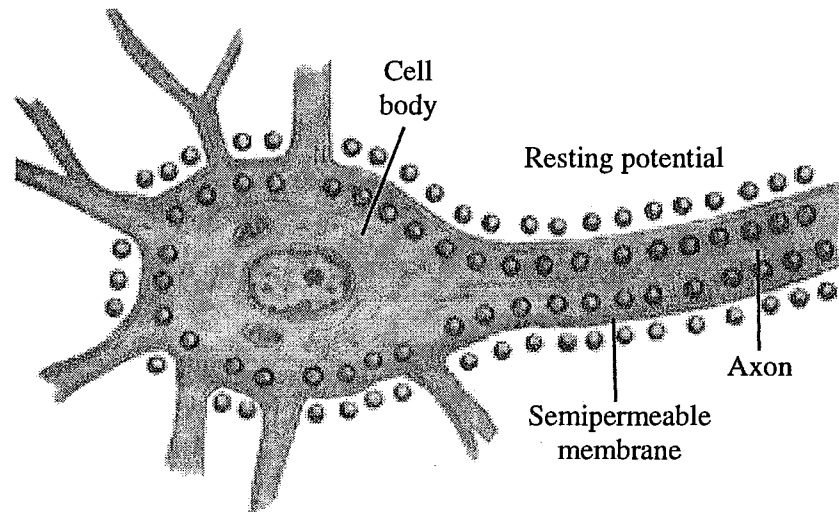


Figure 2.10 Negatively charged ions predominate on the inside of neurons whereas positively charged ions predominate on the outside of neurons. In this way, a resting potential of about -70 mV is maintained across the cell membrane (from Seamon & Kenrick, 1994; p. 45)

communication. There are many different kinds of neurotransmitter in the nervous system (perhaps more than fifty different kinds). Each neuron produces its own neurotransmitter and places it into “sacs” (small pouch-like containers) that are stored at one end of the neuron. From there, they are sometimes released and travel to other neurons. When these neurotransmitters get to another neuron, they bind to it and cause changes in the permeability of its cell membrane. **The main function of neurotransmitters, thus, is to change the electrical potential of the neurons to which they bind by changing the permeability of the cell membrane.** In short, a neuron releases neurotransmitter molecules; these molecules bind to a second neuron, thereby “opening up” its cell membrane to sodium. Sodium now can enter this second neuron more easily, thereby changing its electrical potential. Why is it important to change the electrical potential of neurons? As we will see, this change in electrical potential, if large enough, will cause the neuron to release its own neurotransmitter molecules, which then can go on to change the electrical potential of other neurons. In order to better understand this short sketch of neuronal communication, we first need to describe the basic structures found in a neuron and what happens to the electrical potential of each structure when neurotransmitters bind to the neuron.

In Figure 2.9 is presented a picture of a neuron. Although neurons actually come in all different shapes and sizes, the particular neuron pictured here shows the three structures contained in most neurons: the dendrites, the cell body (also called the soma), and the axon. **The dendrites**

are **branches of the neuron that receive the neurotransmitters released from other neurons**. The neurotransmitter molecules bind to special receptor sites on the dendrites. When a neurotransmitter binds to a receptor site, it changes the electrical potential of the neuron around that site by allowing a small amount of sodium to enter the cell. At any one time, many different neurotransmitters are binding to many different receptor sites throughout the dendrites. At each binding site, the electrical potential of the neuron is being changed slightly. These separate changes in electrical potential then flow into the cell body. **The cell body is the part of the neuron that contains the nucleus and other important structures of the neuron**. At a particular spot in the cell body, the separate changes in electrical potential are summed together. If the value of this summation is large enough, then a large change occurs in the electrical potential of the neuron because of a large change in the permeability of the cell membrane at this location—a change that allows a large influx (flowing in) of sodium ions. This large change in electrical potential then travels down the **axon**. The axon is **the long extension that contains sacs of neurotransmitter at its end**. When the “electrical impulse” (that is, the change in electrical potential that travels down the axon) reaches these sacs of neurotransmitter, the sacs travel to the cell membrane and release their neurotransmitter molecules to the outside of the cell. The released neurotransmitters travel to the dendrites of other neurons and start the whole process all over again (see Figure 2.11). **It is the electrical impulse generated in a neuron, the release of neurotransmitters from the end of the neuron, and the binding of these neurotransmitters to other neurons, that represents the act of communication between neurons.**

Now that I have presented a brief sketch of neuronal communication, let's go back through the steps one at a time and fill in some details. First, we need to know that neurons typically are not in contact with one another. They are separated by **a very small space called a synaptic gap**. The **junction between neurons** that contains a synaptic gap is known as a **synapse**. At a synapse, neurotransmitters released from one neuron travel across the synaptic gap to the dendrites of another neuron. The neurotransmitters bind to the dendrites at receptor sites (see Figure 2.9). The binding of a neurotransmitter to a receptor site causes a change in the permeability to sodium ions of the cell membrane around the receptor site: positively charged sodium ions are now able to pass more easily into the cell. What do you think should happen to the resting potential of the cell around this site if sodium ions are able to enter the cell? Think carefully about this. If the cell is at -70mV and positively charged ions now enter the cell, the cell should become less negative (or, to say the same thing, more positive) at the spot where the sodium ions enter. This change to a less negative voltage is referred to as a **postsynaptic potential** (abbreviated as **PSP**) and is defined as **a change in the electrical potential around a receptor site caused by the binding**

of a neurotransmitter to that site. Many PSPs occur throughout the dendrites of a neuron at any given time. In fact, the brain waves of the EEG represent the effects of perhaps millions of PSPs occurring at any one time in hundreds of thousands of neurons in the cortex.

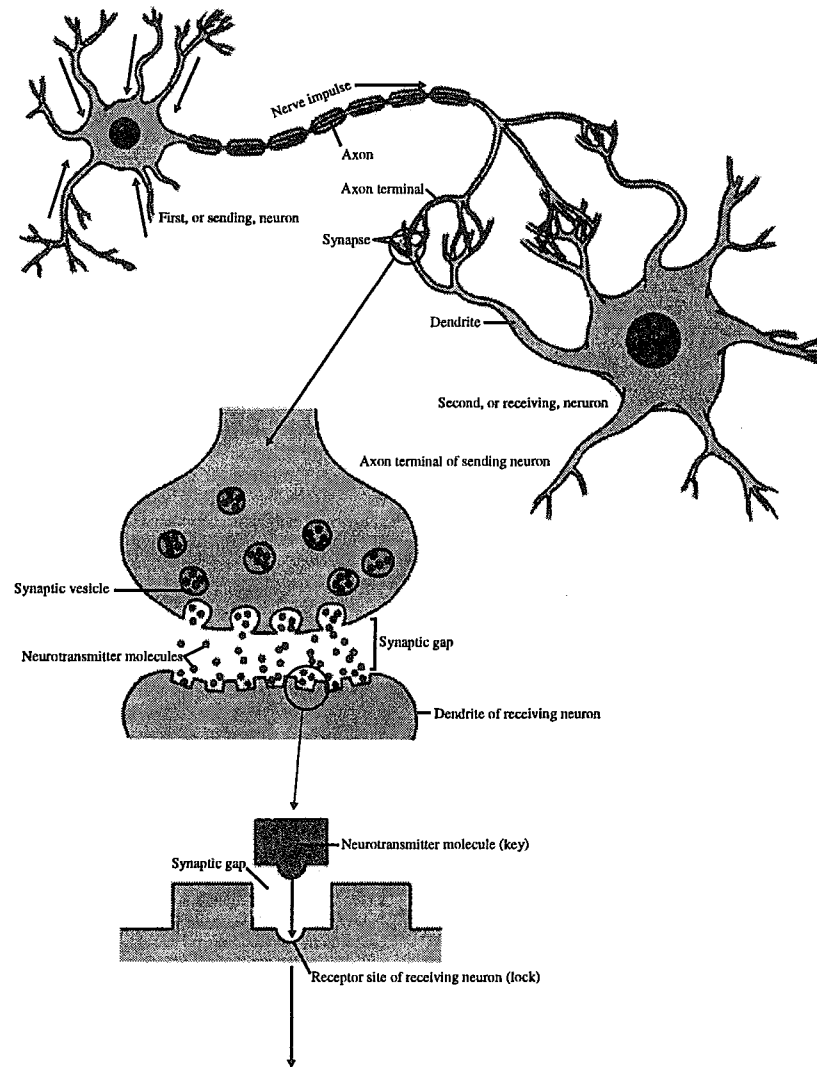


Figure 2.11 Communication between two neurons involves several steps. An action potential travels down the axon of the first neuron and causes the release of neurotransmitter into the synaptic gap. These neurotransmitter molecules travel across the gap and bind to receptor sites on the dendrites of the second neuron. The binding of neurotransmitter to these receptor sites changes the permeability of the cell membrane, causes sodium ions to enter the cell, and thereby generates a postsynaptic potential around the receptor site. (from Wallace & Goldstein, 1997; p. 43)

The electrical changes caused by PSPs travel into the cell body of the neuron. At a certain spot in the cell body (typically where the cell body and the axon meet), the changes caused by all of the individual PSPs are summed together to get an overall change in electrical potential. If this overall change in electrical potential passes a certain value—referred to as the **threshold value**—for that neuron, a very large change in membrane permeability to sodium ions will occur: sodium ions now will be allowed to pour into the cell body. It is as if the cell membrane has opened up wide to sodium ions. For example, let's say that the threshold value is -50 mV. This would mean that the summation of the individual PSPs must change the electrical potential of the cell from -70 mV to -50 mV (a change of 20 mV) before a large change in membrane permeability can occur. If the threshold value is reached, sodium ions pour into the cell body and, for a very brief time, the electrical potential of the cell becomes slightly positive (perhaps reaching + 20 mV). This **large change in the electrical potential of the cell caused by a large influx of sodium ions** is called an **action potential**. The action potential, when it occurs, typically starts at the spot where the cell body meets the axon and travels down the axon towards the end where the sacs of neurotransmitter molecules are stored. The moving action potential is referred to as a “neural impulse,” or simply as an “electrical impulse.” If the threshold value is not reached, no action potential occurs, and the neuron returns to its resting potential.

The production of an action potential is somewhat like the control of an air conditioner by a thermostat. With the air conditioner, you control the threshold value by setting the thermostat (say, to 75° F). Heat from the outside is seeping through cracks, walls, and windows throughout the house. At the spot where the heat enters, the temperature rises a bit. All of these individual changes in air temperature travel into the house toward the thermostat. The thermostat is the place where all of these individual changes in air temperature are summed together. If the overall change in air temperature passes the threshold value (75°), the air conditioner turns on. If the threshold value is not reached, nothing happens. There is, thus, an “all-or-none response” of the air conditioner to changes in air temperature. The same is true with the action potential. All the individual changes in electrical potential occurring in the dendrites (the PSPs) travel into the cell body. At a certain spot (perhaps we could call it the “neuronal thermostat”), these changes are summed together. If the overall change in electrical potential passes the threshold value for this neuron (usually about -55 mV), an action potential is initiated. If the threshold value is not reached, nothing happens. Thus, there is an “all-or-none response” of the cell to changes in electrical potential. When a neural impulse travels down the axon, we sometimes say that the cell has “fired.”

When the neuron fires, a neural impulse races toward the end of the axon. When the action potential reaches the sacs of neurotransmitter stored there, they move towards the cell membrane,

attach to the membrane, and release the molecules of neurotransmitter into the synaptic gap. These neurotransmitter molecules travel across the synaptic gap, bind to receptor sites on a different neuron, and cause PSPs in this new neuron (see Figure 2.11). One can think of the communication between neurons as being like a relay race in which a runner passes the baton to another runner, this person runs with it a bit and then passes it to a third runner, who runs with it until he/she passes it to still another runner. In the case of neurons, the baton may be likened to the neurotransmitters that are released from one neuron and travel to the next; the runners may be likened to the generation of a neural impulse that travels down the axon. Hundreds, thousands, millions, or even billions of neurons may communicate in this way in the production of a single mental event or behavior. Very complex interactions can occur since any one neuron in the brain often is affected by hundreds or thousands of other neurons; and this neuron, in turn, may affect hundreds or even thousands of other neurons.

SQ 2-15: List the three major parts of the neuron. Discuss in detail how the neuron generates an action potential. In your answer, discuss the following: (a) the causes of the electrical potential of the neuron, (b) the meaning of the term “postsynaptic potential,” (c) the concept of a “threshold value,” (d) the cause of an action potential as well as its purpose, and (e) the function of neurotransmitters.

In this chapter, we have learned about how the brain functions in producing mental events and behavior. We will continue to come back to what we have learned here so that we can understand the neural basis for some of the specific phenomena studied by psychologists. In the next chapter, we will investigate how we learn and evolve new thoughts, emotions, and behaviors.

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Practice Test for Chapter 2

1. In comparing the response of rats and humans to stimulation of the pleasure centers of the brain, we find that

- A: both rats and humans enjoy electrical stimulation to almost any area of the cerebral cortex and limbic system.
- B: humans have no pleasure centers whereas rats have very extensive pleasure centers.
- C: nothing can be concluded from these studies because it is difficult to know what parts of the brain are being directly stimulated.
- D: for both humans and rats, the electrodes seem to be stimulating areas of the brain associated with the rewarding effects of sex and food.

2. A person is unable to choose the correct word for objects in photographs. For example, she cannot think of the word "stapler" when she sees a picture of one. Which area of her brain is MOST likely to be damaged?

- A: the hippocampus
- B: the frontal lobes.
- C: Wernicke's area.
- D: the visual cortex.

3. Most drugs that cause changes in mental processes and behavior seem to have their effect by

- A: changing neurotransmitter activity in the brain.
- B: increasing the number of axons.
- C: causing new neurons to grow in the brain.
- D: flooding the brain with newly created ions.

4. The correlation is a measure of

- A: the diversity of a group.
- B: the degree of association between two variables.
- C: the difference between the smallest and largest scores.
- D: the amount of variance.

5. Researchers have found a correlation between taking antidepressants and attempting suicide. At first, they thought that antidepressants might cause suicide. After more study of the problem, however, they concluded that depression causes people to take antidepressants and to commit suicide. This example illustrates the

- A: third-variable problem.
- B: problem of coincidental associations.
- C: problem of biased sampling.
- D: directionality problem.

6. Researchers sometimes perform electrical stimulation of a brain structure in order to
- A: inhibit activity in that structure.
 - B: get an EEG recording from that structure.
 - C: get an X-ray image of that structure.
 - D: activate that structure.
7. In an investigation of the effect of a new teaching technique on the test scores of students, an important extraneous variable would be the _____ of the students.
- A: IQ scores
 - B: hair color
 - C: athletic skills
 - D: sociability
8. An action potential is caused by
- A: the exit of chloride ions from the neuron.
 - B: a large influx of sodium ions into the neuron.
 - C: the dissolving of the cell membrane.
 - D: an accumulation of negative ions inside the cell.
9. In trying to determine if violent TV shows cause children to act aggressively, researchers had a group of eight-year olds watch 30 minutes of a violent television show. They then counted the number of times the children hit each other during a one-hour play period. There were 20 instances of physical aggression counted during this play period. The researchers concluded that violent TV shows cause children to behave more aggressively. Why is this conclusion NOT justified by the results of the study?
- A: There was no comparison group.
 - B: No correlation was calculated.
 - C: There was no operational definition of aggression.
 - D: There was no attempt to control for the directionality problem.
10. The cerebral cortex is divided into four lobes. The lobe that is MOST important for processing visual information is known as the
- A: parietal lobe.
 - B: temporal lobe.
 - C: frontal lobe.
 - D: occipital lobe.
11. Why is it important that the treatment and comparison groups be similar with regard to everything other than the value of the causal variable they receive?
- A: Because we want to see if changes in the affected variable cause changes in the causal variable.
 - B: Because ethical considerations demand it.
 - C: Because other differences will make it difficult to attribute any effects to changes in the causal variable.
 - D: Because we would be unable to calculate correlations if there were any differences between the two groups.

- 12: Which area in the brain stem is MOST important for the regulation of sleep and wakefulness as well as for remaining alert?
- A: pons B: reticular formation C: medulla oblongata D: cerebellum
13. In a research study, the word "control" refers to our attempts to
- A: make initial observations of the phenomenon being studied.
B: develop a specific and testable prediction about the relationship among variables.
C: specific something that we can measure.
D: design a research situation that allows us to identify a particular cause of the phenomenon being studied.
14. When asked to name an unseen object placed in their left hands, what would be the response of MOST split-brain patients?
- A: They would write the name of the object with their right hands.
B: They would state the name of the object.
C: They would probably throw the object against the wall in frustration because of the excessive emotionality of split-brain patients.
D: They would not be able to name the object.
15. In an experiment, an extraneous variable is
- A: a variable that affects the comparison group but not the treatment group.
B: the same thing as the affected variable.
C: a variable that is too subjective to be an operational definition.
D: any variable other than the causal variable that also may influence the affected variable.
16. Mildred talks a lot but what she says does not make much sense: her speech contains words that seem to be almost randomly connected. This problem is MOST likely due to damage of
- A: Broca's area. B: the frontal lobes. C: Wernicke's area. D: all the above
17. The part of the neuron to which neurotransmitters bind is called the
- A: axon. B: synaptic gap. C: cell body. D: dendrites.
18. The cerebral cortex is divided into four lobes. The lobe that is MOST important for processing tactile information is known as the
- A: parietal lobe. B: temporal lobe. C: frontal lobe. D: occipital lobe.
19. Damage to the cerebellum would probably have the LEAST effect on which of the following?
- A: typing
B: playing a piano
C: touching your finger to your nose with your eyes shut
D: walking

20. Years ago, when neurosurgeons electrically stimulated the FRONTAL lobes, they found large areas that had no obvious function. In more recent years, researchers have discovered that these areas are important for all of the following EXCEPT:

- A: forming and manipulating mental representations.
- B: planning and accomplishing tasks.
- C: short-term memory.
- D: recognizing faces and other complex visual stimuli.

21. Suppose that I was doing a study of the causes of anxiety. In my study, I state that anxiety is "the score (from 0 to 20) on an anxiety questionnaire." This would represent my _____ of anxiety.

- A: correlational study
- C: operational definition
- B: conceptualizing
- D: theoretical generalizing

22. If we were to measure the height and weight of 100 adult men, we would find that these two variables would be

- A: uncorrelated.
- C: positively correlated.
- B: causally related.
- D: negatively correlated.

23. A visual image of Barney, the purple dinosaur, was presented in the left visual field of split-brain patients. What response would you predict MOST patients would make when asked later to POINT with their left hands to the correct picture?

- A: They would point to the picture of Barney with their left hands.
- B: They would be unable to point to the correct picture with their left hands.
- C: They would become confused and start pointing at all of the possible choices.
- D: They would begin hallucinating sounds that were associated with the picture.

24. A LEFT-handed person has had a stroke and is now completely paralyzed on the LEFT side of her body. Since the stroke, she no longer can produce speech although she can understand much of what others say to her. What has probably happened?

- A: Broca's area in her left hemisphere has been damaged.
- B: Broca's area in her right hemisphere has been damaged.
- C: Wernicke's area in her left hemisphere has been damaged.
- D: Wernicke's area in her right hemisphere has been damaged.

25. What is a neuron's threshold?

- A: It is the strength of the action potential that occurs in the neuron.
- B: It is the number of action potentials that must occur before neurotransmitter is released.
- C: It is the place on a neuron where action potentials begin.
- D: It is the critical level of electrical potential that must be reached before an action potential is triggered.

26. IQ score, age, weight, grade-point average, and income are all examples of
A: variables. B: constants. C: correlations. D: variances.
27. A person whose amygdala is being electrically stimulated would MOST likely do which of the following during the stimulation?
A: experience visual hallucinations
B: be unable to speak or read
C: attack someone
D: became self-absorbed
28. Suppose that I was doing a study of the causes of anxiety and I measured the amount of anxiety in people by asking them to tell me how anxious they felt. This measurement of anxiety has the disadvantage of being too
A: objective. B: subjective. C: correlational. D: experimental.
29. The main function of neurotransmitters is to
A: cause neurons to undergo cell division.
B: change the permeability of the cell membrane.
C: provide energy to neurons.
D: all the above
30. A researcher found that people placed into same-sex groups participated more in group therapy sessions than people placed into mixed-sex groups. In this experiment, the CAUSAL variable was
A: same-sex versus mixed-sex therapy groups.
B: the amount of participation in group-therapy sessions.
C: people's attitudes toward group therapy.
D: the amount of improvement in mental health.
31. The part of the neuron that releases neurotransmitter is called the
A: axon. B: synaptic gap. C: cell body. D: dendrites.
32. Which structure in the brain stem controls a number of reflexes important for survival?
A: medulla oblongata B: pons C: cerebellum D: reticular formation
33. If the left hemisphere of the cerebral cortex is damaged, which part of the body would be most directly affected?
A: the upper half B: the lower half C: the right half D: the left half
34. When comparing the effects of electrical brain stimulation of the pleasure centers in rats and humans, researchers have found that such stimulation leads to
A: much stronger reactions in humans than rats.
B: much stronger reactions in rats than humans.
C: about the same reaction in both rats and humans.
D: highly variable reactions in rats but almost the same (strong) reaction in humans.

35. A researcher predicted that a protein-enriched diet will enhance the maze-running performance of rats. To test this prediction, one group of rats received high-protein food and a second group of rats received food with ordinary amounts of protein in it. In this experiment, the rat's MAZE-RUNNING PERFORMANCE is the
- A: treatment group. C: causal variable.
B: comparison group. D: affected variable.
36. A person with frontal-lobe damage is likely to do all of the following EXCEPT:
- A: score very low on typical tests of intelligence
B: engage in socially inappropriate behavior
C: show highly emotional behavior
D: become very unmotivated and indifferent to the world
37. The action potential
- A: is a brief but large change in the electrical potential along the axon.
B: usually moves directly across the synaptic gap.
C: begins at the dendrites of the neuron.
D: all the above
38. In the cerebral cortex, information is transferred from one hemisphere to the other via the
- A: cerebellum. B: corpus callosum. C: cerebrum. D: reticular activating system.
39. What is the cause of the resting potential of a neuron?
- A: the concentration of neurotransmitter in the neuron
B: the number of dendrites in the cell body
C: the large influx of sodium ions into the cell body
D: the unequal distribution of ions inside and outside the neuron
40. The brain and the spinal cord make up the
- A: peripheral nervous system. C: somatic nervous system.
B: central nervous system. D: autonomic nervous system.
41. Ralph is able to understand much of what others say to him, but he is almost completely unable to speak or write any words. This problem is MOST likely due to damage of
- A: Wernicke's area. B: Broca's area. C: the temporal lobe. D: all the above
42. I wish to determine if telling jokes in my classes results in higher grades on tests. Therefore, I manipulate the variable of "joke-telling" (by telling jokes in half my classes and telling no jokes in the other half). I then look at the variable of "grades" in each group of classes. This study is an example of a(n)
- A: correlational study. C: case study.
B: experimental study. D: theory.

43. Surgical anesthesia is used to eliminate pain by decreasing a person's awareness of the external world. Based on your knowledge of the BRAIN STEM, which of the following is MOST likely to be affected by the drugs used to produce anesthesia?

- A: reticular formation
- B: cerebellum
- C: medulla oblongata
- D: thalamus

44. Damage to the limbic system would be MOST likely to affect which of the following?

- A: language
- B: sexual drive
- C: breathing
- D: dream onset

45. Which of the following types of study would allow a researcher to make a cause-and-effect interpretation of the results?

- A: a correlational study
- B: a survey
- C: an experimental study
- D: a case study

46. A postsynaptic potential occurs when

- A: ions are unable to move across the cell membrane.
- B: there is a large influx of sodium ions into the axon.
- C: a neurotransmitter binds to a receptor site on a dendrite.
- D: all the above

47. The hippocampus is important for its effects on

- A: the expression of emotions.
- B: the processing of taste information.
- C: the ability to perceive visual information.
- D: certain kinds of memory formation.

48. Changes in the electrical potential of a single neuron generally move in which of the following directions?

- A: from axon to dendrites to cell body
- B: from dendrites to axon to cell body
- C: from dendrites to cell body to axon
- D: from cell body to dendrites to axon

49. Penelope's brain has just been electrically stimulated. She says that it feels as if someone is tickling her on her left arm. Which lobe of the brain is being stimulated?

- A: the right parietal lobe
- B: the left parietal lobe
- C: the right frontal lobe
- D: the left frontal lobe

50. If the spinal cord is cut, paralysis usually results. This is because the spinal cord connects the brain to the

- A: limbic system.
- B: brain stem.
- C: peripheral nervous system.
- D: basal ganglia.

CHAPTER 3

ULTIMATE CAUSES OF MENTAL EVENTS AND BEHAVIOR: LEARNING AND NATURAL SELECTION

In the last chapter, I discussed in some detail how the activity of the nervous system causes our mental events and behaviors. But any given person expresses different behaviors, emotions, and thoughts at various times during his/her life. These changes seem to be caused most directly by changes in their nervous systems. For example, as you went through childhood, you became more and more capable of performing difficult intellectual tasks such as forming and speaking complex sentences, reading words written on a page, and solving mathematical equations. In addition, you became more coordinated in your behaviors so that, by ten years of age, you could perform many actions that would have been impossible for you five years earlier. Just before you became a teenager, you developed more intense sexual feelings and, as you got older, you became more interested in forming sexual relationships. All of these changes were caused most proximately by changes in your nervous system, especially in your brain. But remember that there is a whole chain of prior causes leading back in time from those changes in your brain. In Chapter 1, I referred to distant causes of mental events and behaviors as “ultimate” causes. This distinction between the proximate causes of behavior involving brain activity and the more ultimate causes involving events such as childhood experiences or the genes one inherits leads to the following question: which factors cause changes in brain activity—that is, what are the more important ultimate causes of changes in our mental events and behaviors? And why do people develop in such different directions? In this chapter, I am going to begin an attempt to answer these questions.

When a person’s mental events and behaviors are typical either for a particular social group or for the entire human species—such as the ability to speak a language or the experiencing of heterosexual desires and behavior—we may not often think to ask questions about more ultimate causes. On the other hand, when a person’s mental events and behaviors are not typical—such as the explosions of violence in mass murderers or the unusual sexual behaviors of some of the people on afternoon talk shows—these questions come to the forefront. For example, **fetishism** is a mental disorder in which a person (almost always a male) **frequently becomes intensely aroused sexually by an inanimate (nonliving) object**. Typical fetishes for males involve objects worn by women such as underwear, stockings, shoes, and boots. In general, a person with fetishism either has a great deal of difficulty functioning sexually without the object, or spends much time and effort trying to experience the fetish (either directly or through fantasy). A man with fetishism usually masturbates while touching the object, or he may insist that his partner

wear the object while having sex. A case discussed by Spitzer, et al. (1994) illustrates these characteristics:

A 32-year-old, single, male, free-lance photographer presented with the chief complaint of “abnormal sex drive.” The patient related that although he was somewhat sexually attracted by women, he was far more attracted by “their panties.” ...His first ejaculation occurred at 13 via masturbation to fantasies of women wearing panties. He masturbated into his older sister’s panties, which he had stolen without her knowledge.... The pattern of masturbating into women’s underwear [which he usually stole out of the bedrooms of friends or others he had met] had been his preferred method of achieving sexual excitement and orgasm from adolescence until the present.... (p. 247)

This man—who was attractive and very successful—did not like to date “nice women” because he was afraid that they would not understand his particular desires. He preferred having sex with prostitutes who were paid to wear underwear. On those rare occasions when he had sex with a person not wearing panties, he sometimes had difficulty staying excited. What caused this man to give up the possibility of having a more fulfilling intimate relationship with a woman so that he could continue to satisfy such unusual sexual desires? Because men with fetishism usually become excited by apparel worn by women, it is plausible to explain the initial development of fetishism by some type of learning: these men may have learned their arousal to inanimate objects through prior experiences with women who had worn the items. In fact, in the case we are discussing, the man remembered becoming sexually excited at the age of seven when he saw partially nude women wearing underwear in a pornographic magazine. It is possible that, in general, men who develop fetishism first saw the fetish (the object that sexually excites them) in the presence of an attractive woman and then, later, became excited when they saw the fetish by itself because it reminded them of the woman.

This “learning theory” of fetishism may seem like an obvious one at first. In fact, it can explain the success of the lingerie, fashion, and cologne industries: humans can easily learn to become sexually aroused in normal ways by various sensations. But then we might ask, if it is so easy for humans to learn to become sexually aroused by inanimate objects, why do so few women develop fetishism? That is, women also see or feel inanimate objects worn by potential sexual partners, or they smell their partner’s scent while they are sexually aroused; and they can learn to become aroused by these sensations. So, why do women so rarely develop abnormal reactions to such sensations? Furthermore, why do we also see males of closely related primate species sometimes expressing behaviors that look like fetishism? The following case illustrates this:

The endowing of an object with...[erotic associations] has been noted in a zoo-dwelling chimpanzee...who displayed sexual arousal toward one specific object, a rubber boot.... The chimpanzee quickly approached, gazed at the boot and handled it. The penis became erect and was touched to the boot. Shortly thereafter, manual self-stimulation and ejaculation occurred. The ejaculate was then consumed. This response was said to be invariable and occurred whether the boot was worn by a keeper or simply placed in the cage. (Epstein, 1987; pp. 143-144)

Almost all of these behaviors (except for the consumption of ejaculate) are similar to those a human male with a boot fetish typically would exhibit. In fact, Epstein (1987) noted that, just “as did the chimpanzee, the human takes the object in his hands or even rubs it with his penis” (p. 146). Can we explain this chimpanzee’s “fetishism” in the same way we just explained it for human males? Has this chimpanzee observed attractive female chimpanzees wearing boots? That, of course, is very unlikely. But, perhaps earlier in his life, he felt an attraction towards human keepers wearing boots. He still, therefore, could have learned his fetishism. But there is a more important question to ask here: why would two closely related primates (humans and chimpanzees) both learn similar abnormalities of sexual behavior? Again, we have to remember that there are always more ultimate causes of our mental events and behaviors. Therefore, if we find that a particular environmental event causes a particular response (in the present example, a boot causes sexual arousal), and if we also find that the connection between the event and the response was itself caused by prior learning (in this case, a mental connection between the two was formed when, in the past, boots were worn by a sexually attractive person), we then need to ask the following question: what has caused this particular response to be more easily learned than other possible responses? In the present case, is there something about the evolutionary history of primates that causes males of this order to easily associate nonsexual environmental events with attractive female partners? As you might guess, when we start talking about ultimate causes, there really is no end to the questions we can ask because there always are even more ultimate causes than the one we are considering.

The fact that the same fetish can be learned in a primate which is closely related to humans suggests that there exists a more ultimate cause involving our common evolutionary history. We know that chimpanzees and humans evolved from the same primate ancestor within the last five million years. There may be something in this common ancestry that can explain the similarity between the two species in the development of fetishism. In fact, the fetishism that has developed in this male chimpanzee can be used as support for an “evolutionary theory” of fetishism in human males. The argument is this: during the evolution of higher primates (which includes humans and

chimps as well as several other modern-day species), males seem to have evolved a tendency to become very easily aroused sexually by females. The quick and intense arousal also causes primate males to easily learn associations between arousing females and environmental cues (such as clothing) that signal the presence of potential sexual partners. If you think that the chimpanzee example supporting this theory can be ignored because it is unique, I present the case of a male guinea baboon in the same zoo as the chimp described above: “Upon seeing a boot, the baboon approaches, chatters his teeth, touches and smells it” and then develops an erection (p. 144). The possibility that our evolutionary history makes it more likely that we will develop in particular ways requires us to look not only at how individuals change over their lifespans but also at how species change over generations.

SQ 3-1: Briefly discuss how the mental disorder of fetishism can be explained by learning. Briefly discuss how it can be explained by evolution.

Changes Within and Over Generations

All living creatures, including humans, must respond constantly to what is happening in their environments if they are going to survive. For example, let’s say that you are at an intersection waiting to make a left turn and a cement truck is speeding towards you from the other direction. If you are to survive, you must perceive the truck, estimate its speed, determine whether or not you can turn before the truck enters the intersection, make your final decision about turning, and then, if you judge that you can successfully perform the action, initiate the turn. All of this very complex processing of environmental information occurs within a second or two. This mental processing occurs because of activity in your nervous system—most importantly in your brain, which receives the information via sensory pathways, sifts through all of this information, and then sends motor messages to your muscles and glands (thereby initiating responses in them). As I stated in the last chapter, your nervous system has developed in such a manner that it tends to respond to particular events in typical ways—ways that adjust you to what is happening in your environment. A **typical response of an individual to a set of environmental stimuli** is called a **behavioral tendency**. For example, we talked about the hand-withdrawal reflex—the reflex in which you quickly pull your hand away whenever you place it on a very hot object. A reflex is one kind of behavioral tendency. This reflex obviously helps you to survive longer because, if you did not lift your hand quickly (even before feeling the pain), your hand would become severely burned, which could lead to infection and even death. Behavioral tendencies, thus, can help you to survive in the world as long as the events that initiate them stay constant.

But the world does not stay constant. It changes over time. If you are going to continue to survive and “get by” in your world, your behavioral tendencies must change. For example, you go to different classes with different instructors who have different personalities and requirements. Some instructors may encourage questions from students whereas others prefer to have few or no interruptions. Some instructors may have very difficult tests for which you are always studying whereas others have tests that are so simple that you rarely need to study. Your behavioral tendencies must be adjusted to the peculiarities of each instructor if you are to be successful in the college environment. In a similar vein, there has been a gradual change from kindergarten to college in what is expected of you by your teachers. As each year has passed, more and more has been expected of you, and your behavioral tendencies have had to adjust accordingly. How can this process of constant adjustment and readjustment occur if neural structures already have developed in particular ways? The answer to this question is that the structure of the nervous system itself must be capable of changing over time. This **modifiability of the nervous system in response to internal and external changes** is referred to as **plasticity**. I talked about plasticity briefly in the last chapter when I talked about how the nervous system reorganizes itself after damage. But plasticity of the nervous system is a more general concept than this: it is what allows us, as individuals and as a species, to survive in a constantly changing world. Because plasticity involves changes in the brain and the rest of the nervous system, it results in changes in the mental events and behavior caused by neural activity.

Although plasticity of the nervous system is required if changes are to occur in our mental events and behaviors, the more ultimate causes of such changes—various environmental events—change at widely varying rates. That is, some things about the environment change very slowly, other things change very rapidly, and everything else falls somewhere in between. Thus, our nervous system must be capable of very rapid as well as more gradual readjustments if we are to be able to adapt ourselves to changes in the environment. In fact, the example I used in the preceding paragraph illustrates the problem well: there have been gradual changes over the years in what teachers have expected of you; and these slowly occurring changes have been coupled with much more rapid changes in teacher expectations as you go from one class to another within any given grade level. Furthermore, any particular teacher is in a slightly different mood and is thinking in slightly different ways from one day to the next, and your nervous system needs to adjust to these changes very quickly as well. In psychology and biology, we typically divide important environmental changes into two major categories based upon these differing rates of change: (1) environmental changes that occur within the lifetime of an individual (for example, changes in the expectations that others have of you from infancy to old age), and (2) environmental changes that occur over many generations (such as changes in the average temperature of the Earth). These two

different kinds of environmental change result in two different kinds of change in the body and mind. Environmental changes that occur within the lifetimes of individuals require that the body and mind *of the individual* change over its lifetime. We refer to **mental and physical changes occurring over the lifetime of an individual** by the term **development**. One illustration of this is the fact that, as you went from infancy to the preschool years, you developed a greater number of emotional responses to your world (shame and embarrassment, for example, didn't emerge until you were about two years of age) and more complexity in your emotional responses (for example, you developed different kinds of anger involving rage to mild annoyance). On the other hand, environmental changes that occur over many generations require that the average body and the average mind *of the species* change over many generations. We refer to **mental and physical changes occurring over many generations within a species** by the term **evolution**. For example, our modern "melon-sized" human brains have evolved from the much smaller "orange-sized" brains of our primate ancestors over the last one million years or so. The neural changes making up this increase in brain size have led to major changes in how humans process sensory information and then use it to adapt themselves to the world. In other words, we have evolved in terms of how we think, feel, and behave. The evolution of language abilities is another major example of such a change.

SQ 3-2: Discuss how the concepts of development and evolution are similar to and different from each other. How is the concept of plasticity important for understanding developmental and evolutionary changes in behaviors and mental events? Think of some examples of developmental changes in behaviors or mental events (use examples from your own life). Think of some examples of possible evolutionary changes in behaviors or mental events.

In this chapter, we will look closely at particular aspects of both developmental and evolutionary changes. The aspect of developmental change that we will examine involves two kinds of learning—classical conditioning and operant conditioning. The aspect of evolutionary change that we will examine involves the process of natural selection. By the end of the chapter, you should understand that the effects of learning and natural selection are often intertwined because each species evolves in such a way that individuals will more easily learn about aspects of the environment that help them to survive longer and reproduce more. For example, it makes sense that primate males easily learn connections between inanimate objects and attractive females: this ability should help them to become more quickly sexually aroused in appropriate circumstances and, thus, should help them to reproduce more. Thus, the brains of male primates have probably evolved in such a manner that they now can easily learn these connections. In extreme cases, however, this normal process can go awry and may lead the male to reject females in favor of the

inanimate object itself. Before we proceed to an examination of the topics of learning and natural selection, we should first look briefly at the history of the psychological field most involved in investigating these topics—the field known as “experimental psychology.”

A Historical Sketch of Experimental Psychology

The modern science of psychology is based on the attempt to understand our basic human nature by using the scientific method to study the human mind and human behaviors. Scientific psychology emerged during the late-nineteenth century when the “scientific method” (described in Chapters 1 and 2) was combined with philosophy in order to develop a more certain understanding of the mind. Before this time, the mind and the body were considered to be completely separate. Because of the work of Rene Descartes (see Chapter 1), the mind was seen to be a supernatural thing that could not be understood by the “natural sciences” (those sciences attempting to describe the natural processes of the universe). By the second half of the nineteenth century, however, research on how the brain affected mental events and the publication of Charles Darwin’s major works on evolution (to be discussed later in this chapter) caused many scientists and philosophers to change how they thought of the human mind. Many (but definitely not all) now thought of the mind as a set of mental events that, in some unknown way, was caused by activity in the brain—a brain that had evolved over great spans of time to its present state. It was inferred that, if the human brain had evolved, then the human mind would have evolved along with it. In other words, by the second half of the nineteenth century, the human mind was seen to be caused by a set of natural processes that existed within the realm of all other natural processes making up the universe. If this inference was true, then it followed that the scientific study of the mind was possible. By 1880, there were several investigators in Europe and the United States who referred to themselves as “psychologists,” natural scientists who studied the human mind. Wilhelm Wundt (1832-1920), a German physiologist, is usually credited with the founding of the first psychological laboratory in 1879, as well as with establishing the first psychology journal. But there also were several others at this time who attempted to develop a scientific psychology.

These early psychologists referred to themselves as “experimental psychologists” because they emphasized the importance of experimentation and the precise measurement of experimental variables. Wundt is a good example of this. Wundt wanted to understand the structure of the conscious mind by using the experimental techniques of physiology. But before he could do this, he had to have some way of thinking about the mind. If the mind is similar to a natural object, he reasoned, it must be made up of something. He knew that physical objects are made up of various combinations of chemical elements (for example, a molecule of water is made up of two hydrogen

atoms and one oxygen atom). The mind, on the other hand, is a “nonphysical object,” so it cannot be made up of chemical elements. But perhaps we can think of the mind as being made up of some set of nonphysical elements—of “mental elements.” Wundt distinguished two types of basic mental element: (a) “sensations” such as sights, sounds, smells, tastes, and touches; and (b) “feelings” or elements of emotional states (such as pleasure or displeasure):

Wundt wanted to analyze the mind or consciousness into its elemental components, just as the natural scientists were breaking down their subject matter, the material universe [into chemical components]. The work of the chemist Mendeleev, who developed the periodic table of chemical elements, supported Wundt’s claim. Indeed, Wundt may have been striving to develop a “periodic table of the mind.” (Schultz and Schultz, 1987; p. 65)

He and his students performed a great deal of work trying to identify these basic mental elements. But, in addition to building a “periodic table of mental elements,” Wundt’s other major goal was to mold psychology into an acceptable natural science. In attempting to do this, he imported into psychology the concepts, principles, and methodology of the accepted natural sciences of the day. Because Wundt was trained as a physiologist, this particular natural science was a very influential one in the initial development of psychology.

E. B. Titchener (1867-1927), who did most of his work in the United States, believed along with Wundt that our conscious experience consists of combinations of mental elements. But this view led Titchener to focus on a different question: how do these mental elements combine to form the compound of our conscious experience? Titchener’s approach to answering this question was based upon the philosophical doctrine known as **associationism**—a doctrine which states that **complex mental experience is formed by a passive and automatic combination of simple elements of the mind**. In other words, he believed that individual sensations of colors, tones, smells, tastes, touches, and feelings were linked together (associated) automatically because of past experiences—our pasts mold our minds as we ourselves might mold a lump of clay into a sculpture. Hence, Titchener believed that our minds have been constructed by a passive “soaking up” of associations in the environment. Because of this, he saw humans as being something like “mental sponges”: we involuntarily combine sensations whenever they occur together. In fact, as we will see in this chapter, this view can easily explain many of your own thoughts, emotions, and behaviors. For example, after seeing a bright flash outside your window on a cloudy day, you involuntarily become anxious and brace yourself without any thought as to why you are doing any of this. The doctrine of associationism provides a simple explanation: because of your past experiences with thunderstorms, you have formed an association between

lightning flashes and claps of thunder—an association that now causes you to respond automatically to bright flashes of light on a cloudy day. According to associationists such as Titchener, **the minds of humans and other animals are constructed from the automatic association of mental elements paired closely together in time.**

Associationists believed that we are similar to machines: just as machines are built up by forces outside of them (the humans who construct them), they believed that we also are constructed by the environmental forces outside of us (the often accidental pairings of events in the world).

This belief in the machine-like nature of the human mind led associationists to claim that our responses to new occurrences of events are completely determined (caused) by our past experiences. For example, associationists would not condemn the man with the underwear fetish described above for his immorality. Instead, they would argue that he could not help but feel and act in the way he does. According to associationism, his present emotional responses to underwear are determined not only by his experiences at the age of seven years when he first examined the pornographic magazine, but also by his adolescent experiences with masturbation while fantasizing about women wearing panties and his adult experiences with prostitutes whom he paid to wear panties. These later experiences served to strengthen the association between underwear and sexual arousal that he first learned when he was a little boy. Associationists would argue that condemning him for his fetishism will not change him: the man is helpless in the face of such experiences. At this point, associationists would say, the only thing that we could do to change his responses would be to expose him to some new experiences that might “break” the association. For example, we could repeatedly pair underwear with nonsexual and even negative events (such as electric shock). As we will see, the doctrine of associationism that developed during the nineteenth century in philosophy and psychology eventually led to a widespread mechanistic view of human beings among many experimental psychologists of the twentieth century—a view that has continued to have a wide influence within various areas of psychology. It should go without saying that many experimental psychologists have not accepted the doctrine of free will presented in Chapter 1. They claim instead that our minds and behaviors are completely caused by factors external to us.

SQ 3-3: Discuss the emergence of experimental psychology during the late-nineteenth century. In your answer, describe the sciences that were a primary influence on the scientific methodology of experimental psychology, its major topic(s) of study, and its doctrine of associationism.

The Method of Introspection

The discussion so far shows that early experimental psychologists defined psychology as **the scientific study of conscious experience.** For them, this conscious experience could be

broken down into basic mental elements. As I have discussed in previous chapters, however, a science is built on observations. These early psychologists knew that, if their science was to be accepted by others, they would need a method that would allow them to observe directly the elements of conscious experience. The most obvious method to use was **introspection**, a term which means to “look within” (in other words, to reflect upon one’s own conscious experience). We all use introspection when we answer someone who asks us what we are thinking. We pause, focus on our thoughts, and then report what was just in our minds. During the nineteenth century, introspection was used in physiological work on sensation (the subject reported his or her experience while being stimulated by various objects). Introspection, therefore, already was considered to be a thoroughly scientific technique when it was imported into experimental psychology. In fact, it soon became the most important method for psychological investigation of the human mind. For example, in order to study the elements of the mind and their associations with one another, Titchener had his subjects experience something, introspect upon this experience, and then break it down into its separate sensations. Titchener believed that his subjects, through long and arduous training, could refine their ability to observe their own minds—an ability that would become habitual and machine-like in quality. Schultz and Schultz (1987) described an example of a study in Titchener’s laboratory using introspection:

The graduate students were made to swallow a stomach tube in the morning and keep it in place throughout the day. Apparently, many of them vomited at first..., before they gradually got used to it. In between their lectures and other activities they would report to the lab where hot water would be poured down the tube, and the subjects would introspect on the sensations they were experiencing. The process would be repeated with iced water. (Schultz and Schultz, 1987; p. 91)

It is obvious that Titchener expected his graduate students to be extremely dedicated to their introspective work. In fact, at one point, the students were instructed to record their sensations while relieving themselves in the bathroom; and married students were instructed, in a different study, to attach measuring instruments to their bodies and record their introspections during sexual interactions with their spouses. In fact, the last study gained an unwholesome reputation for Titchener’s laboratory; and some female students were not allowed to visit the laboratory after dark. Because of his dedication and the dedication of his many students, Titchener’s brand of psychology had a major impact on twentieth-century psychology in two ways: **First, Titchener’s focus on precise experimental control and measurement influenced later psychologists to emphasize this in their research. Second, Titchener’s acceptance of associationism, which led him to view his subjects as “recording**

instruments,” influenced later psychologists to look at their human subjects in a similar mechanical way.

Nevertheless, other early psychologists, especially in the United States, focused not on the elements making up the human mind, but on its **functions**—on what **the mind does for us in our everyday lives**. In other words, they wanted to understand how the conscious mind helps us to adapt (adjust) ourselves to our environments. In fact, many of them rejected Wundt’s and Titchener’s attempts to break the mind down into its separate elements: they saw it not only as artificial (because a human mind expresses a “stream of thought” that has no natural breaks in it) but also as unimportant (they believed that the most important questions involved how our minds help us to survive in the natural world). One of the most influential psychologists promoting this alternative view of psychology was William James (1842-1911). James, who was strongly influenced by the thinking of evolutionary biologists, argued that our conscious minds help us to adapt to our environments by allowing us to choose the best course of action in a particular situation. For example, given a choice between studying for a test or going out with friends, you must choose according to some set of conscious goals. Perhaps you have recently moved to a new town and you believe that it will help you more to develop a group of friends who can help you in times of need; or, perhaps you are trying to get into graduate school and, thus, you believe that it will help you more to study so that you can perform well on your examinations. According to James’ view, consciousness is necessary if you are to solve such practical everyday matters in adaptive ways. This approach also had a strong influence on twentieth-century psychology: **many psychologists became interested in studying more practical matters and in helping people learn how to adjust better to everyday demands**. In fact, the modern field of clinical psychology is one important result of this early approach. Although the approach advocated by James differed from the one advocated by Wundt and Titchener, James still relied very heavily upon introspection in his work. Thus, in terms of the major method used in research, the two approaches did not differ much.

By about 1915, experimental psychology was being criticized on several fronts. The most important criticism involved the use of introspection. The major problem with this method, the critics argued, is that a person’s conscious experience cannot be observed directly by anyone other than that person. How can we tell if that person’s experience of a particular event is the same as the experience of another, or if that person’s experience of the event is the same on different occasions? For example, is the taste of butterscotch ice cream the same for you as it is for me? How could we possibly answer this question? There seems to be no way since a person’s experience is so personal. Furthermore, sometimes I really enjoy the taste of butterscotch ice

cream. But, if I start having it too frequently, it starts to become boring to me. This means that my experience of it has changed in some way. In the last chapter, I referred to observations that depended upon a person's individual way of experiencing events as "subjective" observations. In other words, a person's observations are subjective when they exist only in that person's mind. The criticism of experimental psychology's main method, therefore, was that **introspection produces observations that are too subjective**—that is, observations that can be experienced directly by only one person, that are unique to that person, and that are changeable for that person over time. During the first quarter of the twentieth century, critics of introspection argued that, if psychology is to be a science, its observations must be more "objective": they must involve measurements that can be made by any competent observer. This is where psychology's emphasis on operational definitions first began. This criticism (and others) eventually led to the emergence of a new approach called behaviorism.

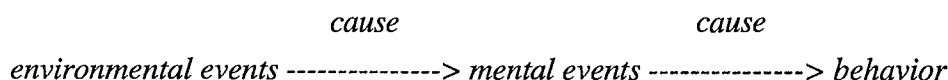
SQ 3-4: Discuss the role of introspection in early experimental psychology. In your answer, describe a major criticism of the use of introspection. In addition, describe the approach of William James, and discuss how it was similar to and different from the approach used by Wundt and Titchener.

Behaviorism Ignores Mental Causes

The approach known as **behaviorism** formed the basis for experimental psychology during a large part of the twentieth century. The year of behaviorism's birth is often given as 1913, the year in which John Watson (1865-1957) wrote his famous article, "Psychology as Viewed by the Behaviorist." Watson believed that science should study only objectively observable events. Thus, he rejected the use of introspection. In fact, because of the subjective nature of mental events, Watson and many other behaviorists believed that the understanding of conscious experience (and the mind in general) was not a valid goal of a scientific psychology. Behaviorists argued that, if psychology is to be a science, its findings must be **verifiable**—that is, its findings must be **confirmable through objective observations made under controlled conditions**. But, if this was true, Watson and the others had to answer an important question: what can scientific psychologists observe, other than their own minds, that can serve as the basic **datum** (most simply defined as **a fact or piece of information**) for a verifiable finding? It seemed obvious to Watson that a major concern of people is the prediction and control of their own and others' behaviors. It was equally obvious that a person's behaviors could be used as the data making up verifiable findings because any competent investigator can observe behavior. Thus, in order to meet the scientific requirement of verifiability, behaviorists changed the focus of psychology from the scientific understanding of conscious experience to the scientific

understanding of behavior. The two most important goals of this understanding were the prediction and control of behavior.

By focusing on the understanding of behavior and by rejecting the study of mental events, however, behaviorists still had another problem: mental events are usually thought of as primary causes of our behaviors. For example, if someone asked me why I was typing these words on my computer right now, I would answer that I wanted to finish this chapter. By using the word “want” to explain my behavior, I am pointing to a mental cause—a “motive” or “desire” for my typing. But Watson and other behaviorists argued that any explanation that pointed to a mental cause is not scientific because mental events are not objectively observable: mental events, as either causes of behaviors or as effects of other causes, are not verifiable in the sense defined above. Thus, behaviorists had to figure out which objectively observable events could serve as possible causes of behavior. It seemed obvious to them that behaviors such as reflexes are direct reactions to events in the environment. For example, one cause of salivation is the presence of food in the mouth. In this case, the environmental event of “food in the mouth” reflexively causes the behavior of “salivation.” Most important, the conscious mind is not involved in directing the reflex. Behaviorists argued that even complex behaviors usually thought of as involving mental causes might instead be looked at as automatic responses to environmental events. For example, a behaviorist might point out that I could not be typing this sentence right now unless there was in front of me a keyboard attached to a working computer. In a sense, then, the computer and keyboard represent environmental causes of my typing behavior. Perhaps this example doesn’t convince you, so let’s look at another. When a cat or small dog jumps into your lap, what do you do? When my dog jumps up into my lap, I usually pet him. In this case, the environmental event of “my dog jumping into my lap” is followed by the behavior of “petting my dog.” Both the environmental event and the behavior are objectively observable and, therefore, the general finding that “people will pet dogs which jump into their laps” is a verifiable one. If we are trying to understand the causes of petting behavior in humans, we do not have to worry about what is going on in the human mind. Instead, all we have to do is find out which environmental events typically precede petting behavior. By rejecting mental causes as scientific explanations of behavior, early behaviorists were not rejecting the idea that mental events might actually be causing behavior. Instead, they simply were stating their belief that mental events cannot serve as basic data in verifiable findings. In other words, early behaviorists believed that the following chain of causes existed for complex behaviors:



In order to make psychology more scientific, however, behaviorists decided to ignore the middle link in this chain of causes. By using arguments and examples such as these, John Watson and other behaviorists transformed psychology into **the scientific study of the environmental causes of behavior**.

Behaviorism and Associationism

In explaining how environmental events come to cause behavior, behaviorists made use of the doctrine of associationism promoted by psychologists such as Titchener. But behaviorists made some important changes to Titchener's associationism. Because they had rejected the study of subjective mental events, behaviorists could not include associations between mental elements in their version of associationism. Thus, for behaviorists, **associationism** became the doctrine that **a particular environmental event becomes linked with other environmental events that have been paired with it**. In other words, when two environmental events occur together over some period of time, they will become associated for the animal. When they have become associated, any behavioral response that already occurs to one of the events will begin to occur to the other one. For example, the sound of my alarm (an environmental event) causes me to respond automatically by waking up (a behavioral response). But, just before my alarm goes off in the morning, the clock makes a soft clicking noise (another environmental event):

<i>Event 1</i>		<i>Event 2</i>		<i>Response</i>
clicking of clock	----->	sound of alarm	----->	waking up

Over time, I have learned to wake up to this clicking noise even though it is barely audible because, for me, it has become associated with the sound of the alarm. The behaviorist doctrine of associationism, therefore, leads us to explain my waking response as being directly caused by associations between environmental events. Thus, we do not need to worry about anything going on in my mind.

As this example suggests, **the behaviorist view of association was based on the physiological concept of reflexes**. The reflex concept states that a particular stimulus, such as a hammer blow to an area under the knee, will cause an automatic response, a knee jerk. If such a reflex is preceded by another environmental event, this new environmental event may become associated with the reflex, thereby causing the automatic response. For example, if a bell is sounded just before the knee is hit with a hammer, and this is done many times, eventually the bell itself may cause the knee to jerk up. In this way, behaviorists believed that humans and other

animals **learn to respond automatically to particular events in the environment because of associations between events built up from past experiences.** This doctrine of associationism states that, in essence, humans and other animals are “learning machines.” In the behaviorist view of human learning, the person does not need to think about what he/she is learning. Instead, learning happens involuntarily as events in the world are paired together and associated by the individual in a **passive** manner (that is, behaviorists believed that **the individual is acted upon by the environment without acting upon it in return**).

Behaviorism Rejects Biological Causes

As I have just discussed, behaviorists focused on understanding the environmental causes of learned behavior and, in doing so, they claimed that most (or perhaps even all) of our behaviors emerge from the pairing of environmental events. Thus, behaviorists **placed our ability to learn from experience at the center of our human nature.** Many behaviorists (such as John Watson) believed that, at birth, we are mostly “blank slates” who, because we have had no experiences yet of the world, move only because of a few inborn reflexes. For example, infants are born with the tendency to splay out their toes when the bottom of their feet are rubbed (called the “Babinski reflex”). Such inborn reflexes, behaviorists suggested, have biological causes: they are due to our evolutionary history and the genes we inherit. However, they argued that there are very few inborn reflexes, and that most of the behaviors we develop are built upon this very small biological base by the development of learned associations. **These associations, behaviorists claimed, cause us to learn a vast number of new ways of responding to events, thereby swamping and eventually eliminating the effects of biological causes of behavior.** For example, newborn infants salivate reflexively to the taste of their mother’s milk. But because the taste of milk is paired with the sight of an approaching nipple, babies soon learn to salivate to the approaching nipple as well. In other words, they develop an association between the sight of the nipple and the taste of milk; and since the taste of milk causes salivation, the newly formed association between the nipple and the milk causes the baby involuntarily and unthinkingly to salivate to the sight of the nipple as well. The development of associations between events in the world quickly multiplies and continues for the rest of our lives. Based on this line of argument, behaviorists rejected the importance of biological explanations of behavior involving genetic and evolutionary factors. Again, as with their rejection of mental causes, behaviorists’ rejection of biological causes of behavior was very controversial for at least some biologically oriented scientists (for example, psychologists who emphasized the importance of human instincts). The controversy eventually led, during the 1960s and after, to the development of several psychological approaches that focused on the importance of biological causes of behavior. I will discuss one of these approaches—evolutionary psychology—later in this chapter.

Behaviorists' rejection of mental and biological causes, and their acceptance of associationism, led them to claim that we essentially are nothing but "robots" molded by our environmental experiences. This is a very disquieting possibility for most of us. On the other hand, by emphasizing the overwhelming importance of environmental causes of behavior and the unimportance of biological causes, behaviorism is also, to some extent, optimistic and egalitarian: by emphasizing that humans are all born equally as "blank slates," and that we learn most of our behaviors, behaviorists believed that any one of us is able to change our maladaptive behaviors simply by experiencing new, more adaptive pairings of events. As John Watson put it later in his career, all possibilities are open to each and every one of us at our births:

Give me a dozen healthy infants, well-formed, and my own specified world to bring them up in, and I'll guarantee to take any one at random and train him to become any type of specialist I might select—doctor, lawyer, artist, merchant-chief, and, yes, even beggerman and thief, regardless of his talents, penchants, tendencies, activities, vocations, and race of his ancestors. (Watson, 1930; p. 65)

Watson and many other behaviorists believed that, at birth, there are no biological differences among humans that are of any lasting importance for differences in behavior. It is mostly one's experiences, they claimed, that cause individual differences: because each person experiences different pairings between environmental events, each person has accumulated a different set of associations determining his/her behavior. Watson and other behaviorists believed that pairings experienced during early childhood are extremely important causes of what the child is to become as an adult. This claim quickly entered the wider culture and is one reason why so many people now believe that early childhood is a particularly important time for personality development. It is not certain that this belief is true, but it does follow from the other assumptions of behaviorism. Even though early childhood was thought to be a very important time for learning, however, most behaviorists also believed that experiences later in life can cause changes in any maladaptive behavior learned earlier in life. Again, other psychologists (especially those who believe that biological factors are important causes of behavior) might argue with this claim. Nevertheless, the optimistic outlook of behaviorism regarding the possibility of changes in behavior was probably one reason for its popularity among psychologists and the wider culture.

SQ 3-5: Discuss the criticisms of early experimental psychology that gave rise to the approach known as behaviorism. Describe the major characteristics of behaviorism. In your answer, describe its major assumptions, its major influences, its central notion of "verifiability," its

interpretation of the doctrine of associationism, and its goals. According to behaviorists, what is the major cause of behavior? What two sets of causes were rejected by behaviorists?

Behaviorism Rejects Free Will

Behaviorism's rejection of the study of mental causes was one factor that led to its most controversial claim—the claim that humans do not freely choose their own behavior. Behaviorists have claimed that our sense that our minds freely choose our actions is nothing more than an illusion. They argued that, if environmental events cause mental events, and if these mental events then cause behavior, then we couldn't have free will. In fact, some later behaviorists, such as B. F. Skinner (1904-1990) even rejected the idea that mental events have any role in causing our behavior at all. Skinner believed that everything a person does—from driving a car to studying for a test—occurs only through automatic (and often learned) responses to environmental events. The specifics as to how Skinner came to this conclusion are not really important for us here (I will discuss them later). What is important are the two general philosophical assumptions—materialism and determinism—that led Skinner and other behaviorists to reject the idea that humans have free will. For the behaviorists, only physical events, such as those making up the environment, could cause behavior. In other words, they were “materialists.” **Materialism** is the doctrine that **the only reality in the universe is matter** (“matter” is defined as the fundamental essence of all objects in the physical world). If matter is the only reality, then everything in the universe must be explained in terms of physical events. Behaviorists were also “determinists” (as I stated in Chapter 1, **determinism** is the doctrine that **every event is caused by some set of preceding events**). Thus, putting materialism and determinism together, **behaviorists assumed that all our behaviors are caused by preceding events that are physical in nature**. If our behavior is caused by preceding physical events, then it follows that our minds cannot be a source of “free will” with regard to this behavior. This claim may confuse you because it may seem obvious to you that you have “free will”—that you freely choose most of your actions by consciously thinking about alternatives and choosing from among them. Skinner and other behaviorists argued, however, that your everyday feeling that you have free will is simply an illusion: we believe that we have free will, they argued, only because we are not aware of the true (environmental) causes of our behavior.

Most other behavioral scientists have also questioned the idea that our minds are a source of free will. In the last chapter, for example, I provided evidence suggesting that the mind itself is determined by activity in the brain—that, in some unknown way, the mind *is* brain activity. Brain activity, which consists of changes in physical events (movements of ions across the cell membrane), is thought to be caused by preceding physical events (neurotransmitter activity, which

itself is caused by a long series of preceding physical events leading back to the environment). If the mind is simply an expression of various states of the brain, and if these states of the brain are caused by preceding physical events, then the mind itself must be *caused by* these preceding physical events. If all of this is true, then how can our minds make “free choices”? The doctrine of “free will” implies that, “on a given occasion, with the past just as it was and the present and ourselves just as they are, we can choose or decide the opposite of what we actually do choose or decide” (Honderich, 1993; p. 2). But behaviorism (and, as we will see throughout this book, almost every other approach within scientific psychology) denies this. Instead, behaviorism assumes that determinism is true. And, because determinism is a doctrine “which seems to imply that every event that occurs is the only one that could have occurred in the circumstances” (Feinberg, 1989; p. 343), free will has no room for action. **Because most scientific psychologists are both determinists and materialists, they believe that our behavior and minds are caused by physical events occurring in our bodies and in the environment.**

Is our feeling that we are freely choosing our actions merely an illusion? Are our choices really determined only by physical events? Are our minds themselves determined by preceding physical events? If the answers to these questions are all “yes,” what would this imply for common spiritual beliefs, such as the belief that our minds continue to exist after the death of our bodies? All of these questions are ones that each of us must answer for ourselves as we learn more and more about ourselves and the world around us. But, if taken seriously, they are disturbing questions for most of us. Those who assume determinism and materialism give answers to these questions that are very different from the answers most of you have learned since early childhood (especially from the religious teachings of your culture). **The widespread acceptance of determinism and materialism by scientific psychologists beginning in the late-nineteenth century is probably the most revolutionary aspect of this science.** Yet, it is an issue that it is rarely discussed by psychologists in their textbooks; and nonpsychologists often are unaware of the deterministic and materialistic nature of most psychological theories. This ignoring of what seems to be a central human concern seems like a very strange way to proceed in a science dedicated to understanding human nature. But it is the impossibility of answering the questions I raised above in a scientifically meaningful way that has led to this state of affairs. Nevertheless, not all psychologists have agreed that this issue should be ignored. For example, the approach known as humanistic psychology was developed in opposition to the rejection of free will by behaviorists and most other scientific psychologists. Humanistic psychologists have assumed that free will is a central aspect of our lives, and that we are responsible for the actions we choose.

Why do most scientific psychologists assume determinism and materialism in their theorizing? The answer is a simple one: these assumptions work for the practical everyday concerns of scientific psychologists, just as they do for you in your practical everyday concerns. That is, just as you are able to fix a car problem or relieve the symptoms of a cold by assuming that these problems are determined by physical causes, psychologists are best able to understand and control the phenomena they investigate by assuming that they are determined by physical causes. Furthermore, the extremely close correspondence between states of the nervous system on the one hand, and our thoughts, emotions, and behavior on the other hand, has provided much support for the assumptions of determinism and materialism in psychology.

SQ 3-6: Discuss the implications of the doctrines of determinism and materialism for the belief that humans have free will. How would you try to resolve the conflict between a belief in free will and the scientific evidence in favor of determinism and materialism?

Now that I have outlined in part the history of experimental psychology up to about 1950, let's examine more closely the topic of learning—a topic that has been one major focus of research in experimental psychology during its history. I will begin with a detailed examination of two types of learning studied intensively by behaviorists: classical and operant conditioning. I then will discuss an approach to psychology based on the evolutionary thinking of Charles Darwin and later biologists. As you will see at that point, the evolutionary approach to psychology has allowed us to expand and alter the view of learning developed by behaviorism.

Classical Conditioning and Operant Conditioning

We are members of a species, *Homo sapiens*, that is very good at learning about various aspects of the environment (in fact, you are learning something right now as you read this paragraph). We humans probably learn much more about much larger aspects of our environments, and learn most of this more easily, than any other species of animal. In fact, we think of ourselves as being very different from other animals (it probably even sounds strange to you hear me referring to us as “animals” at all) partly because of our enormous ability to acquire and remember new information about the world. That is the reason why psychologists, right from the beginning of scientific psychology, have been so interested in understanding how we learn. In general, **learning** may be defined as **a relatively permanent change in an individual caused by an experience or set of experiences**. For example, let's go back to the example in which you are trying to decide whether or not to turn in front of a speeding cement truck. In this situation, perhaps you have reasoned that, if you begin turning, the driver of the truck will see you

turning and will slow down enough to avoid hitting you. Thus, you decide to turn. Halfway through your turn, you notice that the truck does not appear to be slowing down and you push your accelerator to the floor. With your heart pounding, you just barely get out of the intersection before the truck speeds through. You have just learned several things: speeding cement trucks now scare you; speeding cement trucks either won't or can't slow down easily; and it is not safe to turn in front of a speeding cement truck unless it is far away from the intersection.

In the previous chapter, we talked about a structure in the limbic system that is essential for the learning of emotionally tinged information—the amygdala. Activity in the amygdala is important for our emotional responses to the world, and most (perhaps all) learning involves our emotions. In fact, lesioning parts of the amygdala can make at least certain kinds of learning (such as learning to fear an object or to have pleasurable feelings towards it) impossible. In the present example with the cement truck, activity in the amygdala has allowed us to experience **associative learning**, a type of learning in which **two different events in the world are associated**—that is, we see the two events as being related, as “going together,” in some way. For example, you know that, when you see an ambulance approaching with its lights flashing, you must pull over to the side of the road until it passes. That is, you have associated the sight of flashing lights (the first event) with pulling over to the side of the road (the second event). Another example: we inhabitants of Arizona have associated a cloudy day in July (the first event) with something else. For anyone who has lived here for any length of time, a cloudy day in July is immediately associated with “monsoon” rains (the second event). There probably are millions and millions of such associations stored in your brain. Again, most humans are very good at learning associations. In the next two sections, we are going to examine more closely two kinds of associative learning—classical conditioning and operant conditioning.

Classical Conditioning

The day after nearly being hit by the cement truck, you are again at the very same intersection. You see a cement truck approaching and you feel afraid briefly. This surprises you because you have never felt this way before about cement trucks. Why do you now feel this way? The most likely answer is that you have been classically conditioned. In the procedure known as **classical conditioning**, an individual **learns that two events are associated**. In our example, the sight of the cement truck (Event 1) is associated for you with the sights and sounds (perhaps you heard tires screeching and horns blaring) of almost getting hit (Event 2). Now, towards one of these two events, you already have an automatic emotional response even before you first experienced it—a **reflexive response** that you are unable to control through conscious effort. For which event is this true? In trying to answer this question, let's first look at possible

responses to the sight of a cement truck. Is there any reflexive emotional response that a child would have the first time that he/she saw a cement truck traveling towards him/her in the opposite lane (for example, does the child scream in fright)? There probably is no such emotional response in this situation. Will the child have a reflexive emotional response to the second event (hearing tires screeching and horns blaring loudly)? You probably answered “yes” to this question: it seems likely that any person would rapidly and automatically experience some amount of fear when experiencing this set of loud noises. Putting all of this together, we have the following:

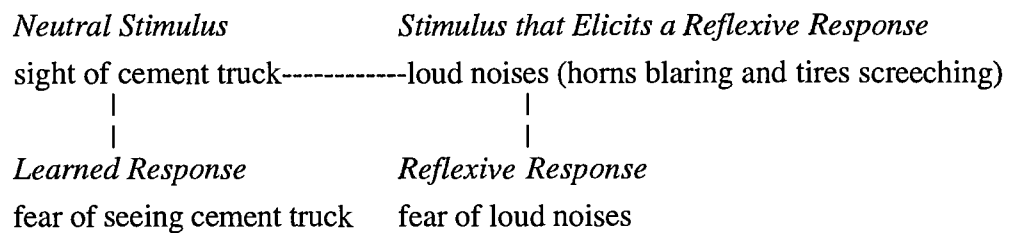
<i>Event 1</i>	<i>Event 2</i>	<i>Reflexive Response</i>
cement truck-----	>almost getting hit-----	>fear response

Because of the close pairing in time of the two events, the child may learn to respond to the sight of the cement truck in the same way that he/she normally responds to very loud noises—with fear. Because of this close pairing, the two events may merge in the child’s mind (the sight of the cement truck may, in some way, come to mean the same thing as a loud noise for the child). **To some extent, for the person who has been classically conditioned, one event comes to substitute for the other event.** In classical conditioning, because the first event (the one to which you *do not* initially have a reflexive response) is associated with the second event (the one to which you *do* initially have a reflexive response), you learn to respond to the first event in the same way that you already respond to the second event.

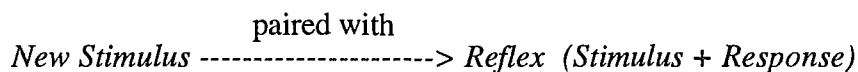
SQ 3-7: Define learning and describe what is meant by “associative learning.” What is being associated in classical conditioning? How do you know when an association has been formed?

Experimental psychologists have been the primary investigators of classical conditioning. They refer to each of the environmental events in a learning situation (actually, our “sensations” of these events) as a “stimulus.” A **stimulus** may be defined as **any environmental event to which an individual responds in some way.** As I stated earlier, the field of experimental psychology was dominated for much of the twentieth century by the theoretical approach known as behaviorism. For many of the proponents of this approach, behaviors were thought to be caused directly by environmental stimuli. In other words, as I stated above, behaviorists ignored mental causes of behavior, preferring instead to focus on the environmental events that immediately preceded the onset of the behaviors they were studying. Behaviorists defined **classical conditioning** more formally as **a procedure in which a neutral stimulus (one that does not initially elicit a particular response) is paired with a stimulus that elicits a reflexive response until the neutral stimulus alone comes to elicit that response.** In

our present example, the “neutral stimulus” is the cement truck because it does not initially elicit a fear response; the “stimulus that elicits a reflexive response” is the near-collision because it does elicit, quickly and without conscious thought, a fear response; and, of course, the “reflexive response” to the near-collision is fear. After one or more pairings of the two stimuli, the “neutral stimulus” becomes associated with the “stimulus that elicits a reflexive response,” so that eventually the “neutral stimulus” begins automatically to produce a “learned response” of fear. Let me outline the connections here so that you may more clearly see what is happening:



When the neutral stimulus is paired closely in time with the stimulus that elicits a reflexive response, a learned response develops that (usually) is similar to the reflexive response. In the future, if the child has been classically conditioned, he/she will become afraid when he/she simply sees a cement truck approaching. Because I used the word “reflexive” in the outline above, you may have realized that the stimulus and response on the right side is a **reflex (an automatic bodily response to a stimulus that often is inborn)**. What we do in classical conditioning is pair a new stimulus with the reflexive stimulus until the new stimulus also gives the reflexive response. In essence, then, in classical conditioning, we are doing the following:



With enough pairings, the new stimulus should eventually produce the reflexive response. In principle, we should be able to do this with any bodily reflex. Classical conditioning, therefore, is **a type of associative learning that causes us to develop automatic (reflex-like) responses to initially neutral stimuli because these stimuli have been paired with other stimuli that already produce these reflexive responses.**

As the label “classical” suggests, classical conditioning was the first kind of learning intensively studied by psychologists and other scientists. In fact, research on this type of learning was begun between 1900 and 1905 by a Russian physiologist named Ivan Pavlov. Pavlov had been studying digestive processes in dogs. Saliva, a fluid that begins the process of food digestion in our bodies, is produced reflexively in our mouths whenever we see, taste, smell, or even think

about the stimulus of food. Researchers in Pavlov's laboratory noticed that dogs salivated not only to the food placed in their mouths, but also to other stimuli in the environment that one would think should not cause an animal to salivate. For example, according to one story, the sound of the footsteps of the person who normally fed the dogs caused them to salivate. It seems strange (at least to me) that the sound of footsteps on a floor could cause a dog to salivate. The dogs, therefore, must have *learned* to respond to this stimulus with salivation. How might this have occurred? Think about this for a minute by examining again the outline of stimuli and responses in the classical conditioning procedure presented in the preceding paragraph. As I stated there, a neutral stimulus is paired with a second stimulus that elicits a reflexive response. With repeated pairings of the two stimuli, the animal learns to respond reflexively to the neutral stimulus. So, in the case of salivation in Pavlov's dogs, what would each of these stimuli and each of these responses be? When you think you have the answer, fill in the following:

Neutral Stimulus

Stimulus that Elicits a Reflexive Response

Learned Response

Reflexive Response

What is the "stimulus that elicits a reflexive response"? If you answered "the taste (or smell, or sight) of food," you are correct since we cannot help but respond to the taste (or smell, or sight) of food with salivation. It follows from this that the reflexive response must be "salivation to the taste of food." What is the neutral stimulus? If you answered, "the sound of footsteps," again you are correct since we do not generally respond to this sound with salivation. However, when the sound of footsteps was paired with the taste of food enough times, the dogs associated the two and began salivating to the footsteps by themselves. The learned response then must be "salivation to the sound of footsteps."

Pavlov developed his own terminology to refer to each of these stimuli and responses. He referred to the neutral stimulus (the sound of footsteps in our example) as the **conditioned stimulus** (CS), whereas the stimulus that elicits a reflexive response (the taste of food) was called the **unconditioned stimulus** (UCS). The learned response to the CS (the salivation to the sound of footsteps) was called the **conditioned response** (CR), whereas the reflexive response to the UCS (the salivation to the taste of food) was called the **unconditioned response** (UCR). Let's now use these new terms to fill in the table you made in the preceding paragraph:

<i>Conditioned Stimulus</i>	<i>Unconditioned Stimulus</i>
the sound of footsteps	the taste (sight, smell) of food
<i>Conditioned Response</i>	<i>Unconditioned Response</i>
salivation to the sound of footsteps	salivation to the taste (sight, smell) of food

If you can fill in this table for any example that I might give you, you will have learned a great deal about the basics of classical conditioning. It would be wise, at this point, for you to go back through the tables above to make certain you understand the terms and the procedures of classical conditioning before you read any further in this chapter. (It's alright, I'll wait here and work on something else.)

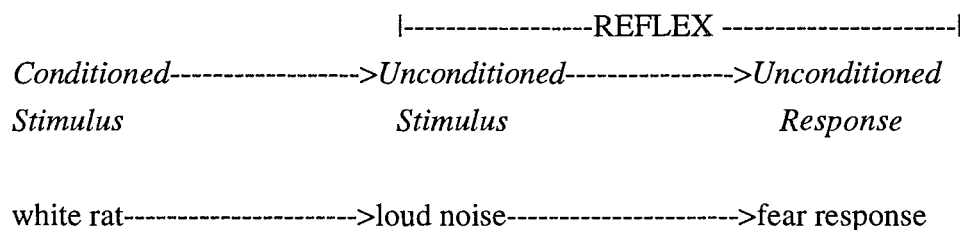
SQ 3-8: Think of at least two examples (your own) of classical conditioning. For each of your examples, identify the CS, the UCS, the CR, and the UCR.

The Importance of Learning for Emotionality. Now, why are we spending so much time on this? Learning to salivate to different stimuli doesn't seem all that important (in fact, it's kind of boring, at least to me). One important reason for focusing on classical conditioning is that the learning of emotional responses to new stimuli is easily understood in terms of classical conditioning. Emotional responses to the world represent a very important category of human behavior. Here we again come upon the name of John Watson, whom I identified earlier as one of the developers and popularizers of behaviorism. With regard to emotional behaviors, Watson claimed that, although we are born with the ability to *reflexively* respond emotionally to a very small number of stimuli (for example, as babies, we might feel joy when someone holds us), over the course of our lives we *learn* to respond emotionally to an enormous number of other stimuli. For instance, when we were babies, a loud noise would have reflexively elicited in us the emotional response of fear, which would have led to intense crying. But we probably would not have responded with fear to the sight of an approaching cement truck as our car turned in front of it. According to Watson, the fact that adults respond with fear to a very large number of stimuli is due to the fact that these stimuli have been paired with a small number of other stimuli that reflexively caused us to feel fear because of our innate (inborn) biological natures. In other words, he argued that the pairing of a large number of potential CSs with a much smaller number of inborn UCSs has caused the emotional development of each of us:

<i>Conditioned Stimulus</i>	<i>Unconditioned Stimulus</i>
a stimulus for which we have no inborn emotional response	a stimulus for which we are born with the reflexive tendency to respond with a particular emotion
<i>Conditioned Response</i>	<i>Unconditioned Response</i>
the learned emotional response to the CS	the inborn, reflexive emotional response to the UCS

In Watson's theory, what we now call classical conditioning is fundamental for the development of our general emotional responsiveness to the world.

In order to clarify this theory, let's take an example from Watson's own research. Watson and Rosalie Rayner (1920) attempted to classically condition an emotional response in an infant who has been dubbed "Little Albert." Watson and Rayner decided to condition the emotional response of fear in the baby. Because Albert was less than one year of age when the study began, he had not yet developed fear responses to many of the objects that older children often fear. For example, he showed no fear of a white rat when he was presented with one. Watson and Rayner tried to get him to learn a fear response to the rat by pairing it with a loud noise:



Although Little Albert showed no fear of the rat (the CS) at the beginning of the study, he showed a great deal of fear (the UCR) to the loud noise (the UCS) caused by a metal bar being struck with a hammer directly behind his head. (NOTE: As you read this, you should be filling in a table like the one we did earlier so that you can follow what is happening.) After several pairings of the CS with the UCS, Little Albert developed a fear response (the CR) to the sight of the white rat. His fear, according to Watson and Rayner, had been conditioned to a new stimulus.

This interpretation of Watson's and Rayner's (1920) study formed the basis for a popular modern theory concerning the development of phobias in humans. A **phobia is a very strong and irrational fear of an object, activity, or situation**. For example, let's take the case of a man who is terrified of flies. This makes no sense (it is irrational) since flies can not harm him. Sit back and imagine how classical conditioning might have led to the development of such a strong and irrational fear and then fill in the following table:

<i>Conditioned Stimulus</i>	<i>Unconditioned Stimulus</i>
<i>Conditioned Response</i>	<i>Unconditioned Response</i>

All of you should have filled in the same answer for the CS and the CR. The CS for this example is "seeing or hearing a fly" and the CR is the "fear felt in response to seeing or hearing a fly." You reached this conclusion because you know that a fly is not something that people typically fear; and, thus, you inferred that the fear of flies must have been learned at some point during this man's life when flies were paired with some UCS. What, then, might the UCS have been? Well, it needs to have been a stimulus that would have reflexively elicited in him (and almost anyone else) a fear response. Perhaps, when he was a boy, this man was frightened when he unexpectedly found flies buzzing around the carcass of an animal. In this case, the UCS was the set of stimuli—the sight and smell—coming from the carcass. As you probably know, the sight and smell of a decomposing animal carcass, especially when unexpected, can cause automatic feelings of fear (and disgust) in most humans and, so, the UCR would be this reflexive fear response to the carcass. The flies (the CS) on the corpse then would be associated with the sight/smell of the carcass (the UCS) that caused him reflexively to feel fear (the UCR). The association that developed between the flies and the carcass caused him to develop a fear of flies (the CR). Of course, you probably thought of a different UCS than this; but, as long as it is something that might be experienced in the real world *and* conceivably could be associated with flies, your answer is also a plausible one.

SQ 3-9: Discuss one major reason for psychology's focus on the study of classical conditioning in humans. Describe the theory behind the study of "Little Albert" performed by Watson and Rayner (1920). Discuss the "Little-Albert" study in terms of this theory, and describe how classical conditioning led to the development of Little Albert's fear of the rat. How might classical conditioning explain the development of phobias?

Although the learning theory presented above is a plausible explanation for the development of phobias, is there any evidence to support the theory? The best evidence for this theory is in the form of case studies. As we saw in Chapter 2, a **case study** is **an intensive examination of a phenomenon in a single individual**. The case of “Danielle” (reported in Meyer and Osborne, 1987) gives some support for the learning theory of phobia development. Danielle was a married woman who was 26 years old. She had gone to a psychology clinic because of problems with depression and anxiety. One of her problems involved a phobia of snakes and insects—a phobia that resulted in her often being unable to enjoy outdoor activities. The initial development of the phobia seemed to be tied to some experiences she had had during childhood: her mother and aunt would shriek in terror whenever they saw a spider. Danielle’s fear of spiders, thus, might be explained as being the result of the classical conditioning of a fear response. Can you see how? Think about this for a minute and then, when you think you have the answer, fill in the following table:

<i>Conditioned Stimulus</i>	<i>Unconditioned Stimulus</i>

<i>Conditioned Response</i>	<i>Unconditioned Response</i>

What are the two stimuli in this example? It is obvious that one of these must be the sight of a spider, but what is the other stimulus? In this case, it is the sight of the terrified faces of her relatives. Which of these two stimuli do you think would give rise to a reflexive fear response in a young child? There seems to be little or no inborn fear of spiders: very young children generally don’t show fear when seeing a spider. On the other hand, if a close relative (or any other human for that matter) shows signs of fear or terror, young children typically become very distressed (if you don’t believe me, try it yourself with some young child in your family, but do it gently since you don’t want the child to become too upset). You should have filled in the table in the following way:

<i>Conditioned Stimulus</i> sight of spider	<i>Unconditioned Stimulus</i> sight of terrified mother and aunt
<i>Conditioned Response</i> fear at sight of spider	<i>Unconditioned Response</i> fear at sight of terrified mother and aunt

The classical-conditioning theory of phobia development, therefore, gives a very plausible explanation of the development of Danielle's phobia of spiders.

Does the fact that we can find such an experience in Danielle's background prove that this experience caused the development of her phobia? We must answer "no" to this question because of two major problems with case studies. As I stated in the last chapter, (1) **case studies do not allow us to rule out the directionality problem or the extraneous-variable problem.** With a case study, we are not controlling the research situation and, therefore, we are not able to rule out alternative explanations for the results we obtain. The best way to rule these out, as we saw in the previous chapter, is to perform an experiment and then replicate it. We cannot perform such an experiment with the learning of a phobia, however, because it would be unethical to cause a long-term fear response in a human being (especially in a child). The experimental study by Watson and Rayner (1920) was performed before psychologists became very concerned about performing ethical studies; and the researchers did not follow Albert long enough to see if he developed a lasting phobia. The best that a case study can do is to suggest a possible causal relationship that we then would have to investigate in some other way. (2) **The biases of the researcher can have a large effect on what is emphasized in a case study.** A behaviorist would tend to emphasize learning experiences such as those just described for Danielle's case. Researchers who are not as fond of learning explanations, however, might emphasize the relationship that Danielle had with her mother, Danielle's medical history, her problems with depression, or any other factor that plausibly could be linked to her phobia. Thus, as we saw with the case of Greg in Chapter 2, a single case study (or even a collection of several case studies) cannot give us the evidence we need to conclude that one particular factor is causing the phenomenon of interest. And, in fact, many phobias develop when no obvious negative experiences have occurred with the feared object. Thus, we must keep open the possibility that causes of phobias other than classical conditioning also exist.

SQ 3-10: Describe what a case study is and give an example. What are two problems with case studies that make it impossible to find causal relationships?

In addition to the learning of fear responses, we also can learn to respond with more pleasant emotions to new stimuli through classical conditioning. For example, classical conditioning is used in many television commercials to influence your emotional reactions to products. Think about this the next time you see a celebrity endorse a product. Why would an underwear manufacturer pay so much money to a famous basketball player for appearing on their

commercials talking about how wonderful their underwear is? Think about this for a minute in terms of classical conditioning and then fill in the following:

Conditioned Stimulus

Unconditioned Stimulus

Conditioned Response

Unconditioned Response

When we see a celebrity, especially one whom we admire, there typically is a reflexive set of positive feelings that occur. Thus, the sight and sound of the basketball player is the UCS and the positive feelings you have towards him is the UCR. But you are only halfway to the answer. If you assume that we typically do not have either positive or negative feelings for the underwear we buy for ourselves, then the sight of this underwear must be the CS, and the positive feelings that we acquired for the underwear because it has been paired with the basketball player must be the CR. This technique of using celebrity endorsements was pioneered by John Watson, who left psychology in the early 1920s and went into advertising. In fact, many of the favored techniques of today's advertisers were first developed by Watson in his capacity as an advertising executive:

Watson exerted a major impact on advertising in the United States through his application of behaviorist principles, an effect that is easily seen and heard in today's commercials and ads. Watson believed that people were machinelike. Therefore, their buying behavior could be predicted and controlled just like the behavior of other machines.... Watson proposed that consumer behavior be studied scientifically, under laboratory conditions, with careful attention given to surveys. He emphasized that advertising messages should focus on style rather than substance and should convey the impression of new designs and images.... He pioneered the use of celebrity endorsements of products; the manipulation of human motives, emotions, and needs; and the appeal to basic fears to sell products from automobiles to underarm deodorants. (Schultz & Schultz, 1987; p. 199)

Thus, behaviorism—an approach that sees people as relatively mindless machines pushed and pulled around by environmental stimuli—has had a major impact on advertising, which is one of the dominant cultural artifacts of twentieth-century America.

Stimulus Generalization. Let's consider another example of a conditioned fear so that we can look at a few other aspects of classical conditioning. When I was a child, I was stung by a bee.

After this experience, I was very afraid of bees. Try to explain the development of my fear by filling in the following table:

<i>Conditioned Stimulus</i>	<i>Unconditioned Stimulus</i>
<i>Conditioned Response</i>	<i>Unconditioned Response</i>

In this example, the CS was the sight (or sound) of the bee, the UCS was the bee sting, the CR was the fear response to the bee, and the UCR was the fear response to the bee sting. The bee that stung me died very quickly after stinging me. Given that it was this particular bee that stung me, it seems most logical to think that I should fear only that bee. But, as you probably already know from personal experience, the fear learned in such a situation becomes generalized (extended) to other similar insects. Thus, after being stung by that particular bee, for many years I have feared other bees of the same species, and, in fact, any flying insect that looks or sounds even a little like this kind of bee—wasps, hornets, bumble bees, and even several stingless species of fly with markings similar to those of bees. In the same manner, Little Albert developed a fear response not only to the particular rat which had been paired with the loud noise but, apparently, also to other objects that were white and/or furry (such as a rabbit). This **tendency for stimuli similar to the CS to also elicit a CR** is known as **stimulus generalization**. There is a limit to stimulus generalization, however: as a stimulus becomes increasingly less similar to the original CS, there is a reduced chance that it will elicit a CR. Eventually, a very dissimilar stimulus will elicit no CR. For example, I was not afraid of birds or airplanes after being stung by a bee because most of the sensations coming from these flying stimuli are very different from those of bees.

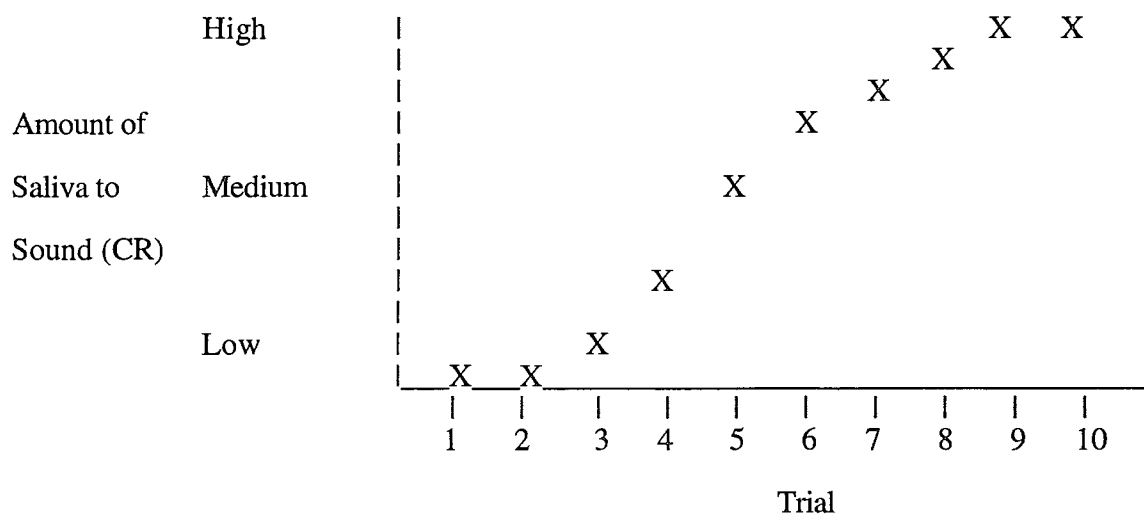
With regard to stimulus generalization, we again can examine the case study of the man with the “underwear fetish.” As you might recall, the man traced his fetish to a childhood experience in which he observed women wearing panties in a pornographic magazine. The initial development of his fetishism, thus, might be due to this experience:

<i>Conditioned Stimulus</i>	<i>Unconditioned Stimulus</i>
a particular set of panties	particular attractive women
<i>Conditioned Response</i>	<i>Unconditioned Response</i>
sexual arousal to panties	sexual arousal to attractive women

Since that experience, however, this man has become aroused whenever he has seen a wide range of panties being worn by a wide range of women, not just the particular ones he observed in the pornographic magazine. His fetishism now involves erotic feelings that have generalized beyond the original experience he had at seven years of age.

SQ 3-11: Describe stimulus generalization and think of at least two examples. Why is the concept of stimulus generalization necessary if we are going to explain the influence of classical conditioning in everyday life?

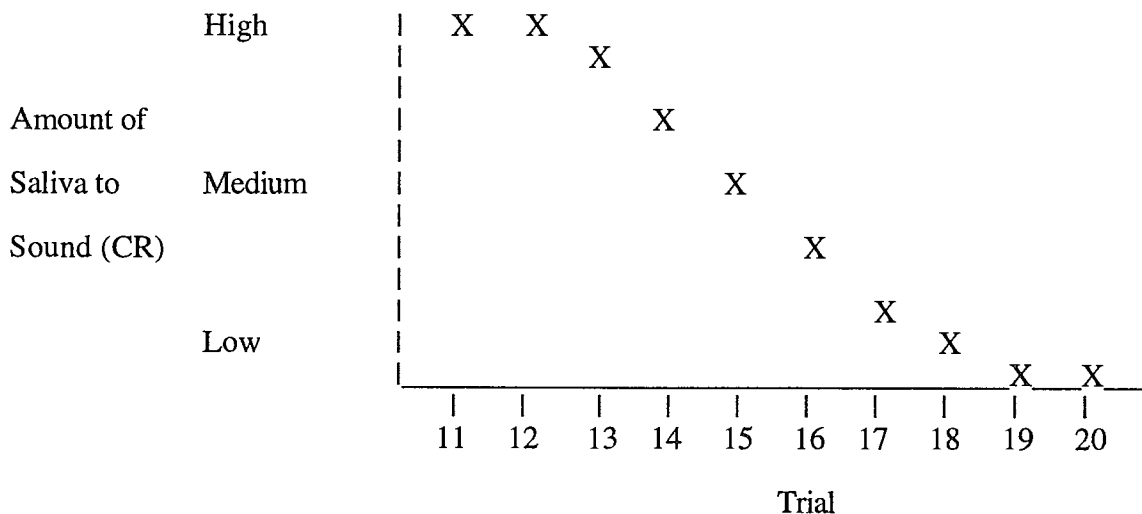
Acquisition and Extinction. Let's again consider the classical conditioning of salivation in dogs studied by Ivan Pavlov. Pavlov used several different CSs in his studies. One of these was the sound of a metronome that was paired with a UCS of meat powder placed into the mouth. The meat powder produced a UCR of salivation. The pairing of the metronome with the meat powder produced a CR of salivation to the sound of the metronome. (Fill out a table showing the CS, CR, UCS, and UCR so that you are clear about what is happening.) In order for a CR to develop, the CS and UCS must be paired repeatedly over time. **Each presentation of a set of stimuli** (in this case, the CS-UCS pairing) is referred to as a **trial**. Each trial is separated by a short period of time (often about one minute to several minutes). Below, I have graphed ten trials of stimulus pairings leading to the learning of a CR (salivation) to the CS (the sound of the metronome):



As you can see, the CR gradually increases over trials until it levels off after about eight or nine trials. This **initial learning of the CR** is referred to as **acquisition**. Have you ever wondered why advertisers show the same commercial over-and-over again? One reason is that it often

requires, as it does here, a number of pairings of the CS (their product) with a UCS (a stimulus which involuntarily elicits positive feelings) to cause the acquisition of a CR of positive feelings for their product. (A large number of trials is not always needed: I learned a strong conditioned fear of bees after only one presentation of a bee, the CS, with a bee sting, the UCS.) By the tenth trial, it appears that the animal has learned all that it is ever going to learn: the amount of salivation to the sound of the metronome has leveled off after an initially rapid increase. At this point, the animal has learned to respond to the CS in the same way that it already responds to the UCS (or at least in a similar way). Acquisition shows that the plasticity of the brain allows for the development of a learned response that is adaptive (that allows the animal to adjust itself better to environmental conditions).

Now that the animal has acquired the CR, let's say that we continue to present the CS on each trial but we stop presenting the UCS. What do you think will happen? Think about this for a minute. There are two possibilities. (1) If we get rid of the UCS, the animal may continue to show the CR to the sound of the metronome. In this case, once learning occurs, it is permanent. (2) If we get rid of the UCS, the animal may stop responding with a CR to the sound of the metronome. In this case, learning is only temporary and depends on the continued pairing of the CS and UCS. If we presented the CS (the sound) by itself on each of 10 additional trials and measured the CR elicited by it, we would get something like the following result:



We see that the CR declines over trials when the UCS no longer is paired with the CS. Eventually, the CR disappears. We must conclude that, if the animal is going to continue to show a CR, the CS must continue to be paired with the UCS. The **decline of the CR in the absence of the**

UCS is known as **extinction**. Extinction shows that the plasticity of the brain allows for the removal of a learned response that is no longer adaptive.

Advertisers guard against extinction by trying always to show their product paired with stimuli that involuntarily elicit positive feelings. For example, have you ever wondered why certain fast-food restaurants have large American flags flying out front? It seems to me very likely that they are trying to get people to associate their restaurant (the CS) with the American flag (the UCS) so that the positive feelings for the flag (the UCR) that many people already have will be elicited by the restaurant (the positive feelings for the restaurant would be the CR). In fact, I have noticed that some of these restaurants have their very own flag, with their own “logo” (such as the “golden arches”) displayed prominently on it, flying right below the American flag. I didn’t understand why until I thought about classical conditioning: perhaps you are more likely to develop an association between the restaurant and the American flag if the logo appears right next to the flag. The constant showing of commercials of fast-food restaurant chains, especially on Saturday mornings during children’s programming, not only strengthens the acquisition of a CR of positive feelings for the restaurant, it also prevents the extinction that might occur during the day.

Does extinction of a classically conditioned response mean that the association between the CS and UCS acquired earlier has now disappeared? If you look back at the extinction graph, you’ll notice that, in the nineteenth and twentieth trials, the CR is gone. Thus, the animal no longer is responding to the CS as if it were the UCS. This suggests strongly that the association between the CS and the UCS has disappeared. But is this true? How could we test the idea? Think about it for a moment. One way to test the idea is to again present the CS paired with the UCS over trials and see if the animal acquires the CR more rapidly the second time around. If the second set of acquisition trials leads to a more rapid development of the CR, then this means that there must have been some degree of association left between the two stimuli at the end of the extinction trials. A simpler way to test the idea is to wait a little time after extinguishing the CR and then present the CS again. If we wait, say, one day after the extinction phase is over and then turn on the metronome, we probably will find that the dog again will show a CR (although it may not be as strong as before). This **reappearance of the extinguished CR after some period of time has elapsed** is called **spontaneous recovery**. Spontaneous recovery of a CR shows that the association between the CS and the UCS had not disappeared during extinction.

If the individual is not “unlearning” the association between the CS and UCS during extinction, then why does the individual stop showing a CR to the CS? What is going on during extinction? It’s hard to know for certain, but perhaps a more intuitive example might help us to

understand what may be happening. When you hear someone yell the words “watch out,” what do you do? You probably bend down while placing your hands over your head. Why do you do this? It probably is because you feel afraid. Why do you feel this fear? The words themselves (“watch out”) should not induce fear by themselves: they seem to be neutral stimuli with regard to fear. In fact, the words seem simply to be suggesting that you should be looking somewhere “out there.” Thus, you must have acquired this fear response from some prior experiences. One way this might have happened is illustrated in the following:

<i>Conditioned Stimulus</i>	<i>Unconditioned Stimulus</i>
“watch out”	getting hit in the head
<i>Conditioned Response</i>	<i>Unconditioned Response</i>
fear	distress and fear

Thus, classical conditioning can explain acquisition of a fear response to these words. This may or may not be how you acquired the response, but many people do acquire it in this way. Now, how could we extinguish the CR in this case? Think about this carefully. In extinction, we present the CS all by itself on each trial. If we want to extinguish the fear response to these words, therefore, we would need to have someone yell, “watch out,” over and over again and make sure that nothing negative happens immediately afterwards. In fact, someone probably has done this to you at some point during childhood: children seem to enjoy scaring others and this is an easy way to do it. What happened to your learned fear-response in this case? It probably decreased and finally disappeared over the time period in which the other person continued to yell, “watch out.” In other words, the CR was extinguished. Now, what would happen if this other person waited some time (perhaps an hour) and then yelled, “watch out,” again? If this has ever happened to you, you probably found that you again showed a fear response to the words. That is, you showed spontaneous recovery of the CR. So, what was going on “inside your head” while the fear response was being extinguished? You probably were merely suppressing (inhibiting) any observable fear response during extinction, but this did not cause you to “unlearn” the association between the words and getting hit in the head (in fact, you probably still felt some fear). Extinction generally does not make you “unlearn” an association between a CS and a UCS unless the extinction procedure is continued for a long time.

What does this discussion of the acquisition and extinction of CRs suggest about therapy for irrational fears and phobias? For example, if you were my therapist, how could you help me to get rid of my fear of bees? You would be most successful in decreasing my fear if you used

extinction in some way. How could you do this? You would have to present me with a CS repeatedly over time without letting me experience the UCS. That is, you would have to present me with bees but make sure that I didn't get stung. How could you do this? Perhaps you first could have me imagine being in a roomful of bees that never stung me. Then you could have a cage of bees on a table next to me or have me go into an apiary (a place where beehives are kept for their honey) wearing protective clothing, or find some other way of presenting the CS (bees) without experiencing the UCS (getting stung). My fear should decrease and perhaps even disappear if you did this long enough. What do you think might be a limitation of this approach to treating conditioned fears? There are several limitations: people may be too afraid to finish therapy, you can't always prevent the UCS, etc. But probably the most important limitation is that, unless the person keeps experiencing the CS without the UCS, spontaneous recovery of the fear probably will occur. If spontaneous recovery does occur (and it often does), the CR will have to be re-extinguished. Eventually, by giving such "booster sessions" of therapy, the fear often is permanently extinguished.

SQ 3-12: Discuss the importance of the acquisition of a CR, its extinction, and its spontaneous recovery for the treatment of phobias. In your answer, make sure that you define each term. Apply these terms to the examples of classical conditioning you thought of when answering earlier study questions.

Operant Conditioning

The day after nearly being hit by the cement truck, you are again at the very same intersection. You see a cement truck approaching in about the same spot. Unlike the day before, however, you do not turn this time. Why do you now not turn? Perhaps your classical conditioning has caused you to become involuntarily "frozen with fear." But, a more likely reason is that the behaviors that led to turning had such negative consequences that you chose not to turn this time. This example suggests that, in addition to being classically conditioned, you also have been operantly conditioned. In the procedure known as **operant conditioning**, an individual **learns that his/her voluntary behavior is associated with particular consequences**. In our example, the act of turning (the voluntary behavior) is associated with almost getting hit (the consequence). This definition suggests one major difference between classical and operant conditioning. In classical conditioning, the individual is learning to perform a behavior that usually cannot easily be controlled consciously (that is, a behavior, such as an emotional response to a situation, that is involuntary). In operant conditioning, on the other hand, the individual is learning to perform behavior that is possible to control consciously (that is, a behavior, such as turning a car, that is voluntary). Although this difference is not always clearly seen in every example of

classical and operant conditioning, it is a general rule that can help you to begin to understand how these two kinds of learning differ from one another.

Another way to think of operant conditioning is that it is a kind of learning in which a **behavioral response to an environmental event is determined by the consequences of that behavior** in the outside world. With regard to the cement-truck example, this means the following:

Environmental Event----->*Voluntary Behavior*----->*Consequence*
approaching truck----->action of turning----->almost getting hit

It should be obvious that, when such a negative consequence follows a behavior, an individual is not as likely to perform the behavior in similar situations in the future. Thus, you probably will not be as quick to turn your car in front of a rapidly approaching cement truck after almost getting hit by one. On the other hand, if the action of turning had been followed by the cement truck slowing down so that you had had enough time to turn (a positive consequence), you probably would be more likely to turn your car in front of speeding cement trucks in the future. In general, when a positive consequence occurs, the voluntary behavior tends to be **strengthened** (that is, **to increase in frequency**). On the other hand, when a negative consequence occurs, the behavior tends to be **weakened** (that is, **to decrease in frequency**). With this in mind, we can define operant conditioning more formally as **a procedure in which the behavioral response of an individual to a particular stimulus is strengthened when followed by a positive consequence and weakened when followed by a negative consequence**.

As with classical conditioning, behaviorists have been the primary investigators of operant conditioning. They have argued that increases or decreases in the frequencies of our voluntary behaviors are caused directly by the environment—in this case, by the positive or negative consequences of these behaviors in particular situations. The most important behaviorist in this regard was B. F. Skinner. Skinner argued for the extreme position that our behaviors have no mental causes at all. He reasoned that nonphysical events occurring in the mind cannot cause physical events involving movements of the body. The environment, however, since it consists of physical events, should be able to cause bodily movements. He concluded that it is the environment that causes our behaviors, not our minds. In other words, Skinner would have said that the voluntary behavior you are exhibiting right now—the reading of these words—is not being caused by any desires or thoughts you are having (thoughts such as, “I better read this chapter if I want to do well on the test”). Instead, you are reading these words right now only because this

action has had positive consequences in the past (perhaps you have done well on tests only after you have read the textbook, or perhaps others have praised you when they saw you reading). This extreme position against mental causes of behaviors was called “radical behaviorism.” It was a position taken by some behaviorists around the middle of the twentieth century; but few or no working psychologists today hold such a position since it soon became very obvious that we cannot fully explain behavior without supposing that mental causes are important, even though we don’t know how such nonphysical events might cause the physical movements of the body. (In the next chapter on memory, we will begin to examine some of the research focused on mental causes of behavior.)

SQ 3-13: What is being associated in operant conditioning? How do you know when an association has been formed? In what way(s) does operant conditioning differ from classical conditioning? Describe briefly B. F. Skinner’s position on mental causes of behavior.

The **behavior that is the focus of operant conditioning** is called an **operant response**. In our example, the operant response was “turning (or not turning) the car.” A response, however, only can occur after a stimulus since it must be a response to some event in the outside world. In our example, the response of turning (or not turning) was being given to the stimulus of “an approaching cement truck.” The **stimulus to which we give the operant response** is called the **discriminative stimulus**. The discriminative stimulus is some very specific event that occurs immediately before the operant response (it is the environmental stimulus that most directly causes the operant response). The positive and negative consequences also have their own names. A positive consequence of an operant response is called a **reinforcement (or reinforcer)**, and is defined as **any stimulus that strengthens the operant response that it follows**. A negative consequence is called a **punishment (or punisher)**, and is defined as **any stimulus that weakens the operant response that it follows**. In our example, the “near-collision” would be a punishment if it led to a weakening of the operant response. Although a near-collision would probably act as a punishment for me, I have known some thrill-seeking people who probably would see it as a reinforcement: they probably would be more likely to turn in front of speeding cement trucks in the future. This shows that we can not tell whether a consequence is reinforcing or punishing until we see what happens to the operant response—if it is strengthened, the consequence was a reinforcement; if it is weakened, the consequence was a punishment. Thus, **individual differences in behavior can be explained not only by individual differences in experiences but also by individual differences in what people find to be reinforcing and punishing.**

Let's look at another example so that we can become more familiar with the points that I made in the previous paragraph. In bungee jumping, as you all know, a person jumps off a tower (or some other high place) while connected to elastic cords. Jumping in this manner is a voluntary behavior, so it seems likely that operant conditioning would be important in some way. In the terminology of operant conditioning, let's outline what is going on in such a situation. Think about this example for a minute and then fill in the following:

<i>Discriminative Stimulus</i>	<i>Operant Response</i>	<i>Consequence</i>

The first thing that you should do when trying to apply such terms (whether the example is classical conditioning or operant conditioning) is to figure out what response is being learned. In this case, after a little thought it should become obvious that one is learning something about jumping off a tower. Thus, in this example, the operant response is "jumping." What is the discriminative stimulus? Well, when do you actually perform the jump? When you are on the ground? When you are in your car driving to the store? No, of course not. In bungee jumping, you jump when you are standing on top of a tower (or some other high place) with elastic cords attached to you. Thus, in this example, the discriminative stimulus is "standing on top of a tower while attached to elastic cords." Finally, is the consequence of the operant response a reinforcement or a punishment? How do we find this out? We have to wait until the operant response is performed and then see if the person is more likely to perform the response in the future or less likely to do so. It should be obvious that there are individual differences here. Some people will find the consequences to be reinforcing: they will be more likely to perform the operant response when they again experience the discriminative stimulus. On the other hand, other people will find the same operant response to be punishing: they will be less likely to perform the operant response when they again experience the discriminative stimulus (in fact, they may avoid the discriminative stimulus altogether). The completed table, then, should have looked like this:

<i>Discriminative Stimulus</i>	<i>Operant Response</i>	<i>Consequence</i>
standing on top of a tower attached to elastic cords	jumping in the air	reinforcement or punishment (depending on person)

If you can fill in a table like this for any example I might give you, you will have learned a great deal about the basics of operant conditioning.

SQ 3-14: Think of some examples of operant conditioning. Your everyday life is a good source for examples. For each of your examples, identify the discriminative stimulus, the operant response, and the reinforcement/punishment. How can operant conditioning explain the existence of individual differences in voluntary behaviors?

Let's practice using the terminology of operant conditioning with one last example. When I am driving around town, I often encounter a situation in which, even if I am already going 5-10 mph faster than the posted speed limit, the person behind me still wants to go faster. The person generally at this point speeds up (the person is usually a male, although I have noticed an increasing number of females doing this in recent years) until he is only a few feet behind my car. According to the principles of operant conditioning, if I want to discourage such behavior, what should I do? Before you can answer this question, you first need to identify the various components of the situation in terms of operant conditioning. Think about what could lead a person to tailgate and then fill in the following table:

<i>Discriminative Stimulus</i>	<i>Operant Response</i>	<i>Consequence</i>

First, what is the operant response in this situation? There are several possibilities: my driving speed, the other person's driving speed, the other person's tailgating, and probably several other behaviors as well. Nevertheless, because it is the person's tailgating that is of concern to me (the behavior that I want to discourage), "tailgating" would be the operant response. Now, why does the person perform the operant response of tailgating? What is the discriminative stimulus that elicits this operant response? It must be the "sight of a slower car up ahead." Now, at some point during his life, the tailgater must have learned to perform this particular operant response when experiencing this particular discriminative stimulus (that is, there probably was a time, just after he first learned to drive, when he did not tailgate). Thus, over time, the operant response of tailgating must have increased in frequency—it must have been strengthened by some consequence. When an operant response has been strengthened, what kind of consequence must have occurred? As I stated above, a "reinforcement" is a consequence that strengthens operant responses. What might have reinforced the operant response of tailgating? Think about this for a minute. It seems to me that the most important reinforcer for tailgating behavior is the speeding up or the pulling over of the person who is being tailgated. So, let's see where we are with this example so far:

<i>Discriminative Stimulus</i>	<i>Operant Response</i>	<i>Consequence</i>
sight of slower car ahead	tailgating	reinforcement (the speeding up of car being tailgated)

If I want to reduce the tailgating behavior of the person who is tailgating me, what should I do? What would you do? You probably gave one or both of two answers: don't speed up when the person starts to tailgate and/or slow down when the person starts to tailgate. I would be doing two very different things if I failed to speed up versus slowing down. If I did not speed up, I would be failing to reinforce the behavior. If I could stay in front of this driver for some period of time, the lack of reinforcement for his tailgating behavior should cause him to slow down (later on, we will refer to this as extinction). I probably could cause a quicker decrease in the operant response, however, if I slowed down. Because this would lead to a direct weakening of the operant response, it would be a punishment. Probably many of you have tapped on your brakes when someone has tailgated. Some of you may even have pushed down hard on your brakes in order to increase the the punishment. What you were attempting to do was to alter the tailgater's behavior through operant conditioning. Of course, there are other influences on human behavior that could result in this being an ineffective strategy (for example, the tailgater might realize what you are trying to do and resist your efforts to punish his behavior). But, if this happened enough times with this driver in enough situations, eventually his tailgating should decrease in frequency.

SQ 3-15: Describe two ways of reducing the frequency of an unwanted operant response. What is a difficulty with using these techniques when we are dealing with humans?

Positive Versus Negative Reinforcement. I have been saying that a reinforcement is any consequence that strengthens the operant response that it follows. But what kinds of event might be reinforcing? Well, let's look at a particular operant response, such as an eye blink. What might get you to increase the frequency of your eye blinking? If I gave you \$5 every time you blinked your eyes, would you increase the frequency of eye blinking? It is very likely that, if this were the consequence, you would begin blinking very rapidly. Thus, receiving \$5 after each eye blink would be a reinforcement for this operant response. How about if I honked a loud horn in your left ear until you blinked your eyes, would you increase the frequency of your eye blinking? Again, it is very likely that you would quickly learn to blink your eyes whenever the horn sounded. Thus, the turning off of a loud noise is a consequence that would be a reinforcement. Both of these consequences—receiving money and turning off a loud noise—are reinforcements because both would strengthen the operant response of eye blinking. But it also should be obvious that they are very different kinds of reinforcement. Speaking subjectively, getting \$5 is a pleasant experience,

whereas turning off a horn might bring relief, but the noise itself is very unpleasant. In the latter case, it is the *removal* of the loud noise that is reinforcing; in the former case, it the *presentation* of the money that is reinforcing. We refer to these two kinds of reinforcement by different names. The presentation of the money is referred to as a “positive” reinforcement whereas the ending of the loud noise is referred to as a “negative” reinforcement.

A **positive reinforcement** is any stimulus that, when presented after an operant response, strengthens that response. For example, let’s say that one of your instructors asks a question to which you know the answer, and you blurt it out without even thinking. The instructor smiles and says, “Great answer!” You feel very good about yourself. Your “question-answering behavior” has just been positively reinforced because the words of praise (and your resulting feelings of self-approval) were presented after you had performed the operant response:

<i>Discriminative Stimulus</i>	<i>Operant Response</i>	<i>Positive Reinforcer</i>
instructor asks a question	you give an answer	the instructor praises you

A positive reinforcement, therefore, typically involves getting something you like after you have performed an operant response. On the other hand, a **negative reinforcement** is any stimulus that, when taken away after an operant response, strengthens that response. For example, perhaps there was a time when you hadn’t studied much for a test. Perhaps you were very anxious when the day of the test arrived because you thought that you were going to flunk it. So, what did you do? Perhaps you called the instructor and told him/her that your car wouldn’t start (even though there was nothing wrong with it) and that you wouldn’t be able to make it to class to take the test. To your surprise, the instructor told you not to worry, that you could take the test the next day. After hanging up the phone, you felt relieved. Your “excuse-making behavior” was just negatively reinforced because your feelings of anxiety were taken away after you had performed the operant response:

<i>Discriminative Stimulus</i>	<i>Operant Response</i>	<i>Negative Reinforcer</i>
talking to instructor on test day while anxious	making an excuse	reduction of anxiety

A negative reinforcement typically involves taking away something you don’t like after you have performed an operant response. Thus, in both positive and negative reinforcement, the operant response is strengthened, but this happens in a different way with each kind of reinforcement.

We can understand the development of many maladaptive behaviors and mental disorders by using the concepts of positive reinforcement and negative reinforcement. For example, many people in college consume more alcohol than is good for them. Drinking alcohol is a voluntary behavior and, thus, we might expect operant conditioning to be involved in alcohol abuse. In fact, it is likely that many cases of lifelong drinking problems begin during the college years as students become operantly conditioned to drink excessively in particular situations:

<i>Discriminative Stimulus</i>	<i>Operant Response</i>	<i>Consequence</i>
glass of alcoholic beverage	drinking behavior	reinforcement

Which type of reinforcement—positive or negative—do you think best explains the development of such drinking problems? It probably depends on the person and the situation. Some people might drink heavily whenever they go to a bar because this helps them to enjoy themselves more: alcohol gives them a very pleasant feeling. This would be positive reinforcement. On the other hand, some people may drink heavily when they are under a great deal of stress. Drinking alcohol can take away the anxiety people feel when stressed. This would be negative reinforcement. Since there are many opportunities during the college years both for pleasant interactions with friends at bars as well as for stressful situations involving classes and other college-related difficulties, students may begin the process of operant conditioning that can lead to a severe lifelong problem with alcohol. It may seem innocent enough when it starts, but it soon can explode into a significant problem unless you are aware of the situations that reinforce your own drinking and find ways to avoid those situations (or at least to deal with them in more adaptive ways).

Other behavioral problems also can be explained by the concepts of positive and negative reinforcement. For example, positive reinforcement probably is important for the development of many fetishes. Earlier in this chapter, I stated that the development of an erotic attraction to an inanimate object can be understood as occurring because of classical conditioning: for at least some people with fetishism, the inanimate object that represents the fetish has been paired at some point with a potential sexual partner. After this classically conditioned attraction has been acquired, the operant conditioning of another response often occurs. In this case, the person engages in voluntary behaviors that allow him to experience the fetish as much as possible. In the example I spoke of earlier, the man with the fetish involving panties began to collect them by stealing them from family members, friends, and acquaintances. This “collecting behavior” is a voluntary one and, thus, it must have been learned through operant conditioning. The consequence—the feelings

of pleasure the man had after he picked up the panties—is a positive reinforcer because the feelings occurred only after he had performed the operant response:

<i>Discriminative Stimulus</i>	<i>Operant Response</i>	<i>Positive Reinforcer</i>
sight of panties	picks them up and places them in pocket	feels pleasure

Thus we can see that the development of a fetish can occur in two steps: the classical conditioning of an erotic arousal to some inanimate object is followed by the operant conditioning of some sort of approach response to the object (often involving the collecting of the object). We will refer to this as the **two-factor model** of fetish development in which **the first factor involves the classical conditioning of arousal and the second factor involves the operant conditioning of approach behavior**.

In a similar manner, the development of a phobia also may occur in two steps. First, as discussed earlier, there is the classical conditioning of a fear response to some event which then is followed by the operant conditioning of escaping from the event. Thus, **the two-factor model** (the classical conditioning of an emotional response to some stimulus followed by the operant conditioning of a set of voluntary bodily movements involving this stimulus) **also can explain the development of phobias**. In the case of phobia development, however, negative reinforcement is involved in the learning of the escape behavior. For example, in the case of Danielle described earlier, a classically conditioned fear of spiders was developed after Danielle saw her relatives become terrified in the presence of spiders. Afterwards, whenever she saw a spider, she would run away from it. In fact, many people with such phobias completely avoid situations in which a spider might be present, such as dark and damp places. Whenever they experience such a situation, their anxiety increases until they escape from the situation. The “escape behavior” is an operant response that is negatively reinforced by anxiety reduction:

<i>Discriminative Stimulus</i>	<i>Operant Response</i>	<i>Negative Reinforcer</i>
sees spider, gets anxious	runs away	anxiety is reduced

The two-factor explanation for the development of phobias has been a popular one. There are some problems with it, however. One problem involves the fact that we cannot always identify an experience that can explain the development of a fear response to an object. In fact, some people just seem to be naturally fearful, and they tend to develop fears of all sorts of objects without having any negative experiences involving them. A biological explanation of their phobias may be

a better one: perhaps they have a nervous system that reacts strongly to many stimuli, even harmless ones, causing them to feel afraid in a wide range of situations. Another problem is that some people have terrible experiences with various objects and, yet, they still do not develop a phobia. Again, a biological approach may explain why this occurs: perhaps they have a nervous system that reacts mildly to most stimuli, even relatively harmful ones, causing them to feel calm and relaxed in a wide range of situations. Later in this chapter, I will discuss evolutionary explanations of the development of some phobias that suggests that humans and other animals may have evolved biological dispositions to develop particular phobias.

SQ 3-16: Describe the difference between positive and negative reinforcement. Give at least two examples (your own) of each. Discuss the two-factor model of phobia development and fetish development. Describe two problems with the two-factor explanation of phobia development.

Acquisition and Extinction. Just as with classical conditioning, an operant response typically takes some period of time to learn. You experience a discriminative stimulus, you perform an operant response, and you are reinforced for it. Over time, the operant response becomes strengthened until you perform it readily whenever the discriminative stimulus occurs. The **initial learning of the operant response when it is followed by a reinforcement** is referred to as **acquisition**. For example, at some point, you may have observed a baby learning how to say “mama” or “dada.” Beginning at about three months of age, babies begin to babble—they begin to vocalize by repeating strings of meaningless syllables (babbling probably is important for the development of language). Sometimes, however, the baby will say something that sounds like a word to nearby adults. The parents especially are waiting for the child to call to them, so anything that sounds even remotely like “mama” or “dada” will grab their attention and they then may run over to the child and reinforce the sound by smiling and getting excited. In this case, the sound initially is being made at random, so there probably is no discriminative stimulus at first. But, over time, as the baby gets praised for the sound, the sight of a parent will serve as the discriminative stimulus for the baby’s operant response of making the sound. So, for the operant response of “mama,” we would have the following situation:

<i>Discriminative Stimulus</i>	<i>Operant Response</i>	<i>Positive Reinforcer</i>
sight of mother	baby says “mama”	mother praises baby

Soon enough, the baby begins to say “mama” everytime she sees her mother. The operant response usually takes little time to be acquired since the reinforcer (parental attention and praise) is such a powerful one for the baby.

On the other hand, if the reinforcement is removed, we typically will see a weakening of the operant response. The **decline of the operant response in the absence of a reinforcement** is referred to as **extinction**. For example, you may have heard the claim somewhere that, if a child throws a temper tantrum, the best thing to do is to ignore it. Although I am not certain that this is always the best advice for a tired parent dealing with a difficult child, the reasoning behind the claim is sound. In this example, the behaviors making up the temper tantrum (crying, screaming, falling to the ground and kicking one's legs, etc.) are the operant response. It usually seems to be true that the child engages in these behaviors when he/she wants the attention of a parent: these are very effective behaviors for getting attention, especially when the parent and child are out in public. Thus, the child may perform these behaviors when the parent has not been paying enough attention to the child (for example, when the parent is trying to concentrate on grocery shopping). In the terminology of operant conditioning, we would have the following situation:

<i>Discriminative Stimulus</i>	<i>Operant Response</i>	<i>Reinforcement</i>
parent ignores child	temper tantrum	attention from parent

Over time, the operant response may occur at a very high frequency. If the acquisition of the operant response is due to such a set of circumstances, then the best thing to do probably would be to remove the positive reinforcement of attention: this then would extinguish the operant response. The child would throw temper tantrums for a while after the extinction began (in fact, they probably would increase in frequency for a short time); but eventually, if the parent can stick it out, the temper tantrums should decrease and disappear. Punishment, on the other hand, is unlikely to work in such a situation. Can you think of why? It has to do with what I said earlier in this chapter about individual differences in what is reinforcing and punishing. In the child's viewpoint, what might seem like punishment to us would still be reinforcement for the child: even if the parent is scolding the child severely, the child still is receiving attention from the parent. On the other hand, if the temper tantrums have been acquired by the child in order to get other kinds of reinforcement, then withholding attention is not as likely to work. For example, perhaps some children throw temper tantrums whenever they want an overly attentive and smothering parent to leave them alone (perhaps the parent always walks away when the child performs the operant response). In this case, ignoring the child is the consequence that he/she desires. Thus, the claim that one *always* should ignore a child throwing a temper tantrum is not valid. What is needed is, first, to identify precisely the reinforcement for each operant response we are trying to extinguish and then, second,

to make sure that we remove that particular reinforcement. This isn't always easy to do, as any good behavioral therapist will tell you.

SQ 3-17: Describe the processes of acquisition and extinction in operant conditioning. If your child whined every night at bedtime in order to stay up an extra half hour, how could you use your knowledge of acquisition and extinction to reduce this behavior?

Processes of Evolution

How did our species, *Homo sapiens*, become made up mostly of individuals who are very good at learning about various aspects of the environment? For example, we learn languages very easily, especially when we are young. Without any explicit instruction, during the first five years of our lives we learn to speak our native language extremely well. By the end of childhood, almost all humans are extremely proficient at using spoken language. For example, Steven Pinker (1994) reported that the average high-school graduate knows about 60,000 words:

Word learning generally begins around the age of twelve months. Therefore, high school graduates, who have been at it for about seventeen years, must have been learning an average of ten new words a day continuously since their first birthdays, or about a new word every ninety waking minutes. Using similar techniques, we can estimate that an average six-year-old commands about 13,000 words.... A bit of arithmetic shows that preliterate [nonreading] children, who are limited to [listening to the speech that they hear around them]..., must be lexical [word] vacuum cleaners, inhaling a new word every two waking hours, day in, day out.... Think about having to memorize a new batting average or treaty date or phone number every ninety minutes of your waking life since you took your first steps. (pp 150-151)

How does this amazing process of language development happen? The answer might seem to you to be an obvious one: we hear language all around us right from birth and, therefore, we "pick it up." But this is not a satisfactory answer: we experience all sorts of things around us right from birth and much of this is not learned unless we pay close attention to it and practice it again and again. For example, you listen to your instructors each and every day, but most of the information they are trying to get across is very difficult to learn and remember unless you pay very close attention to it and think about it very carefully later when you are studying. The same thing is true when learning to play a musical instrument or a sport. Compared to the learning of such material, language learning during the first few years of life is almost ridiculously easy. Young children hear

language around them and quickly learn to use it in novel ways without exerting much effort at all. Could we explain language learning with either classical conditioning or operant conditioning? Well, speaking seems to be a voluntary activity so maybe language is learned through operant conditioning. For example, perhaps we learn a new word by first hearing it and then by being reinforced for using it correctly and punished for using it incorrectly. If this were true then, over time, the incorrect usages would slowly weaken and disappear whereas the correct usages would slowly strengthen and become firmly established. At first, this seems to be a plausible answer. But spending a little time observing young children will show you that this explanation probably is not a good one: children typically begin to use a new word in correct ways without being explicitly reinforced for it at all. For example, how often have you heard a parent praising a preschooler for using, say, the word “light” (or any other word) correctly? The learning of language is a much more subtle process than can be explained by operant conditioning.

Even though language learning may be the premier type of human learning, we also are very good at learning many other things about our environments. Why are we such good general learners? Is it because, somehow, we have become more than just animals? Have we gone beyond instinct into a new plane of existence where only learning exists? Are we infinitely malleable creatures as John Watson suggested in the quote I presented earlier in this chapter? (“Give me a dozen healthy infants, well-formed, and my own specified world to bring them up in, and I’ll guarantee to take any one at random and train him to become any type of specialist I might select....”) None of this seems very likely. We are not able to learn anything we want to learn, and we definitely learn some things much more easily than others. This is true even with language learning: learning to read and write a language is much more difficult for us than learning to speak a language. And many animals easily learn certain things that most humans would find very difficult or impossible to learn. For example, rats quickly learn to navigate very complex mazes that many humans could learn only with great difficulty, if they could learn them at all. Nevertheless, there is no doubt that we have a much better general learning ability than any other animal. The most likely reason that we are such good general learners is that we have evolved an ability to easily associate many kinds of events in our environments—an ability that probably has much to do with the enormous size and complexity of our cerebral cortex. But some other mammals, such as chimpanzees, whales, and dolphins, also have very good general learning abilities. And most animal species are able to learn very well at least some things about their environments. Evolutionary theorists believe that **species tend to evolve a general learning ability when their environments are unpredictable**. With regard to this point, Pinker (1994) made the following argument:

Many social scientists believe that learning is some pinnacle of evolution that humans have scaled from the lowlands of instinct, so that our ability to learn can be explained by our exalted braininess. But biology says otherwise. Learning is found in organisms as simple as bacteria.... Learning is an option, like camouflage or horns, that nature gives organisms as needed—when some aspect of the organisms' environmental niche is so unpredictable that anticipation of its contingencies [in this context, a contingency refers to an association between events] cannot be wired in [in an instinctive way].... [On the other hand,] when an environment is stable, there is a selective pressure for learned abilities to become increasingly innate [inborn or instinctive]. (p. 242)

According to the evolutionary approach, modern humans are such good learners probably because the environments of our ancestors were often unpredictable—so unpredictable that they had to be able to learn and remember many important aspects of it if they were to survive. For example, in the arid environment inhabited by our ancestors during a particular time period a few hundred thousand years ago, they had to learn where sources of water were and where food was plentiful if they were to live long enough to reproduce. This ability to easily learn general information about the environment probably evolved in our ancestors over at least hundreds of thousands of years. We now often put this ability to uses of which our ancient ancestors never dreamed (such as being able to learn and remember the information in this course). Nonetheless, our general ability to easily associate many different events was first forged in those rough and dangerous environments of our hominid forebears. This, at least, is what is suggested by an evolutionary approach to learning.

The major assumption of the **evolutionary approach** in psychology is that **the present set of human emotions and mental abilities has evolved in our species and in our prehuman ancestors over large periods of time**. In general, **evolution** may be defined as **a relatively permanent change in some characteristic of a species that occurs over many generations**. A *characteristic* would be some feature, such as eye color, that we can distinguish from other features, such as hair color. The characteristic of eye color also has many different *expressions*, such as brown, blue, or green. Evolution, therefore, involves **changes over generations in the average expression of some characteristic**. For example, a species that typically has brown eyes might evolve over generations into a species that typically has green eyes. Although the idea of evolution has been around for a very long time, it was not until the middle of the nineteenth century that a biologist by the name of Charles Darwin (1809-1882) amassed such a large amount of evidence in favor of the idea that the rest of the scientific world was forced to take it seriously. Furthermore, Darwin proposed a major cause of evolutionary

change that he called “natural selection.” Let’s look a little more closely at Darwin’s ideas before we apply them to the science of psychology.

SQ 3-18: What makes language learning different from the two kinds of learning (classical and operant conditioning) that I described in the first part of this chapter? Discuss the evolutionary approach in psychology. In your answer, define what is meant by the word “evolution” and describe how this approach explains the fact that humans are such good general learners.

Darwinian Evolutionary Theory

Darwin first described in detail his thinking on evolution and natural selection in 1859, when he published the first edition of his book, *On the Origin of Species*. In this book, Darwin not only presented evidence showing the likelihood that all species on Earth evolved from a much smaller number of ancestral species (perhaps ultimately only one), he also developed explanations for how this might have occurred. No one before Darwin had so masterfully marshaled such an enormous amount of supporting evidence for the reality of evolution. In addition, no one before Darwin outlined a compelling explanation of evolution: the principle of **natural selection**, which may be defined as **differences in the reproductive success of individuals due to differences in their physical or mental characteristics**. Putting it most simply, natural selection occurs when certain individuals produce a greater number of offspring than other individuals because their physical or mental characteristics help them to adapt better to their environments. For example, let’s consider a species of insect that lives on a windy and tiny island. Let’s say that individuals of this species differ in terms of their wing size. Some have very large wings and are very good fliers, whereas others have very small wings and, hence, fly only with great difficulty. On a small and windy island, the large-winged insects are more likely to get blown out to sea where they will die, whereas the small-winged insects tend to live much longer: by rarely flying, they rarely get blown out to sea. Because the small-winged insects tend to live longer than the large-winged insects of this species, they will tend to produce more offspring. This imaginary example illustrates well the very simple idea behind Darwin’s explanation of evolution: Darwin argued that differences among individuals in the number of offspring that they produce (their “reproductive success”) are caused by differences in the degree to which they are adapted to their environmental conditions. Darwin argued that these environmental conditions “naturally select” those organisms best adapted (adjusted) to those conditions. In other words, if their physical and mental characteristics fit in well with that environment, they will reproduce more than other members of their species.

But how does natural selection produce evolutionary changes in the average characteristics of a species? There is a great deal of evidence showing that an organism's physical and mental characteristics are related to the genes that it inherits from its parents (a **gene is the basic unit of heredity**). You see some of this evidence all around you every day: you probably physically resemble your biological parents closely (some of you to a remarkable degree), and you may even show similar mannerisms and personality traits. Thus, if the characteristics that help an individual to survive longer and reproduce more are the result of its biological inheritance, then that individual should be able to pass these characteristics on to its offspring, thereby allowing the offspring to survive longer and reproduce more than other individuals. These offspring will tend to pass these superior characteristics on to their offspring, and so on. Over many generations, the characteristics of individuals who reproduce less than others will tend to disappear from the species, whereas the characteristics of individuals who reproduce more than others will tend to spread in the species until they become "species-typical," which means that most members of the species will express those characteristics. In wolves, for example, a very dense concentration of olfactory (smell) receptors in their nasal passages is species-typical: most wolves have this very dense concentration of olfactory receptors because a very strong "sense of smell" was naturally selected in ancestral species of wolves. (The same is true for dogs because dogs and wolves are members of the same species—a dog is simply a domesticated wolf.) According to Darwin, therefore, evolution occurs when the following events occur: (1) there exist **individual differences** in the expression of a characteristic, (2) these differences are caused, to some degree, by differences in the **biological inheritance** of individuals, and (3) **natural selection** of particular expressions of this characteristic occurs.

Let's look more closely at these three requirements for evolutionary change by considering a real example of natural selection leading to evolutionary changes. Kettlewell (1955) reported on a very rapid change of body color in a particular species of moth in England. Before the emergence of smoke-producing factories, most individuals in this species were colored a light gray, but a few were black. Thus, the first requirement of evolutionary change was met by this species—there existed individual differences in the expression of some characteristic. Furthermore, studies showed that these differences in body coloring were associated with differences in a single "gene" inherited by individual moths. Because of this association of body coloring with the genes inherited by an individual, gray-colored moths tend to pass the gray coloring on to their offspring, whereas black-colored moths tend to pass the black coloring on to their offspring. Thus, the second requirement of evolutionary change was met by this species—the individual differences in body color were, to some degree, caused by differences in biological inheritance. Finally, the third requirement of evolutionary change—that there was natural selection of one or the other expression

of body coloring—also was met. Due to a large increase in the number of factories belching out black smoke during this time period, soot had become deposited on trees around the countryside. As light-gray moths rested upon soot-covered trees, they were seen easily by predatory birds, which then ate the moths. On the other hand, the initially very small number of black-colored moths was less easily seen by birds and, therefore, they survived longer and reproduced more than the gray-colored ones. Because of this natural selection of moths by the predatory birds, within about 100 years the body coloring of this species of moth evolved from mostly gray individuals to mostly black ones. When the environment was cleaned up after this point, the coloring evolved back to mostly gray individuals. In general, then, evolution by natural selection occurs in the following way: when reproductive differences among individuals are the result of differing expressions of a particular characteristic, and when these differing expressions of the characteristic are inherited, then, over hundreds or thousands of generations, the species will evolve toward the expression of the characteristic being naturally selected. Eventually, if certain circumstances are met, the selected expression will become species-typical.

Let's look at one more example of natural selection. Bumpus (1899) described natural selection of sparrows that occurred during "an uncommonly severe storm of snow, rain, and sleet" on February 1st, 1898, on the east coast of the United States. He reported that, out of a total of 136 birds he examined after the storm, 64 died because of the effects of the storm. Certain characteristics distinguished those who survived the storm from those who did not: not only did more males than females survive the storm but, compared to birds which died, those which survived the storm tended to be smaller both in length and weight, and to have longer wing bones (humerus), longer thigh bones (femur), longer chest bones (sternum), and wider heads.

I think these tests prove that there are fundamental differences between the birds which survived and those which perished. While the former [those which survived] are shorter and weigh less..., they have longer wing bones, longer legs, longer sternums, and greater brain capacity. These characters are in accordance with our ideas of physical fitness ; their defective development is evidently a mark of inferiority, and we are justified in concluding that the birds so handicapped failed to pass one of Nature's rigorous tests and perished.
(pp. 213-214)

In addition to these differences between survivors and nonsurvivors, birds who died tended to be at the extremes of any particular characteristic (for example, the bird with the widest head and the bird with the narrowest head both died), suggesting that birds who were closest to some ideal average tended to survive the storm—that is, to be naturally selected by the effects of the storm.

(We see something similar in humans: both those who are among the tallest humans as well as those who are among the smallest tend to die at younger ages than those who are closer to the average height of humans.) Bumpus concluded that:

the birds which perished, perished not through accident, but because they were physically disqualified, and...the birds which survived, survived because they possessed certain physical characters. These characters enabled them to withstand the intensity of this particular phase of selective elimination, and distinguish them from their more unfortunate companions. (pp. 209-210)

It is likely that differences in the bodily characteristics measured by Bumpus were associated with differences in the genes inherited by these birds. And, thus, if natural selection of these bodily characteristics occur during each severe storm, we should expect that, over generations, evolution of sparrows will occur in the direction indicated by Bumpus' results.

SQ 3-19: Discuss in detail the principle of natural selection and how it is thought to lead to evolutionary changes in species. In your answer, list and describe the three requirements that must be met if evolutionary change is to occur. Describe the studies by Kettlewell (1955) and Bumpus (1899) in terms of these three requirements.

Given enough time, natural selection is able to change a species' typical characteristics to such a degree that eventually it can look very different physically from its ancestors. For example, there is fossil evidence showing that, over millions of years, whales evolved from four-legged, "bear-like" creatures that walked on land to finned, "fish-like" creatures that now swim in the oceans. It is likely that most of this evolution was caused by natural selection. There is a great deal of evidence showing that evolution due to natural selection probably has occurred in all organisms, including humans. There is good reason to believe that, to a large extent, the bodies of modern humans are the result of the action of natural selection occurring over millions of years in ancestral primate species. It is important to keep in mind, however, that none of this means that, in some mysterious way, evolution by natural selection had as its goal the eventual production of humans or any other present-day species:

...evolution by natural selection is not forward looking or intentional. A giraffe does not notice juicy leaves stirring high in a tree and "evolve" a longer neck. Rather, those giraffes that happen to have slightly longer necks than other giraffes have a slight advantage in

getting to those leaves. Hence, they survive better and are more likely to live to pass on genes for slightly longer necks to offspring. (Buss, et al., 1998)

In a similar way, evolution was not pointing towards the production of the modern human species when evolutionary changes were occurring among our primate ancestors over the last several millions of years. In fact, if the environment had been even slightly different than it was, our particular species probably would not be here today. In addition, evolution by natural selection should not be thought of as leading to organisms that are superior (“higher”) in some way when compared to ancestral species. To various extents, every species (whether past or present) is adapted to the environment that it inhabits. Modern humans might be at a significant disadvantage if we somehow could be transported back five million years to the environment of our primate ancestors. We might even become extinct in that environment. Over time, as the environment changes, each species tends to change (or to become extinct). As a species changes over generations, it may lose characteristics that we think of as “higher” ones. For example, certain cave-dwelling species of animal have evolved into creatures without eyes even though their ancient ancestors living outside of caves had very well-developed eyes. We might think of this as some sort of degeneration, as an evolution from a “higher” to a “lower” form; but Nature does not “think” in this way. It is only the human tendency to place values on physical and mental characteristics (such as general intelligence) that causes us to think of evolution as tending to lead from “lower” to “higher” species.

Students sometimes say that they don’t “believe” in evolution, as if the matter were one of blind faith for or against the claim (what I mean by “blind faith” is “an unthinking affirmation based on little or no evidence”). Science is never a matter of blind faith. You might remember from Chapter 1 that, if we are to think scientifically, we must examine the evidence in support of any claim to knowledge. Is there any evidence in your everyday life that supports the evolutionary explanation of changes in the expression of characteristics? Think about this carefully. I spoke above about dogs. Can dogs provide evidence for evolutionary changes? There are presently many different breeds of dog; but we know that all present breeds are derived from wolves. In fact, dogs are able to interbreed with wolves—they are members of the same species. But most breeds of dog look very different from wolves because of natural selection that occurred during their domestication as well as “artificial selection” (selective breeding performed by humans). Both natural and artificial selection have produced many breeds of dog from the smallest Chihuahua to the largest Irish Wolfhound, most of which bear only the smallest resemblance to wolves. Nevertheless, you could argue that this doesn’t support the theory of evolution because, as you might say, “I didn’t see dogs evolve from wolves, so I can’t tell for sure if your claim is true.”

Well, there do exist skeletal remains of ancient dogs that help to show that they have evolved; but let's consider another example that is more recent. People are dying from bacterial infections that, just a few years ago were easily cured with antibiotics. Many of these antibiotics now no longer work because the bacteria have evolved resistances to them. In fact, certain strains of bacteria are unaffected by any known combination of antibiotics because of these evolutionary changes. Beyond such everyday evidence for evolution, there is a great deal of fossil and biochemical evidence supporting the claim that evolution of all organisms has occurred. In fact, since the publication of Darwin's book, there has been so much evidence collected supporting the theory of evolution that it is accepted as fact by biologists and as the central organizing principle of their discipline. For biologists, the claim that evolution has occurred in all organisms is as obviously true as is the claim that the Earth revolves around the sun. I recommend that you take at least one course in evolutionary biology so that you too may become familiar with at least some of this evidence.

SQ 3-20: Discuss why it is incorrect to say that evolution is directed towards a particular goal (especially towards the creation of "higher" species such as humans). What is some of the "everyday" evidence in favor of the theory of evolution?

Evolution of Mental and Behavioral Adaptations

The process of natural selection often leads to the evolution of characteristics that are referred to as "adaptations." An **adaptation** is a **physical or mental characteristic that has evolved over generations in a species through natural selection**. Adaptations are just what they sound like: they are characteristics that help individual members of a species adapt (adjust) to the environments in which they find themselves, as long as these environments are similar to those in which their ancestors evolved. In other words, because ancestral individuals possessing a particular characteristic survived longer and reproduced more than individuals without that characteristic, and because this difference in reproductive success continued over hundreds or thousands of generations, significant evolutionary changes occurred so that most individuals in that species now develop that characteristic. The evolutionary approach suggests that at least some of our behaviors and mental abilities are adaptations that helped our ancestors to reproduce more. In humans, the mental ability to easily learn a language is probably such an adaptation. An example of a human behavioral adaptation may be the tendency of females to carry a baby on one particular side of their bodies. The next time you are at the mall (or some other location in which there is a large number of parents holding babies), observe the side on which men and women tend to carry their babies. You probably will find, as have many other researchers (summarized in Peterson, 1997), that the majority of women carry babies on the left side of their bodies whereas men are

about equally likely to carry a baby on either side. This behavioral difference between males and females begins very early: girls as young as six years of age tend to carry babies on the left side of their bodies. This gender difference even occurs even in some other primates.

Could this behavioral tendency for females to carry babies on their left sides be an adaptation resulting from evolution by natural selection? Can you think of any possible function that this behavior might serve that could cause it to be naturally selected? It is possible that this behavior evolved because of the fact that 90% of humans are right-handed: holding an infant in the left arm leaves free our preferred hands. But this does not explain why only females tend to have this behavioral tendency. Perhaps, instead, this behavioral tendency evolved because females have, on average, a greater tactile (touch) sensitivity on the skin of their left breast and, thus, are better able to feel the infant when it is held on that side of the body. This sounds plausible, but could we explain it by some nonevolutionary process, such as learning? Perhaps women are more likely to have to work while holding a baby (females tend to be the primary caretakers in many cultures). Perhaps because of this, women have learned to hold their babies on the left side of their bodies in order to leave free their right hand. Men would not often have learned to do this, the explanation suggests, because they typically do not carry babies while they work. Thus, it is possible that the behavioral tendency of women to carry babies on their left sides may not be an evolved adaptation at all. But then, why do very young girls prefer carrying babies on their left sides—girls who are too young to have done much work while carrying a baby? We have to conclude that, although all these explanations sounded plausible at first, each has significant problems when given further thought. We simply do not know which (if any) of them is correct. In fact, this is one of the biggest problems with evolutionary explanations of behavior and mental events—**we cannot go back into ancestral populations in order to determine if a particular behavioral or mental characteristic evolved**. This is a problem that does not occur to the same extent with evolutionary explanations of bodily characteristics since the fossil record often can show the evolution of at least the hard parts of the body of any given species. But behaviors and mental abilities do not fossilize, so how can we get evidence supporting the evolution of these characteristics? Some evidence supporting evolutionary explanations of human behaviors and mental abilities involves comparisons with closely related primates, especially chimpanzees and bonobos—two species to which we are particularly closely related. Let's look more closely at this.

Evolution and Mental Continuity

Darwin's theory had a major impact on the emerging science of psychology by affecting how psychologists conceived of the human mind and behavior. In his later writings, Darwin argued that, over millions of years, gradual changes occurred in the mental processes of our

nonhuman ancestors. These changes accumulated gradually, he suggested, until the complex minds of modern-day humans emerged. Since these same nonhuman ancestors gave rise to other modern-day primates, such as chimpanzees, our minds should share similarities with the minds of these animals. In other words, Darwin argued that there exists a **mental continuity** between humans and other animals: **the mental abilities of humans are similar to those of other related species because we all have descended from a common ancestral species.** Any differences in mental abilities that are found among closely related species should generally tend to be differences in the amount or degree of these abilities. This suggests that, if we are trying to find evidence that a mental ability or behavior has evolved in humans, we should measure the ability or behavior in our primate relatives to see if they share this characteristic to some extent. For example, chimpanzees and gorillas have been taught to use nonspoken language, such as sign language, although their ability in this regard is much less than that of humans. These findings, therefore, support the claim that human language ability is an evolved characteristic.

But how can the human mind evolve in the way that Darwin argued it did? Because the mind is not a physical object like the body, it might be difficult for you to understand how the evolution of the mind could have occurred. The discussion in the last chapter, however, should help you to solve this problem. The basic assumption made by Darwin is the same one that we made in the last chapter: mental activity is caused by biological activity in the nervous system, especially the brain (I referred to this as the brain/mind theory). If this claim is true (and we went through some of the supporting evidence in the last chapter), then we can infer that, as the brain evolves, the mind should also evolve. In other words, in explaining how the mind evolves, Darwin made the following argument:

- (1) The bodies of humans have evolved over thousands of generations.
- (2) The brain, being a part of this body, has also evolved over this time.
- (3) Activity in the brain causes mental events and behaviors.
- (4) Therefore, the minds of humans have evolved over thousands of generations due to the evolution of the brain.

The claim that brain activity causes all mental activity is different from the dualistic one made by Descartes: he argued that the body (brain) and the mind are separate and distinct, and that only humans have a mind. The brain/mind theory in conjunction with the application of evolutionary principles to the human brain effectively removed Descartes' distinction between the mind and the body as well as the distinction between humans and other animals. **The human mind, according to this newer view, is the result of physical processes in the nervous**

system—physical processes that have evolved from those of nonhuman ancestors.

As the nervous system evolves, the mental processes and behaviors associated with neural activity evolve along with it. Evolutionary psychologists argue that, when mental processes lead to greater reproductive success for the individuals expressing them, the neural structures associated with these mental processes are naturally selected. For example, if the mental processes involving spoken language have evolved through natural selection (and it seems very likely that this is the case), then the evolution of brain structures that serve as the physical basis for language (such as Broca's area) also has occurred.

Thus, the acceptance of the principle of mental continuity led many nineteenth-century behavioral scientists to study animals closely related to humans in the belief that this would tell us much about the nature of the human mind and human behaviors. The science of psychology itself emerged from this research activity:

The influence of Darwinism upon psychology during the last quarter of the nineteenth century probably did as much as any single factor to shape the science as it exists today. Psychology was certain to become consistently more biological; mental processes tended more and more to be stated in terms of the functions served in the task of adjusting to the world.... As a natural consequence, interest in animal psychology rapidly increased. Many books appeared which concerned themselves with the nature of instincts and with the phylogenetic [that is, evolutionary] study of intelligence. Studies of animal behavior appeared in psychological journals. The great gulf established by Descartes between human and animal psychology had been bridged. The life of the organism was seen as a whole. Human psychology was to be seen in relation to all the phenomena of life.
(Murphy, 1949; p. 116)

Thus, Darwin's legacy to psychology was this: **Darwin's work brought human nature fully within the realm of scientific inquiry.** After the publication of Darwin's book, many came to believe that they could use the methods of science to resolve once and for all the various philosophical controversies that had brewed for centuries.

SQ 3-21: Define what is meant by the term "adaptation" and give some examples of possible adaptations. What is the most important difficulty for showing that particular mental or behavioral characteristics are adaptations? How does the concept of mental continuity help us to overcome this difficulty? Discuss how the brain/mind theory helps us to understand how the mind can evolve over generations. What was Darwin's most important contribution to scientific psychology?

Evolution of Learning Abilities: Biological Constraints on Learning

As I stated earlier in this chapter, many behaviorists assumed that **inherited biological differences among different organisms were not important causes of behavioral differences**. Instead, they assumed that most animal behavior is caused by learning involving past experiences. Thus, behaviorists asserted that behavioral differences among different species were the result of environmental differences, not inherited biological differences. In addition, behaviorists believed that associative learning works in the same way in every species. Thus, they assumed that they could study animals of any species (such as rats and pigeons) in order to discover general principles of learning that would be true for all species. And they also assumed that any animal from any species could learn to associate any two events that were presented together. In other words, behaviorists assumed that associations would occur equally well in any animal species regardless of the stimuli the researchers used. Beginning around 1960, however, these assumptions and beliefs began to be seriously questioned by many psychologists. It started to become apparent that species differed in what and how they learned. For example, it should be obvious to those of you who own dogs and cats that these two species learn different things and learn in different ways. Dogs, for instance, can learn to do some things when their only reward is praise, whereas cats don't seem to respond to praise at all. Martin Seligman argued that different species have evolved different learning abilities, an idea that he called **biological preparedness**. Biological preparedness can be defined as **an innate (inborn) tendency to learn certain kinds of associations** (between stimuli in classical conditioning, or between operant responses and consequences in operant conditioning). This idea leads to an obvious question: what causes a species to be biologically prepared to learn some associations but not others? Those who argue in favor of biological preparedness believe that each species has innate tendencies to learn associations that help its members to survive longer and reproduce more. In other words, they claim that natural selection of learning abilities has occurred so that each species has evolved the ability to learn certain associations more easily than others.

Some have suggested that a good example of the evolution of biological preparedness in humans can be seen in the development of phobias. It seems that we easily learn fears of objects or situations that probably were dangerous to our ancestors. For example, young children learn animal phobias very easily. In fact, the tendency to easily learn strong fears of animals begins at an age (about three years) during which children have become highly mobile—a characteristic that often results in their being some distance from the protection of adults. Why would this situation make it adaptive for them to learn animal phobias? Well, let's describe the probable environment of our ancient hominid ancestors. They often lived in an arid environment in which there was a lack

of cover coupled with the presence of large carnivorous animals. Children who walked away from their caretakers would have been very vulnerable to animal attacks because there were few places to escape to and no adult nearby to fend off an attacking animal. Children who easily learned to be afraid of animals with which they had had a negative experience would have a strong advantage if they came upon a similar animal in the future. In this case, as soon as they saw or heard the animal, they would become fearful and would be likely to quickly run back to an adult. If this ability to quickly learn animal phobias was associated with the genes inherited by the children, it could evolve by natural selection over generations: children without the ability would have been more likely to die than would those children with the ability. Eventually, all other things being equal, the ability would become a species-typical adaptation in human children. You may also have noticed that many animal phobias disappear after about ten years of age. This also makes adaptive sense since, by adolescence, humans are much more better at knowing where danger may lurk as well as at defending themselves.

Another example of associative learning for which we seem to show a high degree of biological preparedness is **taste aversion**, a type of classical conditioning in which **an individual learns to avoid the taste of something that has been paired with sensations of nausea**. Taste aversion was investigated by John Garcia and his colleagues in a series of studies performed during the 1960s. Garcia had been studying the effects of radiation on rats. In his research, he used a strong dose of X-rays to irradiate the rats—a procedure which induced “radiation sickness.” Radiation sickness causes vomiting and sensations of nausea (along with other physical problems) after about eight hours. Garcia always irradiated the rats in a cage that contained a plastic water bottle, whereas the cage in which the rats lived contained a glass water bottle. He noticed that, after they had been irradiated, most rats would never again drink from the plastic water bottle even though they had drunk from it before they had been irradiated. Furthermore, although the rats seemed to avoid the water in the plastic water bottle, they continued to drink from the glass water bottle in their “home” cages. What do you think might cause this change in behavior? Let’s think about this. The rats were drinking from a water bottle that gave a “plastic taste” to the water. While in the cage with the plastic water bottle, they were subjected to large doses of X-rays. Several hours later, they became “sick to their stomachs” and began to vomit. After all this, the rats refused to drink from the plastic water bottle when again placed in the cage. One could infer that the rats no longer liked the taste of the water and that, perhaps, they even felt “disgust” when they tasted the water. Such an emotional response could lead to a refusal to drink from the plastic water bottle. What kind of conditioning results in the learning of emotional responses? Earlier, I stated that classical conditioning was important for the learning of emotional responses to new stimuli. Thus, the easiest way to make sense of this change in behavior is to

suppose that the rats had been classically conditioned to experience a negative emotional response when tasting the water in the plastic water bottle:

<i>Conditioned Stimulus</i>	<i>Unconditioned Stimulus</i>
plastic taste of water	sensations of nausea
<i>Conditioned Response</i>	<i>Unconditioned Response</i>
feelings of “disgust”	feelings of “disgust,” gagging, vomiting

This is the basic learning explanation for taste aversion (the word “aversion” means avoidance). In taste-aversion conditioning, the animal learns to avoid a particular taste because it is paired with sensations of nausea.

There is much evidence that many animals, including humans, quickly learn to avoid certain tastes because of such conditioning. You may have had this experience after eating food that had gone bad, especially if this food had a strong or unusual taste. People who get drunk on sweet-tasting alcoholic beverages that later make them sick also tend to avoid drinking them in the future (I call this the “Southern-Comfort phenomenon”). Taste-aversion conditioning, although common, is surprising for two reasons: it is a very strong learning that often occurs (1) after only one trial of a CS-UCS pairing, and (2) even though the CS and UCS have been separated by hours. You may remember that, in the examples of classical conditioning presented earlier in this chapter, the CS and UCS usually were presented very close together in time, and that it took at least several trials of CS-UCS pairings to acquire a CR. So, it seems that it is much easier for us to learn an association between a taste and nausea than it is for us to learn associations between the stimuli typically used in laboratory studies of classical conditioning. This is probably because the stimuli typically used in laboratory studies of learning (such as buzzers and light flashes) are not important for survival or reproductive success. The conclusion that this reasoning leads us to is that we have evolved the ability to learn particular associations very easily because such an ability is *adaptive* (it increases our survival and reproduction) and, thus, has been naturally selected. With regard to taste aversion, if we did not learn quickly and strongly to associate particular tastes with getting nauseous, we would soon die.

SQ 3-22: What did behaviorists between 1920 and 1970 assume with regard to the possible influence of biological differences on learning? How did the concept of “biological preparedness” change this view? In what way is evolution thought to be important for biological preparedness? With regard to the concept of biological preparedness, discuss how certain phobias (such as fears

of animals and fears of the dark) can be so easily learned by humans. Describe what is meant by the term “taste aversion.” In terms of classical conditioning (using the concepts of CS, UCS, CR, and UCR), outline how a person might learn to avoid drinking a sweet-tasting liqueur. Use the concepts of evolution and biological preparedness to explain conditioned taste aversion.

In this chapter, we have examined some basic kinds of learning as well as the evolution of mental processes, especially the evolution of those mental processes underlying our ability to learn. Learning, however, is of little use if we don't remember what we have learned. In the next chapter, we will examine the various mental processes underlying memory. In that chapter, we also will learn about why we so often forget what we have experienced.

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Practice Test for Chapter 3

1. When I was a child, as a joke my mother used to put on a goalie mask, start up her chain saw, and chase the neighborhood children around until they passed out from fright. Even now I have a phobia of goalie masks and cannot watch a hockey game without soiling myself. For me, the goalie mask is a

- A: CS. B: CR. C: UCS. D: UCR.

2. In order to gain a better understanding of the evolutionary origins of human mental abilities, we sometimes study the mental abilities of closely related primates (such as chimps). For example, researchers have studied the language-learning abilities of other primates in order to better understand the origins of human language abilities. Which principle of the evolutionary approach BEST justifies the COMPARING of human mental abilities with the mental abilities of other primates?

- A: taste aversion C: adaptation
B: mental continuity D: biological preparedness

3. I flash a light and then tap your knee with a hammer (which causes you to jerk it up). Over time, you begin to jerk your leg to the light. The jerk of the knee to the light would be called a(n)

- A: conditioned stimulus. C: unconditioned stimulus.
B: conditioned response. D: unconditioned response.

4. Let's suppose that I have conditioned an operant response of eye blinking by giving you a shiny new quarter each time you blinked your eyes. Now, I stop giving you a quarter after the eye-blink response. What would you predict should happen over time?

- A: The eye-blink response will diminish and then disappear.
B: The eye-blink response will continue to be shaped.
C: Stimulus generalization will cause you to begin blinking your eyes for smaller amounts of money.
D: Any of the above are equally possible.

5. A stimulus is presented after an operant response and leads to an increase in the frequency of that response in the future. This stimulus is a(n)

- A: conditioned stimulus. C: positive reinforcement.
B: negative reinforcement. D: punishment.

6. A stimulus that causes an automatic (reflexive) response in an organism BEFORE it has been classically conditioned is called a(n)

- A: conditioned stimulus. C: unconditioned stimulus.
B: conditioned response. D: unconditioned response.

7. Behaviorists argued that the major cause of behavior was
- A: mental events.
 - B: biological events.
 - C: nonmaterial events.
 - D: environmental events.
8. Right now, connections in your brain are probably changing because of your experience of reading this question. These changes in your brain are the result of
- A: instinctive learning.
 - B: the brain's plasticity.
 - C: extinction of learned responses.
 - D: evolution.
9. The two disciplines MOST influential in the emergence of scientific psychology (especially as practiced by Wilhelm Wundt) were
- A: sociology and philosophy.
 - B: philosophy and physiology.
 - C: physiology and theology.
 - D: physiology and sociology.
10. In behavioral therapies for phobias, a fear response to an object generally is extinguished over time resulting in a cure of the phobic behavior. For example, people with a fear of flying eventually are made to fly on an airplane until they no longer are afraid of flying. Which of the following would be a possible limitation to such a cure?
- A: extinction
 - B: acquisition
 - C: stimulus contiguity
 - D: spontaneous recovery
11. Some people work very hard to get a high grade whereas other people will not work very hard to get a high grade. Which of the following is the MOST likely reason for this?
- A: There are individual differences in what people find to be reinforcing.
 - B: The people who won't work hard have trouble being reinforced by any stimulus.
 - C: High grades are punishing for the people who won't work hard for them.
 - D: There is too much of a delay in reinforcement where grades are concerned so that almost no one is reinforced by them.
12. A mother pays little attention to her child until she begins whining. At this point the mother usually will turn toward the child and ask her what is wrong with her. What would you predict will happen if the mother stops paying attention to the child when she whines?
- A: The whining will decrease over time because it is no longer being reinforced.
 - B: The child will begin screaming at the mother incessantly to pay attention to her.
 - C: The child will begin speaking in a polite tone of voice.
 - D: Nothing will happen unless the mother punishes the whining.
13. The type of learning in which, over time, an organism learns to respond to a neutral stimulus in the same way that it responds automatically to another stimulus is called
- A: operant conditioning.
 - B: observational learning.
 - C: classical conditioning.
 - D: punishment.

14. In operant conditioning, extinction occurs when
- A: the operant response is punished instead of reinforced.
 - B: the operant response is shaped into a different one.
 - C: the schedule of reinforcement is changed to an intermittent one.
 - D: reinforcement no longer is given after the operant response has been acquired.
15. The "learned disgust" that occurs to a taste or smell when we have become nauseous hours after experiencing it has been acquired by the process of
- A: operant conditioning.
 - C: classical conditioning.
 - B: intermittent reinforcement.
 - D: negative reinforcement.
16. A stimulus is presented after an operant response and leads to a decrease in the frequency of that response in the future. This stimulus is a(n)
- A: conditioned stimulus.
 - C: positive reinforcement.
 - B: negative reinforcement.
 - D: punishment.
17. The doctrine that states that complex mental experience is formed by a passive and automatic combination of simple elements of the mind is known as
- A: introspectionism.
 - C: combinationism.
 - B: dualism.
 - D: associationism.
18. When certain individuals reproduce more than others because of their physical or mental characteristics, we say that _____ has occurred.
- A: inheritance
 - B: development
 - C: evolution
 - D: natural selection.
19. Psychology emerged as a SCIENTIFIC discipline a little over _____ years ago.
- A: 50
 - B: 100
 - C: 200
 - D: 250
20. If one is both a materialist and a determinist, one believes that every event in the universe is
- A: caused by some set of preceding nonphysical events.
 - B: caused by some set of preceding physical events.
 - C: the result of an association among various phenomena.
 - D: the result of a disassociation among various phenomena.
21. Let's say that your mother is one of an identical-twin pair. She was separated from her twin in infancy and has recently been reunited with her. When you first saw your aunt, you felt the same emotions you normally feel for your mother. This shows the effects of
- A: discrimination.
 - C: stimulus generalization.
 - B: extinction.
 - D: spontaneous recovery.
22. When we say that a finding is ____, we mean that it can be confirmed through objective observations made under controlled conditions.
- A: externally valid
 - B: subjective
 - C: confounded
 - D: verifiable

23. In Chapter 2, I talked about research in which an electrode was implanted into "pleasure centers" of the brain in human subjects. These subjects were allowed to push a button (the operant response) that would stimulate these areas (the reinforcement). The frequency of button-pushing increased very rapidly in most subjects. Nevertheless, some subjects whose button-pushing response showed large increases reported that the experience was very unpleasant (frustrating). Why would we say that the brain stimulation was reinforcing even though they said it was unpleasant?

- A: The response was also able to be extinguished.
- B: There was a discriminative stimulus involved.
- C: The frequency of button-pushing increased.
- D: The brain stimulation served as a punishment of the response.

24. Advertisers often try to classically condition positive feelings to their products by

- A: telling potential customers how pleased they will be if they buy the product.
- B: describing in great detail the good points about the product.
- C: rewarding the person if he/she uses the product.
- D: showing the product in conjunction with another person or object that elicits positive feelings.

25. With which of the following statements would a behaviorist agree?

- A: The whole is greater than the sum of its parts.
- B: The goal of behavior is self-actualization.
- C: Nature is more influential than nurture.
- D: Free will is an illusion.

26. In their study of Little Albert, John Watson and Rosalie Rayner tried to show that a conditioned fear to an object

- A: can generalize to similar objects.
- B: can be removed through extinction.
- C: is due to the development of specific brain connections.
- D: all the above

27. With which of the following statements would a behaviorist be most likely to agree?

- A: The study of conscious experiences should be the main focus of a scientific psychology.
- B: In order to understand actions, we must try to understand the desires motivating these actions.
- C: Behavior can be explained only in terms of the conscious interpretations that an individual makes of his or her experiences.
- D: A science of psychology can study only what is observable by others.

28. John Garcia paired a taste (the CS) with feelings of nausea (the UCS) in one group of rats (the nausea group). In a second group of rats (the pain group), he paired a taste (the CS) with pain (the UCS). According to what you learned from the discussion of conditioned taste aversion, which group should learn best and why should they learn best?

A: the nausea group because rats easily perceive nausea whereas they don't easily perceive pain

B: the pain group because pain is a stimulus that is much harder to ignore than is nausea

C: the nausea group because rats are biologically programmed to easily learn an association between a taste and nausea

D: the pain group because nausea and pain are very similar stimuli

29. What is one likely explanation for the fact that animals are prepared to learn certain associations more easily than others?

A: Animals which, in ancestral generations, easily learned certain associations tended to survive longer and passed the ability to learn this association on to later generations.

B: Animals pass their learned experiences on to their offspring.

C: The culture in which we develop helps us to learn certain associations more easily than others.

D: Some individuals are better at learning some associations than are others.

30. The concept of "biological preparedness" refers to

A: a biological predisposition for members of a particular species to develop certain kinds of associations during conditioning.

B: the anticipation that is activated when an animal experiences a CS that previously has been associated with a UCS.

C: the evolutionary history of a species.

D: an animal's constant awareness of possible dangers in its environment.

31. I taught my dog to fear cats by shocking him whenever he saw a cat. After doing this, whenever he saw a cat, he would cower and whimper. Then, I locked him in a room with a cat for two days without shocking him. His fear of cats extinguished completely. That was four weeks ago. Today, he happened to see a cat and began to whimper and whine. What has happened?

A: The extinction procedure was one of total immersion which is known to result in only partial extinction.

B: He has shown spontaneous recovery of the fear response.

C: Operant conditioning is now influencing his responses to the cat.

D: He has generalized his fear of cats to new situations.

32. According to the principle of reinforcement, if I say "good boy" in a happy voice each time my dog lifts his paw after commanding him to "shake hands," my dog is likely to
- A: increase his responding to this command.
 - B: experience a satisfying feeling.
 - C: not change his behavior because I am not giving him a primary reinforcer.
 - D: extinguish all other responses to this command.
33. A stimulus is taken away after an animal performs an operant response. This consequence leads to an increase in the frequency of that response in the future. The consequence is a(n)
- A: conditioned stimulus.
 - C: positive reinforcement.
 - B: negative reinforcement.
 - D: punishment.
34. The reappearance of an extinguished CR after a period of time has elapsed is known as
- A: spontaneous recovery.
 - C: stimulus generalization.
 - B: simultaneous conditioning.
 - D: operant conditioning.
35. Many people become sexually excited by inanimate objects (for example, underwear) or certain sensory stimuli (for example, cologne). In extreme cases, such reactions may become a fetish in which a person can not become aroused by anything except these stimuli. According to classical conditioning theory, how could such nonsexual stimuli create sexual arousal in a person?
- A: They are UCSs that have been paired with a CS at some point.
 - B: They are UCRs to a UCS.
 - C: They are CSs that have been paired with a UCS at some point.
 - D: They are CRs to a CS.
36. A mother pays little attention to her child until she begins whining. At this point the mother usually will turn toward the child and ask her what is wrong with her. No one can seem to understand why the child is always whining. How would you explain the child's whining to the mother?
- A: The child has inherited an irritable temperament.
 - B: The child has been classically conditioned to whine by having the whining (the CS) paired with attention (the UCS).
 - C: The child has been operantly conditioned to whine because the whining (the operant response) is the only action that seems to get the mother's attention (the reinforcement).
 - D: all the above

37. Behaviorists believed that the results of their studies with rats and pigeons could say something important about learning in any species because they assumed that

A: natural selection caused the evolution of specific learning abilities in each species.

B: any biological differences that might exist among species did not involve differences in learning.

C: learning in all animals was caused by complex mental events.

D: learning was of minor importance for the development of most behaviors in a species.

38. What was a major criticism of the technique of introspection made during the early part of the twentieth century?

A: The data produced by introspection are too subjective.

B: Because there is no conscious mind, introspection produces data that are illusory.

C: We can not introspect on a mind that is constantly changing.

D: We can not introspect on a mind that is made up of mental elements.

39. It seems that objects and events to which we easily learn a phobic avoidance

A: may have been, for at least thousands of generations, a genuine threat to our survival.

B: typically were never a threat to our survival.

C: are potentially, in the future, a great threat to our survival although they have not been so in the past or the present.

D: none of the above

40. What was it about the definition of psychology proposed by early behaviorists that made it such a radical change from previous definitions of psychology?

A: It required that psychologists should give up their attempts to understand consciousness.

B: It implied that psychology as a science was not possible.

C: It supported Freud's attempts to bring into psychological theorizing the concepts of instinct and libido.

D: It implied that we should be studying unconscious aspects of the mind.

41. Natural selection of a particular characteristic that lasts for many generations is MOST likely to produce

A: an adaptation.

C: a higher species.

B: a gene.

D: mental continuity.

42. Let's say that we have classically conditioned a rabbit to blink its eyes (CR) in response to a tone (CS) by pairing the tone with a current of air (UCS) that produces an involuntary blink of the eyes (UCR). If we now present the tone alone for a number of trials we would expect that
- A: the eye blink to the current of air will diminish and disappear eventually.
 - B: the eye blink to the tone will diminish and disappear eventually.
 - C: the rabbit will not be able to blink its eyes for a short period of time after the experiment is completed.
 - D: the rabbit will have learned not to blink its eyes.
43. When I stand in front of my dog and say to him the word "shake," he raises his paw and gets a treat or praise. In this example, what would be the reinforcement?
- A: the word "shake"
 - B: raising his paw
 - C: getting a treat or praise
 - D: my standing in front of my dog
44. Stimulus generalization occurs when
- A: new stimuli move from the sensory realm to the perceptual realm.
 - B: hormones associated with various drives are released.
 - C: new stimuli are similar to the original CS.
 - D: all the above
45. In what way was Charles Darwin's work NOT important for the emergence of psychology in the late-nineteenth century?
- A: He argued that the mind is a reflection of physical processes in the brain.
 - B: He believed that the human mind has evolved from the minds of prehuman ancestors.
 - C: His theory implied that the human mind could be studied scientifically.
 - D: He founded the first psychology laboratory at Oxford University.
46. The emotional responses in phobias are MOST likely learned through
- A: classical conditioning.
 - B: operant conditioning.
 - C: observational learning.
 - D: All the above are equally likely.
47. In general, operant conditioning is best understood as a form of learning in which
- A: stimuli have consequences.
 - B: consequences have responses.
 - C: negative stimuli are associated with positive stimuli
 - D: responses are controlled by their consequences.
48. The stage in which an animal first develops a conditioned response is called
- A: the contiguity phase.
 - B: spontaneous recovery.
 - C: acquisition.
 - D: extinction.

49. What are the two factors in the two-factor model?
- A: the classical conditioning of a fear to a stimulus and the operant conditioning of avoidance of that stimulus
 - B: the classical conditioning of avoidance of a stimulus and the operant conditioning of a fear to that stimulus
 - C: the classical conditioning of a fear to a stimulus and the classical conditioning of avoidance of that stimulus
 - D: the operant conditioning of a fear to a stimulus and the operant conditioning of avoidance of that stimulus
50. Which of the following is NOT one of the factors necessary for the evolution of an adaptation?
- A: biological inheritance of the characteristic
 - B: individual differences in the characteristic
 - C: natural selection of the characteristic
 - D: a learned basis for the characteristic

CHAPTER 4

THE COGNITIVE APPROACH TO PSYCHOLOGY: REMEMBERING AND FORGETTING

In the last chapter, I began to discuss some of the ultimate causes of behavior by introducing you to the approaches of behaviorism and evolutionary psychology. As you learned there, behaviorists assumed that all behaviors are caused by environmental events instead of mental events. It probably already has occurred to you, however, that it is very difficult to explain all or even most behaviors by pointing only to environmental causes. In fact, all you have to do is think about what is causing you to read these words right now and you will quickly realize that your own desires are essential mental causes of this behavior. Furthermore, it is almost impossible to explain your ability to answer test questions about these words unless we assume that certain mental events—memories—exist and are having causal effects on your test-taking behavior. The limitations of the behavioral approach became apparent very quickly once psychologists began to consider complex human behaviors. In this chapter, I will begin a discussion of the critical reaction to behaviorism by discussing an approach—called the “cognitive” or “information-processing” approach—that emerged around 1960 to deal with the important limitations of behaviorism. This newer approach brought the study of the mind back into experimental psychology. Since the emergence of the cognitive approach, its main topic of research has been memory. In this chapter, I will describe what cognitive psychologists have discovered about human memory.

It may help you to better understand the ideas in this chapter if we begin with an example of a person with a severe disturbance of memory. The neurologist, Oliver Sacks (1987), described the case of a man whom he called “Jimmie G.” Jimmie, when first interviewed by Sacks, was a 49-year-old man who, although talkative, also seemed confused and disoriented at times. He could recall many details about his boyhood town and the people whom he had known there, as well as about the time he spent in the navy during World War II as a radio operator on a submarine. As Sacks described it, Jimmie spoke with fondness and emotion as he recalled these intimate memories in great detail:

With recalling, reliving, Jimmie was full of animation; he did not seem to be speaking of the past but of the present, and I was very struck by the change of tense in his recollections as he passed from his school days to his days in the navy. He had been using the past tense, but now used the present—and (it seemed to me) not just in the formal or fictitious present tense of recall, but the actual present tense of immediate experience. (p. 24)

When Sacks asked Jimmie what year it was, he answered, “1945.” Furthermore, Jimmie believed that he was still only 19 years old, although he actually was about thirty years older than this:

Looking at the grey-haired man before me, I had an impulse for which I have never forgiven myself.... ‘Here,’ I said, and thrust a mirror toward him. ‘Look in the mirror and tell me what you see. Is that a nineteen-year-old looking out from the mirror?’ He suddenly turned ashen and gripped the sides of the chair. ‘Jesus Christ,’ he whispered. ‘Christ, what’s going on? What happened to me? Is this a nightmare? Am I crazy? Is this a joke?’ — and he became frantic, panicked. (p. 25)

Distressed by his reaction, Sacks distracted Jimmie by bringing him to a window. Then, taking the mirror with him, Sacks quickly left the room. Two minutes later, he returned. It seemed as if Jimmie were meeting him for the first time in his life:

‘Hiya, Doc!’ he said. ‘Nice morning! You want to talk to me—do I take this chair here?’ There was no sign of recognition on his frank, open face. ‘Haven’t we met before, Mr. G.?’ I asked casually. ‘No, I can’t say we have. Quite a beard you got there. I wouldn’t forget *you*, Doc!’ (p. 25)

How can we understand what is going on here? It seems certain that Jimmie was not suffering from **dementia** (which is a **disorder characterized by several intellectual impairments**). In fact, he performed well on intelligence tests and could solve complex puzzles and problems. His major difficulty, then, did not involve his overall intelligence, but only one part of his intellectual functioning—his memory. Jimmie had two problems with his memory: (a) his memory for new facts was impaired (he could not remember anything new for more than about 30 to 60 seconds); (b) his memory for many older facts was impaired (he could not remember anything that had happened since about 1945). For Jimmie, the “present” was forever the time just after World War II ended (in fact, he believed that Harry Truman was still president of the United States). It is obvious that Jimmie was suffering from a very severe **amnesia**, which I defined in Chapter 2 as a **loss of memory greater than can be explained by normal, everyday forgetting**. Although almost everyone forgets many (probably most) things that happen to them over the course of 30 years, they typically remember the passing of the years and are able to recall many events that have occurred to them during that time. None of this, however, was true for Jimmie.

In this chapter, we will try to come to an understanding of cases such as Jimmie’s by learning about various processes of memory. In Jimmie’s case, damage to his brain caused by

long-term abuse of alcohol and a vitamin deficiency led to his memory problems. The memory problems of people such as Jimmie have helped us to discover where in the brain normal processes of memory occur and why these sometimes fail even in normal people. We will see that we can understand his problems by thinking of memory as being made up of several separate but interacting components. Jimmie had a severe impairment in one part of this memory system. Normal everyday forgetting also can be understood by using the same model of memory, but different problems cause forgetting in everyday life. Before we talk about the components of the memory system, however, it will help us to look briefly at the major methods used to study memory.

Methods for the Study of Memory

Although the approaches that have been used to study memory have changed over the past 100 years, the major methods used to study memory have tended to remain very similar. These methods fall into three general categories:

(1) *Memory Tasks*. In research on memory, two types of memory task have been used. The first involves the use of very simple lists of items to be remembered, such as words or numbers, that later are retrieved from memory. A good example is seen in the early experiments of Hermann Ebbinghaus (1850-1909) on the memorization of nonsense syllables. In the late-nineteenth century, Ebbinghaus studied memory processes by memorizing long lists of **nonsense syllables**, which are “words” made up of a consonant, followed by a vowel, followed by another consonant (such as *nim*)—syllables that have no meaning (and, hence, are nonsense). Because Ebbinghaus wanted to see how quickly we forget *new* information, he believed that he could not use items that were meaningful: meaningful items use information that we already have learned at some point in the past. Perhaps not surprisingly, Ebbinghaus found that we tend to forget lists of nonsense syllables very rapidly. Forgetting probably would not have been as rapid if the items used by Ebbinghaus had been meaningful ones. As we will see later, making material to be memorized more meaningful increases the duration of those memories.

The second type of memory task involves the use of a series of items organized into a meaningful whole, such as the words making up a story. The first version of such a task was developed by Frederick Bartlett during the 1930s. Bartlett gave his subjects a story to read, and then later, at various intervals, asked them to retell it. Upon retelling the story, the subjects usually remembered it inaccurately. In general, people retell stories in particular ways—the retelling tends to be shorter, more unified, and tends to be influenced by the person’s own viewpoint on the topic of the story. Furthermore, stories can arouse a person’s emotions, and some studies have shown

that a person's emotional state is important for forming memories and later remembering them. The influence of a person's emotional state on memory is something that the more neutral tasks of Ebbinghaus and others could not have discovered. Of course, you probably already knew about the importance of emotions for memory. For example, what is your first memory? I bet that your first memory is of an experience that was very emotional—either you were very happy or very upset. When we feel emotional about an event, we tend to remember it better. We also tend to remember details about the event that are consistent with the emotion. We will learn more about such effects on memory later in this chapter.

(2) *Amnesia*. It often has been reported that people who experience certain kinds of physical or psychological trauma generally have greater difficulty than they should remembering important episodes in their lives. By linking the type of memory problem to the type of trauma, researchers have learned a great deal about memory functioning. From cases such as Jimmie's, we now know that **physical trauma** (which is **damage caused by physical insults to the body**, such as being struck in the head or being infected by a virus) that involves particular areas of the brain can cause severe problems with memory. For example, during a severe viral infection, a musician named Clive Wearing lost parts of his limbic system and frontal lobes in each hemisphere of his brain. At present, he is like Jimmie in that he is unable to remember anything for more than about 30 seconds, and he can remember little in his life beyond early childhood. As we learned in Chapter 2, by studying such people, researchers have been able to identify particular structures (such as the hippocampus) associated with particular aspects of memory formation and retrieval. In addition to physical trauma, many psychotherapists have claimed that **psychological trauma**, a phrase that refers to **the cognitive and emotional upheaval that may follow a highly distressing experience**, can cause the loss of memories, especially the memory of the distressing experience. For example, students sometimes come to class on the day of a test and are very surprised to see me handing it out: they had forgotten about the test. It might be that their severe test anxiety caused them to push the memory for the test out of awareness, thereby relieving their anxiety. By studying individuals who have forgotten important events that upset them, we may be able to identify psychological processes important for memory formation and retrieval as well as emotional reasons for our tendency to sometimes forget important experiences or facts. As we will see later in this chapter, psychologists disagree about whether we can forget in this way.

(3) *Everyday forgetting*. The study of normal forgetting also has helped us to learn much about memory functioning. For example, all of us have had the experience of having a word on "the tip of the tongue." When this happens, we feel like we are just about to recall a word (perhaps someone's name), but we are unable to do so no matter how hard we try. When this has happened

to you, you probably could recall the first letter, and maybe even the number of syllables in the word, but you were unable to come up with the word itself (at least for a little while). Why does this sometimes happen to us? The fact that we often are able to guess correctly several aspects of the word implies that it must be “somewhere” in our memory. The failure to remember the word, therefore, must involve a problem in pulling it out of memory. Another common example is being unable to remember where you have parked your car. You might find yourself walking up and down the aisles of the parking lot. As soon as you catch sight of your car, you suddenly remember, “Oh yeah, that’s where I parked it.” Again, the fact that you remembered where you had parked your car when you finally saw it means that the memory was “somewhere” in your mind, but you were not able to bring it into awareness. Memory researchers try to understand why such forgetting occurs in order to understand better how memories are formed, maintained in the mind, and then later remembered.

As may now be obvious to you, much of the research on memory focuses on the causes of forgetting. In fact, it is not likely that we would be interested in this topic if we did not so often forget important past experiences. For example, why do most of us remember nothing from before the age of about four years (a phenomenon referred to as **infantile amnesia**)? Why do most of us have such a difficult time remembering many important incidents from our later childhoods (for example, do you remember your eighth birthday)? Why do we remember a particular event so differently from the remembrances of a friend or relative who also experienced that event? Alternatively, why do we sometimes suddenly remember an event that we had not thought about in years—an event we apparently had forgotten? The study of memory formation and remembering is intimately intertwined with the study of forgetting.

SQ 4-1: Discuss the three major methods for studying memory. In your answer, describe what Hermann Ebbinghaus did; also discuss the two kinds of trauma that are thought to cause amnesia. What is infantile amnesia?

Cognitive (Information-Processing) Approach

Whereas the basic concepts and principles of learning have been constructed by behaviorists, the basic concepts and principles of memory formation and retrieval have been constructed by those who are called “cognitive psychologists.” For behaviorists, the basic units of learning were “environmental events” and “behaviors.” For those who use the **cognitive approach**, the basic unit of memory is “information.” Information is thought of as being “processed” (worked on) in different parts of the mind, then “transferred” (passed on) to other

Automatic Versus Controlled Processes

Each of us processes information about the world every moment of our lives, even when we are deeply asleep (for example, while sleepwalking). Most of this information is processed very quickly, with no effort made to examine it in any depth. For example, it usually requires little effort on our part to process the sensory information required for the performance of a **habit** (which I defined in Chapter 2 as **a set of learned automatic movements that are performed rapidly**). A good illustration of a set of habitual behaviors is seen with driving. If you have been driving for even a short time, it takes little mental effort, say, to start your car and back out of a parking space. On the other hand, some of the sensory information we receive during the day is attended to closely and processed with much effort. For example, we usually exert a great deal of effort when processing information that is novel (new) to us. A good illustration of this is what you are doing right now: you are working hard to process in depth these words because they are novel pieces of information. In order to read words in a textbook, you must use your **selective attention**, which may be defined as a **mental process that involves the focusing of awareness on a narrowed range of stimuli**. The more that we attend to information, the more mental effort we feel we are exerting.

Thus, throughout most of the day, we are processing a large amount of information, but typically only a very small part of this involves the use of selective attention. This is because we can attend to only a few items of information at any given moment. For example, try reading this textbook and listening to a conversation at the same time. You will find that you can do one or the other, but not both at the same time. Nevertheless, even while you are selectively attending to these words, you still are processing the sensory information from your surroundings; but this information processing is occurring outside of your awareness. How do I know this? Well, let's look at a simple example. If you are alone and someone walks into the room while you are attending to these words, you probably will quickly start attending to the other person. In order for you to become aware of the fact that someone entered the room, you must first have processed this information outside of your awareness and then realized that something important had happened. At this point, you shifted your attention to the important event. Since selective attention is **the mental process that brings information into conscious awareness**, and since we are aware of only a very small part of our world at any one time, **we must at all times be very briefly processing a large amount of sensory information outside of awareness**. You still might be having a hard time believing this claim, so I will present one more example. I will bet that most of you have had something like the following experience when you were talking with someone at a party or other social gathering. Because you were giving this person all of your

attention, you were unaware of the other conversations around you. Suddenly, someone behind you spoke your name while conversing with others and they all begin to laugh. At this point, you probably turned around and asked them what they were talking about (by the way, this is referred to in psychology as the **cocktail-party phenomenon**). That is, even though you were not attending to the conversation behind you, you still must have been processing the information in that conversation because you knew that they had mentioned your name and that they then had begun laughing. When the information in the other conversation became important, you selectively attended to it, thereby bringing it into awareness.

In processing information from your surroundings without attending to it, you are using a set of mental processes referred to collectively as “automatic processes.” **Automatic processes** are a set of mental processes that (a) **are outside of conscious awareness**, (b) **occur rapidly**, and (c) **require a minimal amount of mental effort** (because they do not involve our attention). We use automatic processes whenever one of two alternatives is true: (1) when the mental processes are *reflexive* because our nervous systems have evolved in this way (such as recognizing that a stove you have just touched is hot); or (2) when the mental processes have become *habitual* because of prior learning (such as recognizing your own name or driving a car through traffic). Most of the information we process in this manner is unimportant and, thus, remains outside of our awareness. Because we pay no attention to it, this information rapidly dissipates (disappears). In other words, **we forget almost everything that has ever happened to us because the information never reaches awareness**. We attend to sensory information only when it is relatively novel and/or important to us in some way. Once we selectively attend to information, another set of mental processes—called “controlled processes”—becomes activated. **Controlled processes** are a set of mental processes (a) **of which we are aware**, (b) **that occur slowly**, and (c) **that require a large amount of mental effort** (because they involve selective attention). For example, although you may use automatic processes now when you drive a car, when you first were learning to drive, you had to use your selective attention to stay in the proper lane, to avoid other cars, and to do all the other things required to drive a car safely. In other words, *learning* to drive required the use of controlled mental processes because the task was novel at that time. Only later, after much practice, did these actions become so habitual that you then were able to process the information automatically. Many actions require the use of controlled processes when we are first learning them; but later, after much practice, our automatic processes take over and we no longer have to attend to what we are doing.

SQ 4-3: Distinguish between automatic and controlled processes. In your answer, list the major characteristics of each type of mental processing and give at least one example of each.

Levels of Awareness

The concept of selective attention is important not only for distinguishing automatic from controlled mental processes, but also for distinguishing different types of **mental content** (thoughts, emotions, perceptions, images, and anything else that can be thought of as existing in our minds). In fact, with regard to selective attention, the mind can be thought of as consisting of three “levels” of mental content—the conscious, preconscious, and unconscious levels. (1) The **conscious** level is that level of the mind **containing mental content to which the individual, at present, is selectively attending**. For example, you are aware of these words and perhaps one or two other things that are going on right now (such as sounds coming from the next room or your present emotions). *Controlled mental processes work on mental content at the conscious level.* (2) The **preconscious** level is that level of the mind **containing mental content to which the individual could easily attend, but is not doing so at present**. For example, your memory of what you had for breakfast this morning is probably at the preconscious level. When your attention shifts to this memory, you are able to recall what food you ate. Another example is the set of tactile perceptions involving your left big toe which, until you selectively attend to them, are at the preconscious level. Thus, although we are unaware of information at the preconscious level, it is easily brought to the conscious level. *Automatic mental processes work on mental content at the preconscious level.* For example, the cocktail-party phenomenon can be explained as involving sensations that are processed at the preconscious level. (3) The **unconscious** level is that level of the mind **containing mental content to which it is very difficult or impossible for the individual to selectively attend**. This is the level at which we say that we have “forgotten” information that we believe we still hold somewhere in our minds. For example, when you have a word on the “tip of your tongue,” you feel as if the word is somewhere in your mind, but you simply cannot become aware of the word itself. Until we are able to bring it to the conscious level (if we ever are able to do this), the memory for the word is at the unconscious level. *Automatic mental processes work on mental content at the unconscious level.* For example, without apparently thinking about it, a name that had been on the tip of your tongue may suddenly “pop” into your awareness several minutes later, seemingly out of nowhere. The relevant information must have been automatically processed at the unconscious level during those several minutes.

SQ 4-4: List and define the three major levels of awareness. In your answer, describe the role of selective attention in distinguishing among the levels. Provide evidence for the claim that we are always processing information at the preconscious level but are often unaware of doing this.

I have now sketched out some of the assumptions and concepts of the cognitive approach to memory. In the next section, I will begin an attempt to tie these ideas together by describing in more detail how information processing occurs in memory.

Encoding, Storing, and Retrieving Information in Memory

Researchers who use the information-processing approach attempt to describe the fundamental mental processes that allow us to perform various tasks. In trying to understand how we perform tasks involving memory, three fundamental processes—encoding, storing, and retrieving—have been described. **Encoding** occurs when **information is translated into a form that can be processed mentally**. In other words, encoding is “a special way of paying attention to ongoing events” so that this information can be placed into the memory system (Schacter, 1996, p. 42). It is similar to a librarian classifying a new book before placing it on a shelf in the library. Just as the librarian encodes the book so that he/she can write a number on its binding and put it on the shelf, we encode sensory information (we “label” it in some way) before placing it in memory. For example, let’s describe how you might encode the following list:

dog car dance job mouse book can plant lamp sun

What is the *first* thing you would do in trying to memorize this list? You probably are thinking to yourself something like, “I read it!” But what does this involve? It *might* involve something like the following. In order to read the list, you first have to detect the visual information with receptors in your eyes. This visual information is sent to various areas of the cerebral cortex where it is processed first into visual units (the letters), then into sounds, and finally into meaningful phrases (definitions). Each kind of translation in this set of processes (visual to auditory to definitional) involves a different kind of encoding.

(1) *Structural Encoding*. This is a translation that involves processing the physical structure of the information. In this case, the physical structure involves characteristics of the visual input such as the number of letters in the word, whether the word was written in upper- or lower-case letters, etc.

(2) *Phonemic Encoding*. This is a translation that involves processing the sound of the information. After completing this kind of encoding, we would be able to say that the words rhyme with *bog*, *bar*, *chance*, etc.

(3) *Semantic Encoding*. This is a translation that involves processing the meaning of the information. After completing this kind of encoding, we would be able to say that the words mean the same thing as “canine,” “automobile,” “rhythmic movement of the body,” etc.

As you can see, there are several ways to encode word lists. This means that we may encode the same information in different ways at different times. This would be like a librarian taking the book back off the shelf and assigning a new number to it according to a different classification system. When we have **encoded information in one of these (or other) ways**, we say that we have formed a **memory code** for that information. Furthermore, each kind of memory code could take many forms. For example, when semantically encoding, you might form a visual image of the thing to which the word is referring, or think of a dictionary definition, or create a short story using the words, etcetera.

Once new information is encoded, it can be stored. **Storage** occurs when **encoded information is maintained (held) in memory for some period of time**. The mental “location” in which information is maintained is referred to as a **memory store**. Memory itself often is described in terms of two interacting memory subsystems, each with its own memory store: the **short-term** store holds information for less than about 20 seconds whereas the **long-term** store holds information for a longer amount of time (perhaps even for the rest of a person’s life). Further encoding of information can be performed after it is placed in the short-term store. Whether or not further encoding occurs in the long-term store is not known, although some therapists, called psychoanalysts, believe that it does (I will talk about this later in the chapter).

Once encoded information is stored, we must be able to remember it if the memory is to have any practical value. **Retrieval** occurs when **encoded information is recovered from a memory store**. If information is not encoded (perhaps you did not pay attention to the incoming information), or if encoded information is not stored (for example, Jimmie apparently never placed into long-term storage the information he encoded), then it is easy to understand why a memory cannot be retrieved: no memory exists. Nevertheless, even stored information may be difficult or impossible to retrieve at times (we then say that it is at the unconscious level). The tip-of-the-tongue phenomenon is one example of this. As another example, we can look at the times when you knew that you had studied (encoded and stored) a certain piece of information, but you

couldn't retrieve it when you were taking a test on this material. **Forgetting** occurs when **information that has been encoded and stored at an earlier time cannot be retrieved** (at the present time, at least). The forgetting of information may occur because of problems in any one of the three basic mental processes of memory. We will talk more about some of these problems later in the chapter. Before we can do this, you first need to understand more about the basic characteristics of short-term and long-term memory.

SQ 4-5: Describe the three major mental processes of the memory system. In your answer, define the three kinds of encoding of verbal information. What is a memory code? What is a memory store?

The Standard Model of Memory

When people are asked to memorize a long list of words or numbers, they often find that they have an easier time remembering some of the items compared to others. For example, let's say that I ask you to memorize the following word list by reading it out loud to you:

hive ice lake oar year care yarn air axe rod bear week door

As soon as I'm done reading the list, you quickly write down all the words you can remember. It is most likely that **the position of an item in the list will affect your memory for that item**, which is a phenomenon known as the **serial-position effect**. In general, people tend to remember best the first few items in a list as well as the last item or two; but they tend to forget the middle items. In other words, there are two serial-position effects: (a) the **primacy effect**, which is defined as **the tendency to remember best the first items in a list**; (b) the **recency effect**, which is defined as **the tendency to remember best the last (most recent) items in a list**.

Can you think of a good explanation for the primacy and recency effects? Cognitive psychologists have explained the primacy and recency effects by hypothesizing that they represent the influence of two different kinds of memory. The most popular way of thinking about memory in this way was developed by Atkinson and Shiffrin (1968). They constructed a view of memory called the **standard model of memory** that conceives of memory as being **a system subdivided into two major parts (or subsystems): short-term memory and long-term memory**. In this model, **short-term memory** is the part that holds on to **a very small amount of information for up to about twenty seconds** (unless the person repeats the information

over and over, a strategy that allows the information to be held as long as the person keeps doing this). On the other hand, **long-term memory** is the part that holds on to **a very large amount of information for days, weeks, months, or years**. The first items in a word list that one is trying to memorize are often repeated more often than other items in the list. These often-repeated words are more likely to be placed into long-term memory, thereby giving rise to the primacy effect. On the other hand, the last item in a word list is likely to still be in short-term memory, thereby giving rise to the recency effect. Items in the middle of the list, because they are not likely to be in either long-term or short-term memory, are often forgotten by most people.

Atkinson and Shiffrin also proposed the existence of what they referred to as “sensory registers.” They thought of the sensory registers as being parts of memory (one for each of the five senses) that hold on to our simple perceptions of the world for a very brief time (from a fraction of a second to several seconds, depending upon the particular sense). The flow of information through these components of the memory system is illustrated in Figure 4.1. According to the standard model, there are three basic steps to the flow of information through the memory system: (a) a large amount of information enters the sensory registers; (b) a small amount of this information is attended to and thereby transferred to short-term memory; (c) a small amount of the short-term information is encoded well enough to enter long-term memory where it is stored indefinitely. After this point, short-term memory will call up the information stored in long-term memory when it needs this information to deal with a current situation. Since the sensory registers typically do not take part in any complex processing of information, we will not discuss them further. Instead, I would like to focus on short-term and long-term memory.

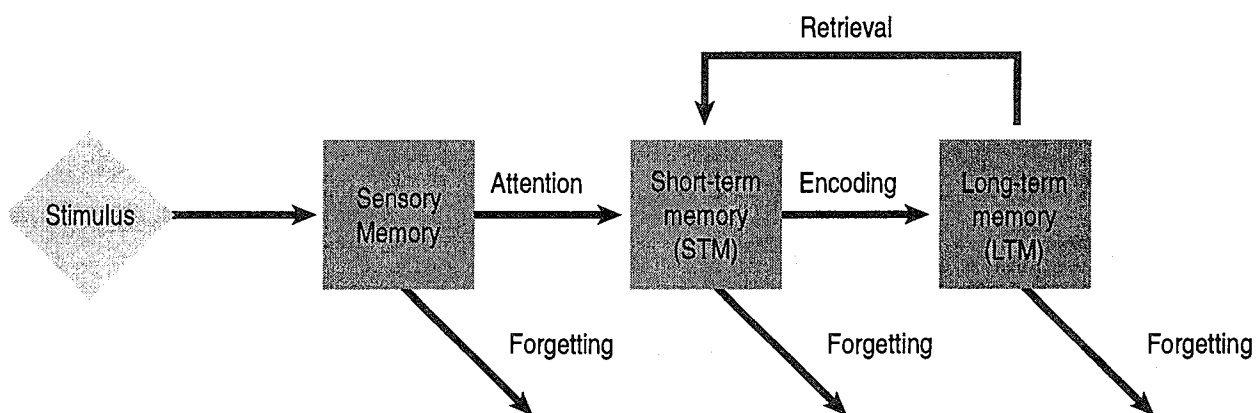


Figure 4.1 The standard model of memory conceives of memory as consisting of three subsystems in which information flows from the sensory registers to the short-term store to the long-term store (from Kassir, 2001; p. 212)

Three characteristics are most important for distinguishing short-term from long-term memory: (1) **duration**—the average length of time that information is stored in the memory subsystem; (2) **capacity**—the maximum amount of information that can be stored at any one time in the memory subsystem; (3) **encoding**—the manner in which information tends to be processed for storage in the memory subsystem. I will discuss each of these characteristics in the next several sections.

Major Characteristics of Short-term Memory

In short-term memory, a small amount of information is held for a brief period of time. This information is used to direct our actions. This information also may undergo a great deal of encoding as we work on it in short-term memory—a process that tends to prolong its retention in memory. Let's begin to describe short-term memory by considering the three characteristics of duration, capacity, and encoding.

(1) *Duration*. Henry M. is a famous name in the history of memory research. In the early 1950s, he had portions of his limbic system and cerebral cortex removed (including the hippocampus, the amygdala and the perirhinal cortex on each side of his brain) as a treatment for his epilepsy. Sadly, after the operation, he developed profound memory problems similar to those of Jimmie described at the beginning of this chapter:

From H[enry].M.'s moment in surgery onward, every conversation for him was without predecessors, each face vague and new. Names no longer rose to the surface, neither histories nor endearing moments came any more. Reassurances of welcome had to be sought every moment from each look in every pair of eyes [because he could not remember anyone he had met since the operation].... When Dr. Scoville [the surgeon who performed the operation] came home and told his wife of the surgery, she said that he told her in the form of a joke: Guess what, I tried to cut out the epilepsy of a patient, but took his memory instead! (Hilts, 1995; p. 100)

Although Henry still was able to perceive the world, to remember events for brief periods of time, and to remember many episodes of his life from before the surgery, he apparently had lost the ability to form new long-term memories. Since his surgery, Henry's memory has been tested in many different ways. Much has been learned from him about the organization and characteristics of memory. Because Henry's short-term memory subsystem is intact, we should be able directly to

measure the duration of a short-term memory by seeing how long he can hold onto a new memory. The following anecdote may give us some insight into this question about duration:

In one test, for example, he successfully kept the number 584 in mind for 15 minutes, and when asked how he did this, he replied, “It’s easy. You just remember 8. You see, 5, 8, 4 add to 17. You remember 8; subtract from 17 and it leaves 9. Divide 9 by half and you get 5 and 4, and there you are—584. Easy.” Yet, a few minutes later, after his attention had shifted to something else, he could not remember the number or the mnemonic scheme [a strategy that helps a person remember information] he had used, or even that he had been given a number to remember.

It might seem, on a superficial reading of this passage, that short-term memories can be retained for about 15 minutes. However, Henry was using a mental process that increased the amount of time that he was able to hold the memory in the short-term store. This mental process is called **maintenance rehearsal**. With maintenance rehearsal, a person **repeats the material over and over again**. You do this often during your day when you are trying to remember something for a short period of time (for example, a phone number that someone has just read to you). We can prevent someone from using maintenance rehearsal by first giving them some material to remember, such as a word list, and then immediately giving them a different task to perform (perhaps counting backward from 100 by 3’s). After a short period of time (say, 5 seconds), we ask them to recall the word list. In this way, we can determine how much of the original material they still retain in their short-term store. By varying the amount of time that we wait before asking them to recall the material, we can get an estimate of how quickly a memory will be lost from the short-term memory store. It seems that we begin forgetting from short-term memory within the first few seconds after receiving new information (see Figure 4.2). By about 15 seconds after receiving the information, the memory virtually is gone from the short-term store. With maintenance rehearsal, we can increase the amount of time a memory is held. Nevertheless, if we stop repeating the information, the memory will disappear very rapidly. Therefore, if our memory system contained only the short-term store and the mental process of maintenance rehearsal, our memories would be virtually useless for most purposes.

(2) *Capacity*. The amount of information that can be held in the short-term store at any one time is easily measured. For example, we can present word lists with varying numbers of words and determine at what point people start to have trouble:

(3 items)	<i>grand</i>	<i>bear</i>	<i>top</i>								
(4 items)	<i>kite</i>	<i>hive</i>	<i>core</i>	<i>wean</i>							
(5 items)	<i>rod</i>	<i>ice</i>	<i>week</i>	<i>gate</i>	<i>pin</i>						
(6 items)	<i>ear</i>	<i>axe</i>	<i>zoo</i>	<i>lake</i>	<i>joke</i>	<i>vase</i>					
(7 items)	<i>fine</i>	<i>dime</i>	<i>cake</i>	<i>nice</i>	<i>moat</i>	<i>shell</i>	<i>oar</i>				
(8 items)	<i>lint</i>	<i>pine</i>	<i>year</i>	<i>urn</i>	<i>bore</i>	<i>zinc</i>	<i>air</i>	<i>mine</i>			
(9 items)	<i>sea</i>	<i>time</i>	<i>oak</i>	<i>earn</i>	<i>wine</i>	<i>care</i>	<i>jam</i>	<i>like</i>	<i>born</i>		
(10 items)	<i>vine</i>	<i>nook</i>	<i>rare</i>	<i>yarn</i>	<i>lawn</i>	<i>bone</i>	<i>hook</i>	<i>wear</i>	<i>grain</i>	<i>door</i>	

Many people who hear the list of eight words probably would have some trouble remembering all of the words, but most of those who heard the lists containing fewer words probably would have little or no trouble remembering all of the words. Lists of nine words or greater in length would

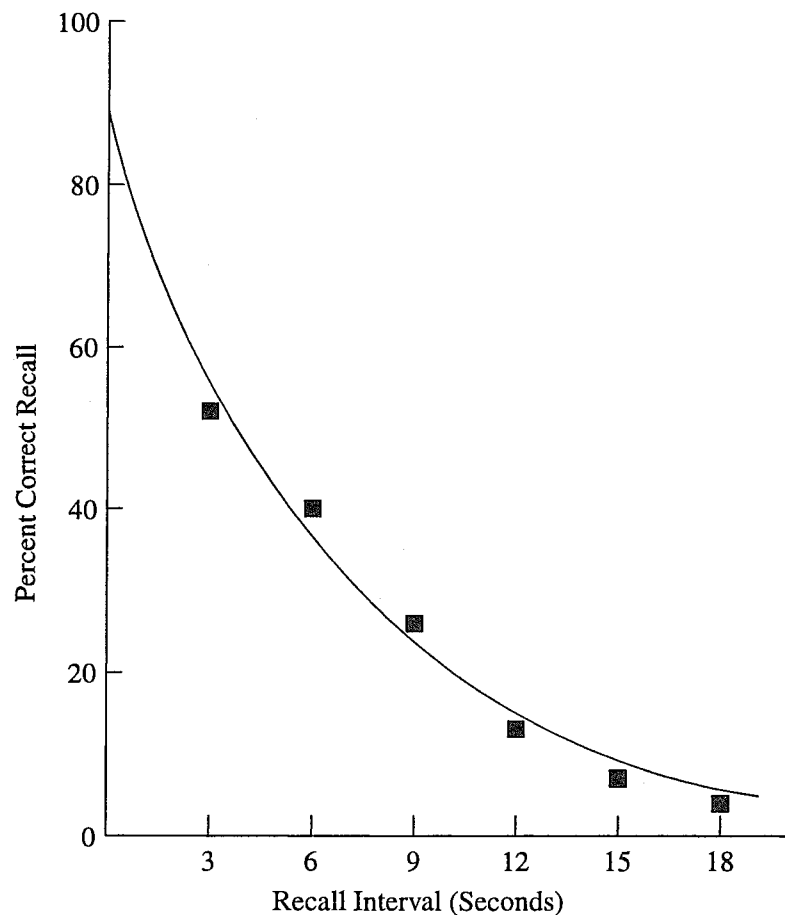


Figure 4.2 The duration of unrehearsed information in the short-term store (from Fernald, 1997; p. 237)

give most people a great deal of trouble. On average, people are able to hold about seven items of information in their short-term store at any given time, give or take a couple items (this may be one reason why phone numbers are seven digits in length).

(3) *Encoding*. As was stated above, encoding involves various ways of processing (manipulating and transforming) information in order to mentally label it. How we encode depends on the nature of the material to be remembered and what we are trying to do with this information. In looking at encoding in short-term memory, most studies have used rapidly presented verbal material (such as a word list or a list of nonsense syllables) that people then immediately recalled. Under these conditions, people tend to use mostly maintenance rehearsal to memorize the material. Let's say that we have presented the following list of words to a group of people:

cat run suit junk frame clothes dress stone age log boat watch

We probably will find that, although most people will be able to recall several of these words, they also may remember incorrectly some words that were not presented. These misremembered words can tell us what kind of encoding a person used. For example, at the extreme, someone might incorrectly remember hearing the following 12 words:

bat bun fruit bunk lame droves mess bone rage bog goat botch

It is very improbable that any one person would incorrectly remember all these words; but an individual might make one or several of these mistakes. Now, in what way are these misremembered words similar to the original list? If you repeat the words out loud, you will find that the misremembered words rhyme with the original list of words. These mistakes suggest that the original list of words is being phonemically encoded in short-term memory. In other words, when verbal material is encoded for storage in short-term memory, it tends to be encoded according to the way it sounds. If the words had been semantically encoded, what kinds of mistakes would we have observed when subjects recalled the list? In this case, the mistakes would have contained words such as the following:

feline jog tuxedo trash border shirts skirt rock old wood ship clock

If we encoded information semantically in short-term memory, people would substitute words that have a meaning similar to those in the original list. The fact that this is rarely done shows that we do not often use semantic encoding for the *initial* formation of short-term memories.

SQ 4-6: Define the serial-position effect, in general, as well as its two specific types: the primacy and recency effects. Discuss the standard model of memory. In your answer, list the characteristics by which we distinguish the two major subsystems of memory. Describe short-term memory in terms of its duration and capacity. How does verbal material tend to be encoded for initial placement in short-term memory? Provide evidence for your answer.

Interaction Between Short-term and Long-term Memory

What I have just reported about short-term memory was based on research that made use of memory tasks involving lists of numbers, words, or letters that were presented rapidly and were retrieved almost immediately. In everyday life, however, we do not often memorize information in this way. For example, when you study for a test, you usually go back over the material many times before you take the test; and there often is a relatively long period of time between these study periods and the actual recall of information on the test. When studying in this way, you usually think about the information and try to relate it to other things you already know. In other words, although we might use phonemic encoding for the initial storage of a short-term memory involving verbal material, once we have done this, we typically continue to encode it further because we want to transfer it to long-term memory. This further encoding in the short-term subsystem often involves “elaborative rehearsal.” **Elaborative rehearsal** is a type of information processing which involves **organizing new information in a meaningful way by linking it up with information already stored in long-term memory**. Elaborative rehearsal can be thought of as a set of mental processes that allows us to semantically encode new information. Thus, elaborative rehearsal gives rise to memory codes that are different from those of maintenance rehearsal.

As an example of elaborative rehearsal, let’s try to memorize the six-item word list that I presented earlier (ear, axe, zoo, lake, joke, vase) by creating a story out of these words:

“A man cut off the *ear* of a stuffed animal with an *axe* at the *zoo* down by the *lake*. As a *joke*, he put it in a *vase* and gave it to his friend.”

As you can see, the story does not have to be a good one, or even one that makes much sense, as long as it has enough meaning to allow some organization of the separate items. We also could

have elaboratively rehearsed these items by writing down a definition for each word or by imagining what each item looked like (and then relating them to each other in an imagined visual scene). As a final example of elaborative rehearsal, you might “chunk” information. A **chunk is a meaningful unit of information**. We chunk information when we take what at first appears to be a random sequence of letters, words, or numbers, and combine them in such a way that the combinations become meaningful. Let me show you how this is done with the following thirteen letters:

n b c c i a t g i f b m w

Thirteen letters is too many items of information to hold all at once in short-term memory (as stated earlier, we can store only about seven items of information in short-term memory). But, we could organize them in the following way so that they formed only four chunks of information:

nbc cia tgif bmw

Four chunks is a number that can be held in short-term memory easily by almost anyone. In elaborating in this way, the total amount of information held in the short-term store has been dramatically increased. In general, the key to elaborative rehearsal is **to make the information meaningful by relating it to things that you already know**. In this way, you create semantic memory codes for the information.

The phenomenon of elaborative rehearsal shows clearly that the short-term subsystem (the subsystem in which elaborative rehearsal occurs) must be interacting constantly with the long-term subsystem in trying to make sense of the world. This conclusion follows from the fact that we can make information in short-term memory meaningful only by relating it to information already stored in long-term memory. An example discussed by Baddeley (1993) illustrates well this interaction between the short-term and long-term subsystems:

John Bransford describes an informal experiment in which experimenter E walked into the office of a colleague C and said simply, ‘Bill has a red car’. [This statement was made with no explanation.] Here is the description of C’s reactions: ‘He looked very surprised, paused for about three seconds, and finally exclaimed “What the h--- are you talking about?” After a hasty de-briefing session C laughed and told E what had gone on in his head. First he thought that E was talking about a person named Bill that C knew. Then C realized that E could not in all probability know that person; and besides Bill would never

buy a red car. Then C thought that E may have mixed up the name and really meant to say J (a mutual friend of C and E). C knew that J had ordered a new car, but he was surprised that it was red and that it had arrived so soon. C also entertained a few additional hypotheses—all within about three seconds. After that he gave up, thereupon uttering “What the h--- are you talking about?” (pp. 143-144)

As you can see from this example and from your own experiences, our short-term memory constantly takes in information from the outside world and compares it with other information already in long-term memory. This process of elaboratively rehearsing the new information occurs very rapidly. By comparing new information with information already stored in long-term memory, we are more likely to make sense of the new information and, thus, to hold most of its meaning in short-term memory (although we may forget individual items). As we will see later, elaborative rehearsal also helps us to transfer new information into long-term memory. Thus, elaborative rehearsal is an extremely important function of short-term memory.

SQ 4-7: In as much detail as you can, discuss the two major kinds of rehearsal in short-term memory. How can the duration of a short-term memory be increased? How can the capacity of the short-term store be increased?

Working Memory and Levels of Information Processing

As I have just mentioned, the controlled processes of short-term memory, especially those involved in elaborative rehearsal, allow for a great deal of information processing (encoding). This encoding results in the organization and transformation of information in the short-term store. Because so much information processing occurs in short-term memory, many memory researchers refer to this subsystem as **working memory**, a term which emphasizes **the ability of short-term memory to keep several pieces of information simultaneously in mind while relating them to one another**. (I will use both terms, short-term memory and working memory, interchangeably.) For example, try multiplying 16 by 3 in your head. In doing this, I mentally multiplied 10 by 3 to get 30, 6 by 3 to get 18, and then added 30 and 18 to get 48 (the correct answer). All of this required me to mentally relate several pieces of information at the same time. In other words, I had to mentally organize and transform the information using the controlled processes of the short-term subsystem. In using short-term memory for such a task, a large amount of selective attention was used to manipulate information. The information used to accomplish the task came from the sensory registers (I perceived the numbers to multiply as I looked at the written material above) and from long-term memory (I have stored there the rules that allow me to perform arithmetical operations). I transferred all of this information to working

memory by directing my attention to the numbers on the page as well as to my long-term memories about arithmetic. **Attention**, then, is the **mental process that transfers information from the sensory registers and from the long-term store into working memory**. *Because attention transfers information into working (short-term) memory, this memory subsystem can also be thought of as existing at the conscious level of the mind, whereas long-term memory can be thought of as existing outside of consciousness* (that is, at the preconscious and unconscious levels). Working memory is similar to a “work file” on a computer: just as all the information that is being typed into the computer enters the work file where it is manipulated according to the rules that are stored in the program being used, all the information from the immediate situation enters working memory through the sensory registers where it is manipulated according to other information stored in long-term memory.

Depending upon what we are trying to do, we use various amounts of attention and mental effort to process the information in working memory. The processing of information in working memory with regard to a specific task (such as memorizing a new phone number) involves a particular **level of information processing**, a phrase that refers to **the degree to which attention is used and effort is exerted to process information in working memory**. Thus, the level of information processing refers to the amount of controlled processes you use to process incoming information: the more controlled processes you use to rehearse (encode) new information in working memory, the “deeper” the level of information processing. For example, let’s say that I ask you to remember my office phone number (423-6213). You might encode this information with maintenance rehearsal by simply repeating the number over and over again. This involves a relatively superficial processing of information because you are encoding it simply in terms of its sound (that is, phonemically)—a type of encoding that does not require much in the way of manipulation or transformation of information. In general, you are engaged in a **shallow (or superficial) processing of information** when you **process information in working memory by using a minimal amount of attention and effort**. On the other hand, you might use a great deal of attention and effort to encode the number. The “deepest” levels of information processing in working memory involve elaboratively rehearsing new information by relating it to other things we already know. This deep processing of information requires that working memory interact with information already stored in long-term memory. For example, you might try to memorize my office phone number by substituting letters for the first three numbers, thereby coming up with a more meaningful organization of these items—such as, ICE-6213 instead of 423-6213. In general, you are engaged in a **deep processing of information** when you **process information in working memory by using a maximal amount of attention and effort**.

In talking about the encoding of verbal material earlier in this chapter, I stated that we can process information (such as the word, “chin”) in terms of its physical structure (for example, it is written in lower-case letters), in terms of its sound (for example, it rhymes with “pin”), and in terms of its meaning (for example, it is a part of the face). These three ways of processing verbal information were called structural encoding, phonemic encoding, and semantic encoding, respectively. As I have already stated or implied, it takes more mental effort (and elaborative rehearsal) to semantically encode than to phonemically encode; and more mental effort to phonemically encode than to structurally encode. Thus, of the three types of verbal encoding, the most shallow is structural and the deepest is semantic. The type of encoding used seems to affect how much information is transferred from short-term to long-term memory. Many studies have found that semantic encoding of verbal information leads to the greatest amount of transfer, whereas structural encoding leads to the least. This provides evidence for one popular explanation of information transfer from short-term to long-term memory called **levels-of-processing theory**, which states that **the more deeply we process information in short-term (working) memory, the more likely it is that we will transfer it to long-term memory**.

Good Versus Bad Strategies for Studying

As I stated above, maintenance rehearsal involves a relatively superficial level of information processing whereas elaborative rehearsal involves a deeper level of information processing. Although both maintenance and elaborative rehearsal allow you to transfer information from the short-term to the long-term store, research shows that elaborative rehearsal is much more effective for doing this. This is consistent with what we would predict from levels-of-processing theory because elaborative rehearsal involves semantically encoding new information. Can this help you to explain why studying with “flash cards” may not be the best studying strategy to use if you want to remember terms and their definitions for a test? Think about this for a minute before reading on. Studying with “flash cards” tends to be a bad strategy because, if you write terms and their definitions directly from the textbook onto flash cards and then simply repeat the definitions word-for-word as you go through the flash cards, you are using maintenance rehearsal (and phonemic encoding). Rewriting definitions in your own words or drawing a picture that represents the meaning of the word are better strategies because they involve elaborative rehearsal (which allows semantic encoding). Even semantic encoding, however, can be done at different levels of processing: at the most superficial level, you might simply reword a dictionary definition of a term; at a deeper level, you might visualize the object it refers to; at a still deeper level, you might use it in a story; etc. The deeper the level of semantic encoding, the better your chance of transferring it

permanently to long-term memory. That is why proper studying requires so much effort if you want to remember the information for a test. Schacter (1996) put it this way:

If we want to improve our chances of remembering an incident or learning a fact, we need to make sure that we carry out elaborative encoding [elaborative rehearsal] by reflecting on the information and relating it to other things we already know. Laboratory studies have shown that simply intending to remember something is unlikely to be helpful, unless we translate that intention into an effective elaborative encoding. For example, when preparing for an exam, a good student may make a special effort to form meaningful mental associations among the study materials, whereas the same student may not bother engaging in such elaborative encoding if she is not going to be tested. (p. 45)

Many students make the mistake of simply using maintenance rehearsal when studying. For example, they might use a highlighter to emphasize certain passages in the textbook and then reread this highlighted material several times. According to the best evidence, however, this strategy should result in a minimal transfer of information to long-term memory because it requires little or no elaborative rehearsal. Instead, you should be writing definitions out in your own words, thinking up your own examples, relating the information to yourself, answering the study questions included in this textbook, etcetera, because such strategies involve a great deal of elaborative rehearsal. These strategies should allow a more complete transfer of the information to long-term memory and also help you to understand test questions when these are worded differently from the information in the textbook or lecture.

Our Memory is Very Limited

Because elaboration takes so much time and effort, and because elaboration is necessary for remembering most of the information we would like to remember, we can expect to forget almost everything we experience. In other words, because we are able to process deeply only a very small amount of the information we receive at any one time, most of the information either will never enter short-term memory or will rapidly disappear from it because it gets little or no rehearsal. Thus, you can expect to forget permanently almost all of the information in your short-term memory at any particular moment for the following two reasons: (1) this memory subsystem has a very short duration and a very limited capacity; (2) it is impossible to process deeply enough more than a small amount of the information in this memory subsystem. On the bright side, the more that we learn about a particular topic, the easier it is to elaboratively encode new material related to that topic. This increased ease of memorizing new information concerning topics we already have much knowledge about is probably due to the fact that we have a large amount of old information to

which we can link the new information. In fact, when you become an expert in an area, elaborative rehearsal for new material involves fewer controlled processes and more automatic processes. For example, Schacter (1996) discussed the ability of chess experts to remember the positions of pieces on a board after only glancing at the board:

After just a single five-second exposure to a board from an actual game, international [chess] masters in one study remembered the locations of nearly all twenty-five pieces, whereas novices could remember the locations of only about four pieces. Moreover, it did not matter whether the masters knew that their memory for the board would be tested later; *they performed just as well when they glanced at the board with no intention to remember it.* (p. 48; italics added)

The italicized words show that, for these chess masters, elaborative rehearsal for pieces on the chess board involved automatic processes: they know so much about chess, that they can quickly and effortlessly compare the present game with their long-term memories about chess and learn the new positions. That this involved elaborative rehearsal and not simply some exaggerated memory ability is shown by the fact that these chess masters were no better than anyone else at remembering pieces on a chess board when these pieces had been placed randomly: the pieces had to be in meaningful positions for the experts to remember these positions. The moral of such research is this: **as you continue in school and learn more about particular areas, your studying in these areas should require less effort.**

SQ 4-8: In as much detail as you can, discuss the concept of “levels of information processing.” In your answer, relate this concept to the concepts of working memory, automatic processes, controlled processes, maintenance rehearsal, and elaborative rehearsal. What is the relation of levels of information processing in working memory to the transfer of information to long-term memory? What does this say about the best strategies to use for studying? Why did I conclude that our memory is very limited? How can elaborative rehearsal become easier (that is, require fewer controlled processes)?

Now that we know a little more about what affects the transfer of information from short-term memory to long-term memory, let’s discuss the general characteristics of long-term memory.

Long-term Memory and Retrieval Cues

Of the large amount of information that we can sense at any moment in time, only a small amount is ever encoded for storage in short-term memory (only that information to which attention

is directed). If this encoded information is sufficiently rehearsed (that is, encoded further), it will be transferred to long-term memory where it will be stored and then perhaps retrieved at a later time. Let's begin the discussion of the long-term subsystem by describing how we retrieve information from the long-term store. This was something I did not need to discuss when I talked about short-term memory because the retrieval of information from the short-term store is rarely a problem: it is already at the conscious level. But information in the long-term subsystem is stored outside of consciousness. Thus, we need to understand how we find and become aware of information in the long-term store. This involves the use of "retrieval cues."

A retrieval cue is a stimulus that aids in the retrieval of information from the long-term store because it is associated in some way with this information. If you go back to a place you have not visited in a long time (such as your elementary school), you may find that many memories return to you as you walk around (perhaps the time you lost an important ball game or were sent to the principal's office). In this case, the location itself is a retrieval cue that helps you to retrieve memories about that location. Or perhaps while eating waffles one day, you suddenly think of a friend from childhood. As you think about this friend, you remember the time you stayed overnight at his house and ate waffles for breakfast. In this example, the waffles were a retrieval cue for your memory of your childhood friend because of their association with him. The importance of retrieval cues for gaining access to long-term memories is seen in a passage from *In Search of Lost Time* by Marcel Proust:

The other evening, having come in chilled, by the snow, and not being able to get warm, as I had started to read in my room under the lamp, my old cook offered to make tea, which I never drink. And chance had it that she brought me some slices of toast. I dipped the toast into my mouth and having the sensation against my palate of its soggiess permeated with the taste of tea, I felt a disturbance, scents of geraniums and orange trees, a feeling of extraordinary light, of happiness; I stayed motionless, fearing a single movement could interrupt what was happening in me, which I did not understand, but still concentrating on this taste of dunked bread, which seemed to produce such wonders, when suddenly the shaken partitions of my memory caved in, and it was the summers I spent in the country house I mentioned which burst into my consciousness, with their mornings, and drawing with them the procession, the nonstop charge of happy hours. Then I remembered: every day when I was dressed, I went down into the room of my grandfather, who had just awakened me and was drinking his tea. He used to dunk a rusk and give it to me. (quoted in Hilts, 1995; p. 77)

As an adult, the taste of toast dipped in tea served as a retrieval cue for a memory that this person had not recalled in many years—a memory of summers spent at a relative’s house. In this case, the retrieval cue brought back a very powerful memory full of much sensation and emotion. Most recollections are not this vivid, however. Retrieval cues (such as the several choices you read on a question from a multiple-choice test) typically allow you to retrieve pieces of general information or vague memories of your past.

The concept of a retrieval cue helps to explain why elaboratively encoding new information is the best strategy for developing an easily accessible long-term memory. When we elaboratively encode something, we are engaged in a deep processing of information that provides many possible ways to later retrieve the memory being encoded. Thus, many different retrieval cues will work for an elaboratively encoded memory. For example, if you encode a memory for John Watson (described in the last chapter) in terms of his later career as an advertising executive, you may be unable to answer a test question asking you to name the famous behaviorist who studied Little Albert. A memory encoded by using a great deal of elaborative rehearsal, however, would allow you to answer this question very easily since you would have spent much time constructing a more complete memory for John Watson. Retrieval cues may also explain *deja vu* experiences (in which a person feels as if has experienced the present situation before). You may sometimes experience *deja vu* because of stimuli that are serving as retrieval cues for a memory of a different (but similar) past situation. For example, in staring out at a classroom of faces, I sometimes feel as if I am reliving a previous experience; but this experience probably is caused by the fact that I have so often stared out at classrooms full of faces, and the present set of faces is serving as a retrieval cue for one or more of these memories. (A comedian once claimed that he was suffering from two memory problems—amnesia and *déjà vu*—at the same time. He stated, “I feel as if I’ve forgotten this before.”) The concept of retrieval cue also explains the common experience of having to return to the place in which you recently had a thought in order to remember what that thought was. For example, let’s say that you are in your bedroom and you decide that you want to drive your car to the store. You remember that your car keys are in the kitchen and begin walking there. Halfway there, you forget what you were going to the kitchen for. You stop and return to the bedroom. As soon as you look around the bedroom, you remember that you were headed to the kitchen to get your keys. In this example, your bedroom served as a retrieval cue for the memory.

There is evidence that mental states can serve as retrieval cues. For example, **state-dependent memory** is said to occur when a person is better able to retrieve information learned while in a particular mental state (a particular state of consciousness or a particular mood) if they are placed in that same mental state

when retrieving the information. For example, if you study for your test while drinking a few beers, it may help you to have a few beers before taking the test in order to better retrieve the information. Before you go and put this strategy into action, however, you should be aware that you will do much better on the test if you are sober both while studying for and while taking the test. But, if you had been drinking beer while you were studying, then you might do a little better if you are slightly intoxicated during the test than if you are not. A mood state also can serve as a retrieval cue in state-dependent memory. If you learn a word list while depressed, then when trying to retrieve this information at a later time, you are more likely to do better if you are again depressed than if you are in a neutral or in a happy mood. A concept related to this aspect of state-dependent memory is the **mood-congruence effect**, which is **the tendency to more easily remember events that are consistent with your present mood than events that are inconsistent with this mood.** For example, when you are happy, you are more likely to recall positive experiences from your past (such as the time you found a twenty-dollar bill) than you are to recall neutral or negative experiences (such as the time you lost a twenty-dollar bill). Thus, the mood-congruence effect suggests that your present mental state is serving as a retrieval cue. The mood-congruence effect helps us to understand why it may not be a good idea to trust the negative memories of a person who is depressed, anxious, or otherwise distressed: such a person will more easily recall memories that are negative than memories that are positive. If you have known this person for a long time, you may be amazed at how many positive memories this person seems to be forgetting. There is no need to worry, however. As soon as his/her mood improves, there should be an increase in the number of positive memories recalled.

SQ 4-9: Describe the concept of a retrieval cue and discuss how it is important for long-term memory. Think of some examples of retrieval cues. Describe state-dependent memory and the mood-congruence effect. Relate these terms to the concept of retrieval cue. Why should you not trust a happy person who tells you that her life has always been wonderful?

Major Characteristics of Long-term Memory

Now that you have a better idea of how we retrieve memories from the long-term store, I will describe the major characteristics of long-term memory. As I stated earlier, we can distinguish short-term from long-term memory by considering three characteristics: duration, capacity, and encoding.

(1) *Duration.* By definition, long-term memories last for a long period of time. When trying to estimate the duration of these memories, however, we run into problems we did not have to deal with when discussing the brief memories of the short-term subsystem. In determining whether or

not a memory exists in the short-term store, all we had to do was get the person to “recall” the memory. A **recall task** is one in which the individual **retrieves information from a memory store without being given a retrieval cue**. For example, in the section on short-term memory, we saw that researchers had people repeat from memory a list of words they had just heard. Because the person is consciously aware of the material held in the short-term store, recall is a relatively simple task. Recall can be much more difficult, however, when it is used to retrieve memories from the long-term store. This is because, unlike short-term memories, long-term memories are not at the conscious level. The person, therefore, first needs to transfer the long-term memory into awareness (that is, into short-term memory) before he/she can recall it. Try to recall the letters I used in my example of chunking earlier in this chapter (after trying this, go back to that section to see if you were correct). In order for you to recall this information, two things were necessary: (a) it must have been stored in long-term memory, and (b) you must have constructed your own retrieval cue so that you could become aware of the information. Constructing a retrieval cue yourself involves complex mental processes. In doing this for the items of chunked information, you might have tried to remember where they were on the page or what you had been doing when you reading them earlier. Essay tests are good examples of recall tasks. As you should be able to see, the fact that you are not at first aware of your long-term memories makes it more difficult to retrieve stored information from the long-term store than to retrieve it from the short-term store.

Let’s say that I ask you next week what those chunked items mentioned earlier were. Even if you were able to correctly recall them just a moment ago, you may no longer be able to recall them next week. Have the memories disappeared from your long-term store? It is very unlikely that this is the case because, if I show them to you and ask if you remember seeing them before, you will probably answer, “yes.” That is, even though you might be unable to recall the letters a week from now, you probably will be able to “recognize” them. Thus, some memory of these letters must still exist in your long-term store. A **recognition task** is one in which **the original items of information memorized serve as the retrieval cues for that information**. Multiple-choice tests are recognition tasks whenever the correct answer, presented as one of the choices, is worded in a way similar to the wording in the textbook from which you studied.

Now, if we wait five years and then I ask you to recall or recognize the chunked items, it is very unlikely that you will be successful at either task. Has the memory of the list now disappeared from your long-term store? Again, there is evidence to suggest that this is not always the case. If I have you memorize the list again at this later date, I might find that you will learn it more rapidly than you did the first time. The only way that this could happen is if you had retained some

(unconscious) memory of the items in the list—a memory that made it easier for you to learn the list a second time. A **relearning task** is one in which the individual **encodes and stores information more rapidly and with less effort when learning it a second time**. For example, people who have taken a year or so of a second language in high school often cannot consciously recall or recognize much of it when they start college. If they take the beginning class in that language sometime during college, however, they probably will find that it is easier to learn the language the second time around. This shows that there must have been some memories left in the long-term store—memories that were at the unconscious level. Thus, **relearning tasks measure memories in the long-term store that are outside of the reach of selective attention** (that is, that are at the unconscious level), **whereas recognition and recall tasks measure memories to which we can direct our selective attention** (that is, that are at the preconscious level) with varying amounts of help from retrieval cues.

(2) *Capacity*. It is believed that we can store an unlimited amount of information in the long-term store. That is, in the course of a lifetime, it seems quite probable that we can never fill up the long-term store. Everyday experience should tell you that this claim is probably true. For example, elderly people who have accumulated a great deal of information in their long-term stores over a lifetime can still learn new facts (such as the name of a person they have just met) without losing old memories. And no matter how much you have studied for the large number of tests you have had over the years, it is not likely that you will ever reach a point where you cannot learn even more information: you will not fill up your long-term store with the material you have learned in your previous courses. We also can look at this issue in terms of adaptation—we would not be well-adapted creatures if we could ever get to a point where we reach the capacity of our long-term stores. Such a human would not be able to learn new information and, hence, would not be expected to survive much longer as conditions changed.

(3) *Encoding*. When encoding for long-term memory, the proper rehearsal of information in short-term memory is essential. As discussed earlier, the processing of information in short-term memory can occur in either a shallow or a deep manner. Maintenance rehearsal represents a shallow processing of information because you simply are repeating the information over and over again with very little effort being expended on transforming and organizing the material. On the other hand, elaborative rehearsal represents a deep processing of information because you are using effort to link the new information up with older information already stored in long-term memory. As I have already discussed, research shows that the more deeply we process new information in short-term memory, the more likely it is that it will be encoded for transfer to long-term memory. When we investigate how memories for word lists are encoded for long-term

storage, we often find evidence that people make use of elaborative rehearsal. For example, if we have people memorize any one of the word lists presented earlier, and then test their memories for it a day or two later, we probably will find that, when they make mistakes, they will substitute words that have a similar meaning. That is, if I asked you to memorize the following word list:

lint pine year urn bore zinc air mine

and then tested your long-term memory for it two days from now, you are likely to make mistakes such as the following:

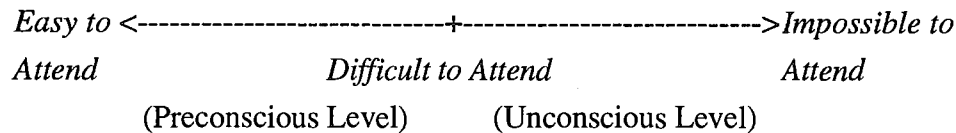
dust tree day jar drill iron oxygen quarry

Although you probably will remember some of the words correctly, when you do make a mistake, it is likely to involve a word that has a meaning associated with the original word, which implies that you had semantically encoded the information for long-term storage. In order to semantically encode verbal information, you must have used elaborative rehearsal. In general, studies such as this show that elaborative rehearsal leads to the transfer of the greatest amount of information from short-term to long-term memory as well as to the most stable long-term memories.

SQ 4-10: Discuss long-term memory in terms of its duration and capacity. In your answer, describe the different kinds of retrieval task. How is verbal material encoded for storage in long-term memory? Provide evidence for your answer. What does this tell you about the best way to study for a test?

Explicit Versus Implicit Long-term Memories

According to the standard model of memory, as soon as we selectively attend to information in the long-term store, the information is transferred back into the short-term store (working memory). Hence, by definition, memories in the long-term store are below the conscious level. As you know from your own experience, some of these memories are relatively easy to attend to (for example, your maternal grandmother's name or the day and time of your favorite television show). We would say that these long-term memories are stored at the preconscious level. On the other hand, there are other long-term memories that are much more difficult (sometimes even impossible) to become aware of. These long-term memories are stored at the unconscious level. We can think of the ability to selectively attend to information in long-term memory as involving a continuum from preconscious to unconscious:



Where we draw the line between preconscious and unconscious memories in the long-term store is somewhat arbitrary, but our everyday experience suggests that this is a distinction that makes sense. In cognitive psychology, long-term memories stored at the preconscious level are called “explicit memories,” whereas long-term memories stored at the unconscious level are called “implicit memories.” An **explicit memory** is a **preconscious long-term memory that can be retrieved with recall or recognition tasks**, whereas an **implicit memory** is an **unconscious long-term memory that cannot be recalled or retrieved but that can still affect our behaviors, thoughts, or emotions**. In the case of implicit memories, relearning tasks sometimes can help to show their presence: if a person can relearn a task more quickly a second time, this shows that there must have been an implicit memory for the task. But there are also other ways to detect implicit memories. Let’s look more closely at the concept of implicit memory and how it is different from explicit memory.

The case of Henry M. can help us to understand better the distinction between explicit and implicit memories. As we saw earlier, it was very difficult for Henry to learn new information. Nevertheless, there are some things that he could learn and remember quite well. For example, he was tested often over many years in the same room at the Massachusetts Institute of Technology. When walking down the hall to the testing room, he would claim that he did not know where this room was, yet he would make the correct turns taking him to it. He seemed to know approximately where the room was, but he did not know that he knew this! This suggests that his amnesia was not complete. Although Henry did not have an explicit memory for the location of the testing room, he did have an implicit memory for it because he was able to walk there. In general, Henry was unable to form new explicit memories, but he seemed able to form new implicit memories. Let’s look at another example. In Chapter 2, I mentioned Edouard Claparède who, in 1911, was showing his students a patient with amnesia like Henry’s. When he reached out to shake the patient’s hand, Claparède stuck a pin in it. Later, the patient, although unable to recall explicitly this incident, refused to shake hands with Claparède. Thus, the patient must have formed an implicit memory of the event. In fact, we can think of this patient’s reaction as being due to the classical conditioning of a fear response (the CS was the sight of Claparède’s hand, the UCS was the pain caused by the pin, and the CR was the fear elicited by the sight of Claparède’s hand). Classical conditioning, because it causes the learning of automatic responses, often involves the formation of implicit memories.

Most people with brain damage similar to that of Henry are not able to form explicit memories for word lists. There is much evidence, however, that they are able to form implicit memories for these word lists. For example, we might give such patients a list of ten words to memorize:

vine nook rare yarn lawn bone hook wear grain door

If we asked them fifteen minutes later to recall this list of words, they would be unable to do so because of their problems with forming new explicit memories. Nevertheless, if they are told to fill in the blanks in the following list, they would tend to use the words they had been told to memorize fifteen minutes earlier:

vi__ no__ ra__ ya__ la__ bo__ ho__ we__ gr__ do__

The fact that they would use the words from the word list to complete this task even though they could not recall them shows that they must have formed an implicit memory of the word list. This particular implicit-memory effect is referred to as **priming**: exposure to a word list “primes” (prepares) people to use those same words when presented with a similar list at a later time. People without brain damage also show the priming effect. For example, if people with intact brains are given the same word list as above and then asked one hour later to pick them out from a much larger list of words, they tend to have little trouble with this. If asked one week later to do this, however, they will have a much more difficult time recognizing those words they have seen before. In fact, there will be many words for which they no longer have an explicit memory. Nevertheless, if we give them a list of partial words followed by blanks as above, they are likely to complete the words with those they learned a week earlier even though they have no explicit memories for many of them. Furthermore, they will do just as well on this task a week later as they would have done one hour after learning the list. So, **it seems that explicit memories may become implicit memories over time, and that these implicit memories can last for a long time**. The probability that implicit memories are relatively stable shows why it can be so difficult to say with certainty how long a long-term memory lasts.

In general, the priming effect refers to a **tendency to respond automatically to a stimulus in a particular way after prior exposure to a similar stimulus**; and it probably affects us in many ways in our everyday lives. For example, it may be that many of the “great ideas” we have—ideas that seem to be caused by some mysterious power of intuition—

actually are caused by priming. That is, we may have heard an idea before but no longer have an explicit memory for it. The implicit memory for the idea, however, may cause us to interpret events in such a way that this idea now “pops into our heads.” For example, a key idea in Freud’s development of his psychoanalytic approach seems to have arisen through priming:

Freud had maintained for years an intense and tumultuous friendship with the Berlin physician Wilhelm Fliess. He frequently confided his latest ideas and insights to Fliess, and was emotionally dependent on his approval of them. When Freud announced to Fliess a momentous new insight—that every person is fundamentally bisexual—he fully expected Fliess to be amazed by the idea. Instead, Fliess responded by reminding Freud that he himself had made exactly the same discovery two years earlier and [had] told Freud all about it, and that Freud had rejected the idea. (Schacter, 1996, p. 168)

Freud eventually remembered the earlier event and realized his mistake. In many cases, however, it is likely that people do not remember the priming event. In fact, you may have experienced such a disagreement yourself, and become very frustrated when the other person did not remember events the way you did. If you learn nothing else about memory in this chapter, you should at least learn that our memory can be very faulty. In fact, we probably should not place much trust in many explicit long-term memories without looking for objective evidence that the memory is relatively accurate. I will talk more about this later when I discuss the issue of “false memories.”

SQ 4-11: Distinguish between explicit and implicit memories in the long-term subsystem. In your answer, discuss evidence for this distinction by describing research on people who have suffered damage to the limbic system. Give some examples of each type of memory. How can priming explain the experience we occasionally have of a great idea just “popping into our heads”?

Types of Explicit Memory

We can subdivide explicit memory into two major types: semantic and episodic memory. A **semantic memory** is a memory for a fact or some other piece of general knowledge. For example, fill in the following blanks: (1) Abraham Lincoln was the ____th president of the United States; (2) _____ was the first person to step on the moon; (3) John F. Kennedy was assassinated in the city of _____. These three facts are referred to as semantic memories: many of you know the answers but you probably don’t remember where you first learned them (that is, the learning of any one of them is not tied to any particular episode in your life). An **episodic memory**, on the other hand, is a memory for a personal experience. For example, when you tell someone what you had for dinner last night, you are recalling a personal experience (an

episode) from your life. You would also be able to recall the names of the other people there, what time it was at, or any other detail about the experience that you encoded. It seems that people with amnesia such as that suffered by Henry M. are better able to form new semantic memories (although they still have much trouble with this) than new episodic memories. Let me illustrate this with an anecdote about Greg, the patient you learned about in the beginning of Chapter 2.

You might remember that Greg developed severe problems with his mental functioning, including amnesia, after the growth of a large brain tumor during the early 1970s. After the tumor was removed, he was institutionalized because he no longer could care for himself. In 1991, Greg's neurologist, Oliver Sacks, took Greg to a concert featuring the Grateful Dead, a musical group that Greg had loved since the 1960s. Because Greg's amnesia for explicit memories extended all the way back to the late 1960s, he had no memory for anything that had happened since that time. Sacks described what happened at the concert:

The first half of the concert had many earlier pieces, songs from the sixties, and Greg knew them, loved them, joined in. His energy and joy were amazing to see, he clapped and sang nonstop, with none of the weakness and fatigue he generally showed.... But the second half of the concert was somewhat strange for Greg: more of the songs dated from the mid- or late seventies and had lyrics that were unknown to him, though they were familiar in style. He enjoyed these, clapping and singing along wordlessly, or making up words as he went.... The newer songs [from about 1980 and after] went far beyond any development that he could have imagined, were so beyond (and in some ways so unlike) what he associated with the Dead, that it "blew his mind." It was, he could not doubt, "their" music he was hearing, but it gave him an almost unbearable sense of hearing the future. (Sacks, 1995, pp. 75-76)

By the next morning, Greg no longer remembered having been at the concert or having heard any of the newer songs: his episodic memories for the concert had disappeared. Nevertheless, he was able to sing some of the new songs he had heard: he had developed semantic memories for them. It seems, therefore, that the connections between the hippocampus, amygdala, and perirhinal cortex (the structures most often damaged in amnesiacs such as Greg and Henry M.) may be more important for the development of new episodic memories than of new semantic memories. In general, long-term memory is made up of divisions of distinct memory subsystems, each of which seems to be associated with activity in different parts of the brain. Although there is still controversy about all this, the brief descriptions of working memory, implicit memory, and explicit

memory that I have given you in this chapter should make it clear that the very simple model proposed by Atkinson and Shiffrin back in the 1960s has had to be greatly modified.

SQ 4-12: Distinguish between semantic and episodic memories. Give examples of each. Discuss these two types of memory with regard to people who have suffered damage to the limbic system.

Reconstruction of Explicit Long-term Memories

We have learned much about explicit long-term memories. But we still have not learned the most important thing about them: what is an explicit long-term memory? And, in order to answer this question, we first need to answer other questions. Is each explicit memory stored in a specific area of the brain or perhaps spread across different areas of the brain? Is an explicit memory of an event something like a “videotape” of the original experience (consisting of a large number of completely accurate details) that is replayed when we remember, or is the memory stored in some sort of abbreviated form, perhaps with only bits and pieces of the original experience retained in memory? Some answers to these questions were first proposed during the middle of the twentieth century by the neurosurgeon, Wilder Penfield. Penfield and his colleagues electrically stimulated areas throughout the cerebral cortex of their patients. They found that, when certain areas within the temporal lobes were stimulated, a small proportion (less than 4%) of their patients reported experiences that seemed to be memories from long ago in their lives. These experiences were extremely vivid ones, as if they were reliving the remembered incidents:

One of Penfield’s patients was a young woman. As the stimulating electrode touched a spot on her temporal lobe, she cried out: “I think I heard a mother calling her little boy somewhere. It seemed to be something that happened years ago...in the neighborhood where I live.” Then the electrode was moved a little and she said: “I hear voices. It is late at night, around the carnival somewhere, some sort of travelling circus. I just saw lots of big wagons that they use to haul animals in.” (Blakemore, 1977; quoted in Baddeley, 1993; p. 123)

Penfield and his colleagues believed that they were accessing actual memories—memories containing all the details of the original experiences. They reasoned from this that long-term memories (at least those we have been calling episodic memories) are stored in the temporal lobes of the cerebral cortex. This research provided what seemed to be conclusive evidence for the **videotape theory** of long-term memory—the idea that, for each event in our lives, we store every detail (every thought, perception, and emotion that occurred during the event) in a completely accurate way. This theory, however, is not consistent with the research supporting the theories of

short-term and long-term memory I discussed above. I stated there that we forget almost everything that has ever happened to us because most of the information either is not attended to (and, therefore, disappears from the sensory registers) or is not encoded for transfer to long-term memory (and, thus, disappears from short-term memory). This should make you skeptical about Penfield's claim that he was activating very vivid memories from long ago.

If you think more carefully about Penfield's claim, you might begin to see that this skepticism is warranted. There are two problems with accepting Penfield's interpretation of his patients' experiences during brain stimulation. First, only a very small number of patients reported such experiences. Second, there is another possible explanation for their experiences. As you know from Chapter 2, electrical stimulation of the brain can give rise to various hallucinations. It may be that the stimulation of these patients' temporal areas gave rise not only to sensory hallucinations but also to an illusory feeling that these incidents had actually happened to them. In fact, it is now generally agreed that these patients were *not* experiencing memories of actual events—that, instead, they were experiencing very complex hallucinations caused by the electrical stimulation of their cortex. Most memory researchers now believe that the videotape theory of long-term memory is wrong (for both explicit and implicit memories) and that, in fact, we forget most of the details of our pasts. Furthermore, there seems to be no specific area of the brain in which long-term memories are stored. But these claims lead to another difficulty: if long-term memories are not stored in much detail, and if they are not stored in specific areas of the brain, how and where are they stored? And, even more important, when we do retrieve a long-term memory, it seems that we often can remember a large number of details of past events. In fact, we often can visualize in much detail the locations in which the events took place and the people who were there. How is this possible if the claim that we forget many of the details is true? Let me now try to answer these questions.

As to the question of where explicit memories are stored, it seems that the **memory trace** or **engram** (which is defined as **the biological change in the brain thought to be the physical basis of a memory**) of a single explicit memory is probably scattered throughout several different parts of the cerebral cortex, and that the ability to retrieve such a memory depends upon the activation of this scattered engram. The best evidence for this claim comes from “brain scans” that measure brain activity as people try to remember an event (such as where they were last Thanksgiving). When people try to remember something, areas throughout the cerebral cortex and the limbic system become active. It seems that a retrieval cue (such as asking people where they were last Thanksgiving) initiates activity in these various areas. If no retrieval cue occurs, this activity will not be initiated, and no memory will be retrieved. So, when you are taking a test and

you are struggling to construct an appropriate retrieval cue for the information, you are activating areas in your brain associated with the information you encoded and stored during the time that you studied for the test.

As to how long-term memories are stored, it seems that, when we encode an event for placement in long-term memory, we attend to and elaborate upon only parts of the event—we do not encode a “videotape” that records every detail of the original event. For example, let’s say that you are watching a frightening movie about a serial killer. During the movie, you are much more likely to encode details that are relevant to the main theme of the movie, such as the large knife that the killer used to mutilate his victims, than you are to encode details that were irrelevant to this theme, such as the fact that the room in which he imprisoned his victims had a radio in it. Later on, if asked whether or not a radio was present in the room, you probably will not remember because you did not encode this detail for storage in long-term memory. If you are asked to describe an event from the movie, you will piece together the bits of information you have encoded for that event and come up with a memory that has many gaps in it. At this point, you will unconsciously fill in the gaps with what you think probably happened during the event so that you are left with a memory that is full of details, and probably quite a few inaccuracies as well (see below). In general, it seems that the engrams that make up long-term memories consist of a small number of “memory fragments”—memory traces that consist of only a few details of the original experience.

Let’s try to understand how we fill in the gaps in our memories with details that may or may not have been in the original experience. In this regard, it may help you to think of the retrieval of an explicit memory as similar to the construction of a small number of fossilized bone fragments into a dinosaur:

For the paleontologist, the bone chips that are recovered on an archeological dig and the dinosaur that is ultimately reconstructed from them are not the same thing: the full blown dinosaur is constructed by combining the bone chips with other available fragments, in accordance with general knowledge of how the complete dinosaur should appear. Similarly, for the rememberer, the engram (the stored fragment of an episode) and the memory (the subjective experience of recollecting a past event) are not the same thing. The stored fragments contribute to the conscious experience of remembering, but they are only part of it. (Schacter, 1996, pp. 69-70)

When fossilized dinosaur bones are found, they usually make up only a small portion of the original skeleton. The complete skeleton must be reconstructed using our general knowledge of

what dinosaurs probably looked like—knowledge that has been accumulated over the last 150 years. Because we now have so much knowledge about dinosaurs, our reconstructed versions are probably very accurate. Nevertheless, the builders of such reconstructed skeletons have often made mistakes because their knowledge of the original creatures is limited by the fact that the last dinosaurs died about 65 million years ago. In a similar way, **we use our general knowledge of what usually happens, or what we think must have happened, when we reconstruct a memory from the small number of memory fragments** (the engram) **we have stored for a particular event**. When an engram is activated by a retrieval cue, we use the knowledge that we have accumulated over our lifetimes about various objects and situations to fill in the large gaps in the engram:

activates		reconstructs
<i>retrieval cue</i>	-----> <i>engram + other knowledge</i>	-----> <i>LT memory</i>

This set of processes leads to a remembrance that is very much like a reconstructed dinosaur: **it is probably accurate in broad terms, but is often wrong in details**. The problem is that we are not aware that we have added details to the stored information. In fact, we usually are very certain that our reconstruction is accurate in all of its details and will resist strongly anyone who questions them, even if they have definitive proof that our details are wrong

Let's take an example. Let's say that I have asked you to describe in detail your memory of your last birthday party with your family. You might tell me that your father cooked your favorite dinner (meat loaf) and baked your favorite cake (white cake with chocolate frosting). You remembered that, first, you ate dinner; and then they brought out your cake, you blew out the candles, and you opened your presents. The problem here is that you probably have had many birthday parties with your family and, thus, have accumulated much knowledge over the years about how these parties typically progress. Since you could not have encoded every piece of information about the party, you will need to fill in the gaps in your memory by using this general knowledge about family birthday parties. If you did not do this, your story would be choppy and not make much sense either to you or to anyone else. We fill in the gaps in our memories with so little effort that we usually are not aware that we are doing so. Now, if we look at a videotape of this remembered party, we are likely to find discrepancies between your memory and the actual event. For example, we might find that, first, you blew out the candles on your cake and opened presents, and then you ate dinner (because it took longer than expected for the dinner to cook and your brother had to leave early). And we might find that you had chocolate cake with white frosting, not white cake with chocolate frosting (because the store had run out of chocolate

frosting). You probably would be surprised by the discrepancies because you could “see” the remembered events so clearly in your mind. These discrepancies occur because people unconsciously fill in the gaps in their memories by accessing the general knowledge they have about various categories of events. (You might even want to try this with some event that you know was videotaped. Think of such an event, but make sure that you have never before watched the videotape. First, write down your memory of the event in as much detail as you can. Then, watch the videotape and compare your written account with the videotape. Share your results with your instructor.)

Let’s take an example of an actual remembrance showing the kinds of inaccuracies one would expect if memories are reconstructed from a small number of memory fragments. In 1968, Jack Hamilton, a pitcher for the California Angels, threw a fast ball that hit Tony Conigliaro, an outfielder for the Boston Red Sox, on the left side of his face. Years later, Hamilton recalled the event:

“I never hit a guy that hard.... He [Conigliaro] went right down, he just collapsed.... I’ve had to live with it, I think about it a lot,” Hamilton, now fifty-one years old and the owner of a Midwestern restaurant chain, told *The New York Times* after hearing about Conigliaro’s death [in 1990]. “Watching baseball on TV, anytime a guy gets hit, I think about it. It was like the sixth inning when it happened. I think the score was 2-1, and he was the eighth hitter in the batting order. With the pitcher up next, I had no reason to throw at him.” It was a day game, Hamilton recalled, because he remembered visiting Conigliaro in the hospital later that afternoon. After the accident he remembered wondering whether or not to return to Fenway Park later that year for another series of games; eventually he decided to make the trip. (Loftus & Ketcham, 1994, p. 76)

Although this memory had one element of truth to it (Conigliaro was hit during a game in which Hamilton pitched), the rest of it was almost completely false. For example, the event happened in the fourth inning, not the sixth; it happened during the final road trip to Boston, not earlier in the season; the game was at night, not during the day; the score was 0-0, not 2-1; Conigliaro was the sixth person in the batting order, not the eighth (and, so, the pitcher would not have been up next). Hamilton had recalled this memory hundreds (perhaps even thousands) of times over the 22 years since it had first occurred. During each remembrance, as he filled in the gaps in his memory, he introduced inaccuracies that became part of the memory. Over time, most of the details of the story had changed, although the general theme of the story (that Tony Conigliaro had been hit hard by one of Hamilton’s pitches at Fenway Park) stayed the same.

The general knowledge we use to reconstruct our memories often involves what is called a **schema**, a term that refers to **the general knowledge acquired by an individual about a particular kind of event**. In reconstructing your memory of your last birthday party, for example, you made use of a schema consisting of your general knowledge about typical family birthday parties—a schema developed over the years from your experiences of many family birthday parties. Schemas, therefore, are based upon prior experiences with each kind of event and are organized into a mental category that is activated when you next experience a similar event. For example, you have a *college-professor schema* based upon your experiences with various college professors. You also have subdivisions of this college-professor schema (perhaps into different fields, such as psychology versus chemistry, or different locations, such as community-college versus university). When you talk to your professors, the relevant schema is activated. The schema helps you to figure out what is going on in the interaction so that you know how to respond. For example, if your professor asks you if you have “read the book,” you will understand that he/she is asking about the textbook being used in class. On the other hand, if a stranger appears at your front door and asks if you have “read the book,” what schema will be activated? This second situation probably will activate a *missionary schema*, and you will infer that the stranger is asking about the Christian Bible.

Schemas, however, not only influence how we perceive situations, they also influence what we remember about them. For example, when you call up a memory for an experience with a professor, your *college-professor schema* is again activated so that you can construct a complete memory for the event. Because of this, **you will tend to distort the memory so that it becomes more consistent with the schema. Thus, you will tend to add details that are consistent with the schema even though they never happened.** For example, you may remember that your professor wore a sports jacket yesterday (because professors often wear such things) when, in fact, he actually wore a sweater. In addition, **you will tend to accurately remember details that are consistent with the schema and forget details that are not consistent with it.** For example, you might remember correctly that he wore laced shoes of a conservative style, probably because many professors do so. On the other hand, you may forget that you saw your professor at the car wash because that is not consistent with your schema of professors. If schemas can cause us to introduce inaccuracies into our memories, why do we use them at all? The answer is that schemas are essential for our ability to function in everyday life. As I suggested in the previous paragraph, **schemas allow us to organize and respond appropriately to events in the external world.** For example, on the first day of this class, your *classroom schema* allowed you to walk in and immediately organize all of the

information you were presented with. You knew, for example, that the person standing behind the desk at the front of the class was the instructor, and that everyone else was a student. You also knew that the instructor's words were something you needed to write down, but that what other students were saying typically did not need to be written down. Because of their importance for our everyday functioning, I will talk more about schemas in the next chapter.

SQ 4-13: Discuss the issue of the reconstruction of long-term memories. In your answer, describe the "videotape theory" of memory, the concept of the engram, the relation of schemas to memory reconstruction, and the functions of schemas in everyday life.

Forgetting Long-term Memories

The major reason we are so interested in the topic of memory is that we are trying to understand why we so often forget the things we would like to remember. Of course, when we talk about forgetting something, we usually are talking about the forgetting of explicit memories: implicit memories are either explicit memories that have become unconscious (and, hence, forgotten) or memories for events that never could be consciously retrieved in the first place. Explicit memories not only may be forgotten by becoming implicit memories, they also may be forgotten when they disappear completely from the memory system or become distorted by various influences. Two theories that do *not* seem to be important for the forgetting of explicit memories are decay theory and displacement theory. **Decay theory** states that forgetting is due to **the dissipation of a memory trace (engram)**. If a memory trace dissipates (disappears), the memory will be lost. When a memory subsystem is limited in terms of the *duration* of a memory, this means that memory traces in that subsystem are decaying. For example, short-term memories last only about 15 to 20 seconds (without rehearsal) because the neural changes that form the foundation for short-term memory degrade over a short period of time. Does a similar kind of decay occur in the long-term store, thereby causing the disappearance of explicit memories? It is very difficult to answer this question with confidence. As I stated above, we find that our ability to detect a long-term memory depends upon the type of retrieval task we use: a person may recall an explicit memory, recognize it but not be able to recall it, or relearn the information more quickly even though it can be neither recalled nor recognized. Long-term memories undoubtedly change form over time (for example, an explicit memory may become an implicit one), but whether or not such memories decay naturally is almost impossible to answer. **Displacement theory** states that forgetting is due to **new information removing old information from the memory store**. When a memory subsystem is limited in terms of its *capacity*, it can be inferred that memories in that subsystem are likely to be displaced: the memory store is too small to hold much

information at any one time. Thus, when new information is added to a memory store that is already full, the new information will “push out” the information already contained in it. For example, the short-term-memory store can hold only about seven items (chunks) of information and, thus, displacement of memories (in addition to the decay of memory traces) is believed to be an important influence on forgetting from this memory subsystem. As discussed earlier in this chapter, however, it seems that the capacity of the long-term store is virtually unlimited.

Most memory researchers conclude that decay and displacement are not important causes of forgetting from the long-term store. In general, they claim that the forgetting of explicit memories can be explained by four theories: encoding-specificity theory, interference theory, reconstruction theory, and defensive theory. Let’s examine these theories more closely.

Encoding-specificity Theory

Encoding-specificity theory states that forgetting is due to **an inability to retrieve stored information when the retrieval cue is dissimilar to the form in which information was encoded for storage**. As stated earlier, we probably always need some sort of retrieval cue to get information out of long-term memory. In order to serve adequately as a retrieval cue, the stimulus must have some similarity to the way in which we have stored that information in the long-term store. For example, a memory that is encoded in a tactile form (such as a memory for how an unseen bump on your back feels) is not likely to be retrieved by a cue that is in visual form (such as a picture of that same bump). The **encoding-specificity principle** states that **the ability of a retrieval cue to facilitate (aid) the retrieval of a stored memory depends upon the degree to which it is similar to the memory code**. Let’s say that there is a particular woman in your class whom you know by sight. In this case, your long-term memory for her is encoded in a visual form (when you think of her, you see an image of her that you have retrieved from your long-term store). Now, let’s say that you get assigned to a group with this person and she calls you in order to discuss the project. In this case, you may not know who she is because her voice, which is serving as the retrieval cue, is an auditory stimulus, not a visual one. In other words, because you have encoded your memory of her in a visual form, her voice is not an adequate retrieval cue for activating this memory. In a sense, you have “forgotten” who she is.

There are more subtle examples of forgetting due to a mismatch between retrieval cues and memory codes. Let’s say that you have studied for a test primarily by memorizing the definitions of terms word-for-word. Rote memorization requires that you memorize the sounds of the words. Your memory codes for such definitions, therefore, would involve phonemic encoding. On a

multiple-choice test, the retrieval cue is the correct answer (presented as one of several choices). If the correct answer is worded exactly as it was presented in the textbook, you should have no difficulty picking it because the form of the retrieval cue is identical to the form in which you encoded it. On the other hand, if the instructor gives an answer that is worded differently from the original definition—an answer that means the same thing—then the form of the retrieval cue is not similar enough to your memory code: the retrieval cue involves a semantic (meaning) code but you have a phonemic memory code. After the test, you may even complain angrily: “I don’t know where he got those questions! I know the answers weren’t anywhere in the book or in my notes!” In a sense, you are correct; but the problem was in *the way* you studied instead of in *what* you studied. If, during your studying, you had encoded information by forming more complex memory codes for the information (codes formed by using elaborative rehearsal), you would have been better able to choose the correct answers on the test. Thus, the encoding-specificity principle shows that **how you encode information in working memory for transfer to long-term memory will affect your ability to retrieve this information later**. In order to do your best on tests, you need to elaboratively rehearse information in working memory so that you can form complex semantic codes for your explicit memories. Not only do semantic codes allow for a more enduring long-term memory, they also allow a greater number of retrieval cues to activate any particular memory.

Interference Theory

Interference theory states that forgetting is due to **an inability to distinguish several separate memories that are similar in some way**. In other words, when separate items in memory share an important similarity (for example, several separate phone numbers or several separate names), we may begin to confuse the separate items and, hence, will have more difficulty extracting any particular item from the long-term store. There are two ways that interference can cause forgetting of explicit memories: (a) old information interferes with the memorizing of new information; (b) new information interferes with our memories for old information. For example, I often have trouble learning the names of my present students because I keep getting them confused with the names of former students (the older names make it hard for me to remember the new names) and I often have difficulty remembering the names of former students because I get them confused with the names of my present students (the new names make it hard for me to remember the older names). In general, **interference is greatest when the competing items are similar in some way—the more similar, the greater the interference**.

There are limits to interference. In fact, we often find that learning similar information in two different courses can help you to better remember the information. Such facilitation of learning is probably much more common than interference. Why isn't interference occurring in this situation? Well, it is, but it depends on what we are testing for. We probably would see interference if I asked you in which of these two courses you had learned a particular item of information. But of course, no one asks you such questions on a test. Your teachers simply want you to learn the material, not also remember in which class you learned it. Thus, you should remember that interference studies are somewhat contrived and artificial: they involve rote memorization of very similar and simple material. In general, it is probably safe to say that **interference is an important cause of forgetting only when we learn similar items of information that we need to keep separate in our minds for later retrieval**. For example, parking in the lot outside of school each and every day can cause problems when you are trying to remember where you parked today: you probably keep getting this confused with where you parked during the past week. Nevertheless, parking in the same lot each day also facilitates your learning of other material. For example, you probably have learned a great deal about where you are most likely to find an open space at a particular time.

Reconstruction Theory

Reconstruction theory states that forgetting occurs because **the process of retrieval from the long-term store distorts memories in particular ways**. That is, as I have already discussed, information stored in long-term memory contains only a fraction of the details making up the original event, thereby resulting in many gaps. Whenever we retrieve this information, we transform it to some degree by filling in these gaps with information obtained from other sources, especially from schemas activated by the situation in which we find ourselves. When reconstructing a memory, any schema activated at the time of memory retrieval will tend to distort the memory in such a way that it will become more consistent with the schema. This distorted memory will be retained in the long-term store until the next retrieval. Over time, the memory may become so transformed that it bears little resemblance to the original event. There is little doubt that this is an important reason for forgetting from the long-term store.

Let's look at an example. Two cognitive psychologists, Ulric Neisser and Nicole Harsh, decided to take advantage of a highly publicized tragedy, the explosion of the space shuttle *Challenger*, to study something called "flashbulb memories." **Flashbulb memories** are defined as **long-term memories of emotionally intense events that are thought to be encoded in very vivid and enduring detail**. This idea is based on the common belief that memories for very upsetting events (such as the memories of eyewitnesses to the assassination of

President Kennedy or the sinking of the *Titanic*) are remembered for the rest of one's life in very vivid detail. The day after the explosion of the *Challenger*, Neisser had the students in his introductory psychology course fill out a questionnaire asking them to describe the situation in which they first heard the news of the disaster (where they were when they heard about it, how they found out, who was with them, what they were doing, and what time it was). Since the event had occurred only 24 hours before, the memories of most students should have been highly accurate. Three years later, Neisser and Harsh gave the same students a new copy of the questionnaire. At the second testing, the students were asked to answer again the questions they had answered three years before and then to rate how confident they were in their answers. The researchers compared the first set of answers to the second set for each student. It was discovered that only three of the 44 students (about 7%) remembered perfectly, whereas 11 of the 44 (exactly 25%) had completely inaccurate memories of where they had been, who they were with, what they had been doing, and what time it was, when they had heard about the disaster. Everyone else had a mixture of accurate and inaccurate memories. For example, one student gave the following answers on the first testing: "I was in my religion class and some people walked in and started talking about [it]. I didn't know any details except that it had exploded and the schoolteacher's students had all been watching which I thought was so sad" (quoted in Ofshe & Watters, 1994, p. 39). Three years later, this same student stated: "When I first heard about the explosion I was sitting in my freshman dorm room with my roommate and we were watching TV. It came on a news flash and we were both totally shocked. I was really upset and I went upstairs to talk to a friend of mine and then I called my parents" (p. 39).

Neisser and Harsh showed that over 90% of their subjects had memories that contained at least one major inaccuracy, with a quarter of the people retrieving a completely false memory. What is even more surprising is that those who had completely inaccurate memories were just as confident in the truth of their remembrances as those who had completely accurate memories! For example, the student whose answers I just quoted had complete confidence in her memories: she was absolutely certain that her false memory was perfectly true. In fact, one semester after the second testing, the researchers allowed all the students to look at their answers to both questionnaires. Neisser and Harsh predicted that those who had misremembered the original incident would realize this after reading their answers to the first questionnaire and change their remembrances. But not one student did so. Although most were upset by the differences between the two sets of answers, their false memories did not change. Why did the memories of these students change over the three-year period between the two questionnaires? Of course, we can never know for certain. But it is likely that they had combined memories of various events as they reconstructed the memory over the years. In addition, various schemas that were activated as they

repeatedly recalled the memory led to the incorporation of incorrect details into the memory. For example, someone who had been in class when they had heard about the disaster might later remember that they had been in their dormitory room because, a couple years after the event, they were recalling it with someone who had lived in their dormitory at the time of the disaster. That is, their *dormitory schema* was activated at the time they were remembering the tragedy, and some of its details were incorporated into the memory.

In general, then, reconstruction theory states that long-term memories are stored as small fragments of information that must be put together again whenever we try to retrieve a memory. Any gaps in the memory will be filled in automatically with other knowledge without any awareness on our part. Loftus and Ketcham (1991) concluded that the process of memory reconstruction introduces inaccuracies into each and every long-term memory that we retrieve:

Memories don't just fade, as the old saying would have us believe; they also grow. What fades is the initial perception, the actual experience of the events. But every time we recall an event, we must reconstruct the memory, and with each recollection the memory may be changed—colored by succeeding events, other people's recollections or suggestions, increased understanding, or a new context.... Truth and reality, when seen through the filter of our memories, are not objective facts but subjective, interpretive realities. We interpret the past, correcting ourselves, adding bits and pieces, deleting uncomplimentary or disturbing recollections, sweeping, dusting, tidying things up. Thus our representation of the past takes on a living, shifting reality; it is not fixed and immutable [unchangeable], ...but a living thing that changes shape, expands, shrinks, and expands again, an amoebalike creature with powers to make us laugh, cry, and clench our fists. Enormous powers—powers even to make us believe in something that never happened. (p. 20)

The reconstruction theory of forgetting is supported by a great deal of evidence; and it has changed dramatically how we look at memory. It also has important implications for practical matters, such as testimony in legal cases and therapy in which clients try to recall events from years before. I will talk more about memory reconstruction later in this chapter when I discuss the controversial issue of therapies designed to retrieve forgotten traumatic memories.

Defensive Theory

Defensive theory states that forgetting is due to **the removal of mental content from consciousness because it causes too much anxiety when attention is focused on it**. In other words, this theory states that a person may transform an explicit memory into an

implicit one when the information contained in the memory distresses him/her. According to this theory, people do this because, if they no longer are aware of the memory, then their distress disappears. For example, if you had seen one of your parents temporarily become very ill when you were a young child, your memory for this event (even after the parent had recovered) may have caused you a great deal of anxiety. If you were not able to cope at this time with your memory of the event (for example, if you were too young to be able to say to yourself something like, “well, that was upsetting, but now it is over and everything is alright”), then you would have felt severe anxiety whenever you remembered it. At this point, according to defensive theory, you may have transformed the explicit memory into an implicit one by using what I will call “defensive forgetting.” If you do not now remember certain traumatic events from your childhood that you know happened (because others have told you they did), defensive theory states that defensive forgetting may be the cause. Because this is a very controversial idea in modern psychology, I will discuss it in some detail in the next section.

SQ 4-14: Which theories best explain how we forget from short-term memory? In as much detail as you can, discuss the four major theories of forgetting of explicit memories from long-term memory. Think of an example for each one.

The Controversy Over Implicit Memories: The Problem With Psychodynamic Explanations

Why would explicit long-term memories become transformed into implicit memories that are difficult or impossible to bring into awareness? For example, why do you sometimes have a word on the tip of your tongue? And why, if you finally do remember the word, can you not describe the thought processes that led you to remember it? Over the years, many different answers have been tentatively offered to such questions. In general, there are two approaches to answering these questions. One approach offers answers that reflect a cognitive view of the unconscious, whereas a second approach offers answers that reflect a psychodynamic view of the unconscious. As I stated at the beginning of this chapter, when we speak of the **cognitive approach**, we are talking about the **transfer of information between different parts of the mind** (I will discuss the cognitive view of the unconscious in the next chapter). When we speak of the **psychodynamic approach**, we are talking about **the effects on behavior and mental events of mental forces (motivations) that are in conflict with one another**. According to the psychodynamic approach, basic needs and desires in one part of your mind may conflict with basic needs and desires in other parts of your mind. For example, perhaps one part of your mind wants to continue reading this book (so that you can do well on the test) but another part

wants to stop reading and watch television instead (because you are getting bored). You are experiencing a conflict of motivations that you will have to resolve in some way (perhaps by trying to read while watching television). Psychodynamic psychologists believe that much of the mental content contained within the unconscious is there because of motivational conflicts. In the rest of this chapter, I want to critically examine this approach to the unconscious.

The Psychodynamic Unconscious

The **psychodynamic unconscious** is thought to be the part of the mind that contains **mental forces and content (desires, thoughts, and emotions) toward which selective attention cannot be directed**, often because these mental forces and content cause too much distress when they reach awareness. In other words, those who use this concept believe that we place distressing mental events into the unconscious because we feel better if we are not aware of them. According to psychodynamic theorists, “repression” is the most important way we have of forgetting upsetting memories. **Repression** is defined as a **mental process that pushes mental content into the unconscious**. Although removed from conscious awareness, the repressed feelings and memories still exist at the unconscious level and are thought to express themselves indirectly in various signs and symptoms, such as unusual sensations in the body, paralysis of parts of the body, depression, or overeating. In order to understand better what repression is, let’s look at an example. Fredrickson (1992) described the case of “Sarah,” who had a very unusual experience one morning that may have been caused by unconscious forces involving repression. According to Fredrickson:

Sarah was walking in the bright summer sunshine with her husband of six months. She was relaxed, enjoying her new husband, the beautiful day, and the brisk, invigorating exercise. She thought, “I have never been so happy.” Suddenly, she was gripped by a wave of pure terror. She could not breathe, and her whole body began to tremble. Paralyzed by fear, she was convinced she was dying. Her husband desperately tried to convince her that she was having a panic attack, not a premonition of her own death. (p. 22)

And Sarah undoubtedly was having a panic attack (feelings of terror and dread that occur along with various bodily symptoms such as a rapid heartbeat and trembling). Fredrickson was convinced that the cause of Sarah’s panic attack was a set of repressed memories of childhood sexual abuse. Because these memories can be so distressing, Fredrickson argued, a person will experience severe anxiety and even panic if the memories begin to surface into conscious awareness. Fredrickson claimed that this is what had happened to Sarah that bright summer

morning. Sarah also showed other unusual behaviors, thoughts, and emotions that seemed consistent with possible effects of repressed memories of sexual abuse: she often became very anxious if the doors of bathroom stalls were closed; she experienced frequent nightmares; and she suffered from depression. According to many therapists, repressed memories may remain in the unconscious for years (even for the rest of one's life); but it is thought that they typically indicate their presence by causing behaviors, emotions, and thoughts uncharacteristic for that person or that seem to erupt from nowhere. During therapy with Fredrickson, Sarah began to have fleeting images and, finally, full memories of being sexually abused by family members during her childhood. These remembrances seemed to confirm Fredrickson's initial suspicion that Sarah had been sexually abused and had repressed the memories of this abuse.

The fact that the evidence for repression primarily involves case studies should make you skeptical of the claims made by therapists who use this defense mechanism to explain abnormal thoughts, emotions, and behaviors. As we discussed in an earlier chapter, case studies have two major flaws: (1) they do not allow us to rule out the directionality problem or the third-variable problem; and (2) the biases of the researcher (or even the subject) have a large influence on the information collected and emphasized in the interpretation of a case study. The second problem may be the more important one here. In fact, we see some evidence for this problem in Fredrickson's belief that sexual abuse during childhood occurs very often in her clients (and in the wider society, as well). This belief, which Fredrickson claimed developed only after her experiences with treating and lecturing about childhood sexual abuse, undoubtedly influenced many aspects of her therapeutic approach, including the questions she asked of her clients and the ways in which she interpreted their answers as well as their more spontaneous behaviors and utterances: "I began to listen to my clients with focused attention to the possibility of buried memories. Strange dreams, half-finished sentences, strong reactions to abuse issues, and imagery that persistently bothered my clients began to take on new meaning" (p. 15). All of these experiences (except for the upsetting imagery), however, are common ones in the general population. Is it possible that Fredrickson's growing belief that many of her clients were sexually abused caused her to incorrectly interpret such common experiences and behaviors in people? Even if we answer, "yes," to this question, however, it still does not explain the source of the abuse memories apparently retrieved by her clients. If these memories are accurate, then it seems reasonable to conclude that people who have experienced upsetting events use repression to protect themselves from the distress caused by remembering these events. There is evidence, however, that such memories are not always (or even often) completely accurate. In fact, there are good reasons to conclude that memories seemingly retrieved during certain types of therapy are often false. This evidence has led many researchers and therapists to criticize the concept of repression

and the notion of the psychodynamic unconscious that goes along with it. Let's examine some of this evidence and some of these criticisms.

SQ 4-15: Briefly describe the psychodynamic approach to the study of the unconscious. In your answer, define what is meant by psychodynamics, define what is meant by a defense mechanism, and explain what repression is thought to do. Why is it difficult to identify when repression is occurring? What is the evidence for repression? Describe two problems with this evidence.

Therapy for Retrieving Repressed Memories

As discussed above, those who accept the concept of repression believe that the memory of a distressing event can cause us to feel so much anxiety that we often will push it away from the conscious part of our minds, thereby eliminating our anxiety. Sigmund Freud—who used the concept of repression as the cornerstone of his approach to mental disorders—believed that everyone repressed various experiences from childhood. For example, **infantile amnesia**—the **forgetting of much of our lives before the age of about four years**—was attributed by Freud to repression caused by the anxiety surrounding intense sexual and aggressive impulses he believed we felt towards our parents during early childhood. Therapists inspired by Freud believe that, under certain circumstances, repressed memories can enter consciousness. For example, when a person experiences an event that has similarities to the repressed event, the implicit memory may break through the barrier of repression and enter consciousness. But the best way to become aware of a repressed memory, most believe, is to make repeated attempts to retrieve it during therapy. I will refer to **the therapeutic procedures used to retrieve repressed memories as recovered-memory therapy**. Recovered-memory therapy is performed in a variety of ways, but they all tend to share important similarities. (Although I will describe these similarities by discussing therapies for the retrieval of sexual-abuse memories, the techniques used in such therapies are the same as those used to recover other kinds of traumatic memory.)

There are two major steps to the therapeutic recovery of memories of sexual abuse: (1) An authority figure (often a therapist) suggests to a person that he/she probably has repressed memories of sexual abuse. (2) After the person (whom I will refer to as the “client”) accepts the possibility of abuse, he/she begins to use techniques thought to allow access to the unconscious. Let's consider first the influence of suggestion. As I stated earlier, those who use the psychodynamic approach believe that repressed memories are expressed in the form of abnormal behaviors, thoughts, or emotions. For example, Fredrickson (1992) presented a checklist of symptoms to clients that she believed indicates the likelihood of repressed memories of sexual abuse. A sample of 24 of the 63 “common warning signals of repressed memories” follows:

I showed no interest in sex until I was in my twenties.
 I feel as if there is something wrong or bad about my sexuality. *
 I have had a period of sexual promiscuity in my life. *
 I often have nightmares.
 I have difficulty falling or staying asleep. *
 Sometimes I fear or sense that someone is in my bedroom. *
 I remember vividly one or more nightmares from my childhood. *
 I am frightened of one or more common household objects.
 Basements terrify me. *
 I neglect my teeth. *
 I have often taken foolish risks with my safety.
 I have had periods in my life when I couldn't eat, or I had to force myself to eat. *
 Certain foods or tastes frighten me or nauseate me. *
 I hate my body. *
 I avoid going to the gynecologist, or I dread it terribly. *
 I have an addiction to drugs or alcohol. *
 I do some things to excess, and I just don't know when to quit. *
 There have been times when I was very suicidal.
 I have unexplained bouts of depression. *
 I identify with abuse victims in the media, and often stories of abuse make me want to cry. *
 Sometimes really violent or strange pictures flash through my mind. *
 I startle easily.
 I can't remember much of my childhood. *
 I space out or daydream. *
 (Fredrickson, 1992, pp. 48-51)

A very important question first needs to be answered before we can use this list to detect repressed memories of sexual abuse: are the items in this list valid indicators of repressed memories of sexual abuse? The answer seems to be "no." There are two serious problems with this list and others like it: (a) no controlled research has ever shown that sexual abuse is more likely to lead to this cluster of problems than other kinds of traumatic (or even nontraumatic) experiences; (b) no controlled research has ever shown that *repressed memories* of sexual abuse (or any other traumatic event) lead to such problems. In fact, many of the problems are ones that anyone in the general population might show (I placed an asterisk after each of the "signs" that seemed to me to be common). It

seems obvious that the sole purpose of this list is to *suggest* to clients that they may have repressed memories. It is hard to avoid this conclusion after reading the instructions for the proper use of the list:

Check each item that applies to you, *even if in a different way than the question indicates*. There is no specific number of checkmarks needed to “prove” you have repressed memories. *This list is only to help you start thinking about warning signals you may have missed or to validate signals that you feel might be clues to your abuse.*

No single item is a certain indicator of repressed memories. People who have not been sexually abused have nightmares, overeat, and sometimes hate their bodies, but if you check several times in each category or nearly all the items in a single category, *you will want to consider the possibility that you have repressed memories.* (Fredrickson. 1992, p. 47; italics added)

It is likely, however, that almost anyone will check off a large number of items (especially considering that one of the instructions states that you should check off any “item that applies to you, even if in a different way than the question indicates”). In trying to be conservative, I still checked off 31 of the 62 items that applied to me (since I have no reason to go to a gynecologist, I didn’t count that item; but the thought of doing so still frightens me, so perhaps I should include it). In fact, I checked off 70% of the items in one of her seven categories (Fredrickson suggested that checking off nearly all the items in a single category was an important sign of repressed memories). If I had been seeing a therapist who believed this checklist was a valid indicator of repressed memories of sexual abuse, it is probable that he/she would have informed me that I am likely to have such memories. Such a suggestion coming from a respected authority figure can have a powerful effect on people in therapy: either they will terminate therapy immediately (perhaps because they fear what they will discover) or they will begin an active search for their repressed memories.

The second major step in recovered-memory therapy involves repeated attempts to become aware of repressed memories. There are many techniques used to recover repressed memories. Most of these techniques emphasize two general procedures: (a) clients are encouraged to imagine the traumatic events they are suspected of having repressed; (b) clients are encouraged to reinterpret mundane experiences as direct expressions of repressed memories and are told that, if they focus on these experiences, they will be led to the memories. With regard to the first procedure, clients try to fill in the details of what they believe has happened to them by using various techniques such as the following: they tell a story about what they think happened to them; they try to focus on the

details of any visual images they have (ones they believe to be partial memories of actual events); or they free associate (that is, they state out loud everything that is going through their minds without censoring themselves). With regard to the second procedure, therapists try to show their clients that everyday experiences involving their thoughts, emotions, or bodily sensations are expressions of the unconscious that will help them to remember their sexual abuse. For example, clients may recount dreams for their therapist, who will then lead them through interpretations that suggest that elements of the dream are actually parts of a repressed memory; the therapist may help clients to interpret normal or abnormal bodily sensations as “body memories” of sexual abuse; or clients who experience frequent feelings of sadness and anger may be encouraged to interpret these emotions as a normal response to repressed memories that will help them (if these emotions are expressed completely) to release the associated memories. Along with these two general procedures, clients in therapy often are subjected to hypnotic inductions that are thought to create a state of consciousness (a “hypnotic trance”) that allows direct access to unconscious material. I will examine the use of hypnosis later in this chapter.

SQ 4-16: List the two major steps of recovered-memory therapy. What is one way in which it is suggested to clients that they might have repressed memories? What is a problem with this technique? Briefly describe the two major procedures used to help people retrieve their repressed memories.

Criticisms of the Concept of Repression

Now that I have given a brief overview of recovered-memory therapy, I will examine it in light of what I discussed above about the formation and retrieval of long-term memories. Although the concept of repression is widely accepted among therapists and the general public, the evidence for it is not very good. There is one major problem with most research on repression: **because repression is thought to work unconsciously—and, thus, has no unambiguous (clear) effects on our conscious mental events and behaviors—it is difficult to find examples of this defense mechanism that cannot be explained in other ways.** One needs controlled research to rule out the various possibilities. As I stated earlier, the evidence supporting repression consists mostly of clinical case studies that use some version of recovered-memory therapy. Case studies, however, involve the use of uncontrolled research situations. The results of few (if any) laboratory studies using adequate controls give support to the concept of repression. As Holmes (1990) concluded in his review of decades of research on repression: “despite over sixty years of research involving numerous approaches by many thoughtful and clever investigators, at the present time there is no controlled laboratory evidence supporting the concept of repression” (p. 96). He stated that clinicians often dismiss these studies and instead focus on evidence involving

case studies. Holmes, however, correctly argued that case studies do not provide adequate evidence for any claim, including claims about the existence of repression. He suggested in jest that anyone using the concept of repression should also provide the following cautionary label: “Warning. The concept of repression has not been validated with experimental research and its use may be hazardous to the accurate interpretation of clinical behavior” (p. 97).

Because of this lack of controlled experimental evidence for repression, cognitive psychologists have questioned whether or not repression actually occurs. They are especially concerned about those “memories” that return after weeks, months, or years of therapeutic work. They base their criticism on the evidence for reconstruction theory showing that, when we retrieve a long-term memory, we reconstruct it by combining the fragments of information contained in the activated engram with the large amount of information contained in activated schemas. In this view, as I stated earlier, each reconstructed memory is always a combination of fact and fiction. In other words, **according to reconstruction theory, all of our memories are inaccurate to various degrees.** When a person is strongly encouraged to retrieve memories of events that may not have occurred (as they are in recovered-memory therapy), it seems possible that memory reconstruction could lead to predominantly false memories—memories that include true but irrelevant details surrounded by a fictional story. For example, clients receiving recovered-memory therapy often are encouraged to visualize traumatic childhood events that they suspect may have occurred. It is plausible that such a technique could activate schemas that then might be incorporated into the reconstructed “memory.” Ofshe and Watters (1994) suggested that the process could occur something like this:

Picture an elephant. Imagine an apple. Now spend a moment visualizing an image of being sexually assaulted by one of your parents. It is an often distressing trick of the mind that it will create any event regardless of our desire to visualize that event. What separates an imagined image from a memory image is not a simple matter, for even imagined events are themselves largely built from memory. Our ability to imagine an elephant would be impossible if we didn’t have a memory of having seen an elephant or a picture of the creature. Similarly, our ability to...imagine a sexual assault by a parent would also come from an amalgam of memories. To create this image we might use recollections of our parents’ physical appearances and of ourselves as children. We might place the scene in the memory of our childhood room. To create the action of the scene, we might use memories of other people’s descriptions of sexual assaults or of abuse scenes depicted in books or movie dramas. In the end, all the pieces of the imagined event would have something of the weight of memory. (p. 107)

All these various schemas might be combined with bits of remembered events from childhood (for example, the night one of your parents came into your bedroom to open your windows after the air conditioner broke) to produce a remembrance that contains a small slice of truth and a large amount of fiction—a remembrance that accords with the therapist’s suggestion that you have repressed memories of traumatic events. The question we now need to answer is this: are we so good at filling in gaps in our memories that we can create a traumatic memory that is almost completely false (and without realizing that we are doing this) when we are encouraged to do so by an authority? Can we do so even when no therapist has influenced our remembrances? Let’s examine some of the research that addresses these questions.

The Creation of False Memories of Traumatic Events

There is much anecdotal evidence that suggests that we are able to create false memories of traumatic events in everyday life. For example, Elizabeth Loftus, a well-known memory researcher, described a false memory she developed in adulthood of a traumatic event from her adolescence. When she was 14 years old, she went on a vacation with her mother and her aunt to visit a relative. One morning, she awoke and was told that her mother had drowned in the swimming pool. Loftus did not see her mother’s body because it had been found by her aunt before she had awakened. Nevertheless, many years later, when an uncle misremembered that Loftus had found her mother’s body, she quickly constructed a false memory:

Thirty years later...a relative informed me that I was the one who found my mother in the pool. After the initial shock—*No, it was Aunt Pearl, I was asleep, I have no memory*—the memories began to drift back, slow and unpredictable.... I could see myself, a thin, dark-haired girl, looking into the flickering blue-and-white pool. My mother, dressed in her nightgown, is floating face down. “Mom? Mom” I ask the question several times, my voice rising in terror. I start screaming. I remember the police cars, their lights flashing, and the stretcher with the clean, white blanket tucked in around the edges of the body.... For three days my memory expanded and swelled. Then, early one morning, my brother called to tell me that my uncle had checked his facts and realized he’d made a mistake: His memory, it turned out, had temporarily failed him. Now he remembered (and other relatives confirmed) that Aunt Pearl found my mother’s body in the swimming pool. (Loftus & Ketcham, 1994; p. 39)

Loftus explained that all “it took was a suggestion, casually planted, and off I went...eagerly searching for supporting information” (p. 40). **Suggestion is probably the most important**

factor in the construction of false or inaccurate memories. Because of her uncle's off-hand suggestion that she had found her mother's body, Loftus was quickly led to construct a vividly detailed memory that was false in almost all of its details.

As another example, we can examine a false memory of a traumatic event constructed by Jean Piaget, the famous Swiss psychologist who developed a very influential theory of cognitive development:

One of my first memories would date, if it were true, from my second year. I can still see, most clearly, the following scene, in which I believed until I was fifteen. I was sitting in my pram [a baby carriage], which my nurse was pushing in the Champs Elysées [a famous avenue in Paris], when a man tried to kidnap me. I was held in by the strap fastened round me while my nurse bravely tried to stand between me and the thief. She received various scratches, and I can still see them on her face.... When I was about fifteen, my parents received a letter from my former nurse...she wanted to confess her past faults, and in particular to return the watch she had been given as a reward.... She had made up the whole story.... I, therefore, must have heard, as a child, the account of this story, which my parents believed, and projected into the past in the form of a visual memory. (quoted in Loftus & Ketcham, 1994, pp. 76-77)

Perhaps you have memories from your earliest years. Piaget's anecdote shows that such memories may be constructed from stories you have heard from others (especially those of trusted family members). These stories would act as suggestions for the development of memories that, although usually true (since the events probably did occur), were not encoded from your own first-hand experience of the events. Instead, they were encoded from the remembrances of others. It would be impossible at this point in your life to decide whether these memories were actual remembrances or were constructed "second-hand" based on the stories you heard from others. Nevertheless, if you have any detailed memories that date from before about 3 1/2 years of age, it is probable (though not certain) that they are fabrications constructed second-hand.

But anecdotes such as those told by Loftus and Piaget can only suggest possible directions for more controlled research: with anecdotes, one cannot rule out alternative explanations of a phenomenon. Therefore, if we are to reach any firm conclusions, we need to examine the results of well-controlled research (that is, we need to regulate the research situation in such a way that all alternative explanations but one are excluded). Loftus, her colleagues, and her students did this with a series of formal and informal studies that we may call the "lost-in-the-shopping-mall"

studies. For each subject in these investigations, an older family member suggested to the subject that he/she had been lost in a shopping mall at the age of five years (interviews with family members were used to confirm that this had never actually happened to the subject). For example, a student in one of Loftus' courses tried it with his 14-year-old brother, Chris. He told Chris that he had been lost in a shopping mall in Spokane when he was five years old, and that he had been found by a "tall, oldish man" who might have been wearing a flannel shirt. This was an incident that had never happened (an interview with the mother confirmed this). A few weeks later, after he had been encouraged by his brother to try to remember the incident, Chris had developed a very detailed false memory:

I think I went over to look at the toy store, the Kay-Bee toys and, uh, we got lost, and I was looking around and I thought, "Uh-oh. I'm in trouble now." You know. And then I . . . I thought I was never going to see my family again. I was really scared, you know. And then this old man, I think he was wearing a blue flannel, came up to me . . . he was kind of old. He was kind of bald on top . . . he had like a ring of gray hair . . . and he had glasses. (Loftus & Ketcham, 1994, p. 98)

When Chris finally was told that he had never been lost in the shopping mall, he did not believe it. His memory of the imagined incident was so vivid that he still felt as if it must be true: "I remember being lost and looking around for you guys. . . . I do remember that. . . . And then crying and Mom coming up and saying. 'Where were you? Don't you ever do that again!'" (p. 99). But being able to create a false traumatic memory in a single case is not evidence for the claim that such a process occurs in many people. Thus, several other people, ranging in age from eight to 42 years, were given suggestions by older family members that they had been lost in malls or stores at the age of five or six. All five developed false memories of the imagined incident. For example, 42-year-old Bill was told by his older sister that he had been lost in a department store when he was a young child. He developed a vivid false memory: "I felt panicky—where were Mom and Linda? I felt scared . . . I remember going up and down the stairway at Sears. I remember the elevator bell at Sears" (p. 99). But again, these examples were not very well-controlled: somewhat different suggestions had been made to each subject. Thus, Loftus and Pickrell (1995) designed a tightly controlled experimental situation in which they attempted to replicate these findings. They found that 29% of the subjects constructed false memories after an older family member had suggested to them that they had been lost in a shopping mall at five years of age. When one considers that the encouragement to develop a false memory was very mild compared to what occurs in recovered-memory therapy, the proportion developing false memories of the imaginary incident is quite high.

In general, we can conclude that false memories are most likely to develop when the following two conditions occur: **(1) an authority suggests to a person that he/she has experienced an event; (2) the person tries repeatedly to remember the suggested event** (especially by visualizing what they think might have happened). Nevertheless, even when these two influences are operating, many people still will not develop false memories. Thus, there must also be other factors that influence their development (for example, psychological factors such as the ability to visualize easily). We must also be cautious about going too far with our conclusions about false memories: although many people develop false memories, this cannot prove that repression never occurs. All we can conclude is that we should never accept a “recovered memory” at face value. There are two problems with doing this: (a) we know that false memories of traumatic events can occur; (b) there is nothing that distinguishes true from false recovered memories (they can be equally vivid and believed with equivalent amounts of certainty). **If a person has no memory of an event until many years after its occurrence, and this remembrance occurs only after an authority has suggested the existence of this memory, there is good reason to doubt the accuracy of the recovered memory.** The authority behind a suggestion can be of many types. For example, the suggestion may come from therapists, family members, authors of popular books or magazine articles, or guests on television talk shows. In addition, support groups for those who believe that they have experienced various traumatic events (such as sexual abuse, alien abductions, or membership in a satanic cult) often exert subtle pressures on members to remember events that may not have occurred. Because a primary purpose of such support groups is to help members recall forgotten events, a person who cannot remember will tend to be ignored by other group members, whereas someone who can recall vivid details will tend to be given a great deal of attention. Thus, it can be socially rewarding to “remember” (that is, to construct a false memory), especially for the lonely, depressed, or anxious people who often make up such groups. On the other hand, **if you have always remembered that a traumatic event has occurred to you** (that is, you have never forgotten it even if you have tried not to remember it on occasions), **then there is good reason to believe that the event did occur.**

SQ 4-17: According to what you know about reconstruction theory, what is the major problem with pushing someone to retrieve memories of forgotten events (or events that may not have occurred in the first place)? Describe some anecdotal evidence for the claim that we can develop false memories of traumatic events. Describe some evidence from controlled experimental research for the claim that we can develop false memories of traumatic events. List the two essential conditions for the construction of a false memory of a traumatic event. Why should we never

immediately accept the truth of a memory that has been retrieved during recovered-memory therapy?

The Importance of Suggestion

I have mentioned several times an influence that I have referred to as “suggestion.” I have stated that suggestion can have powerful effects on our experience. I have used it to argue that therapists need to be careful what they say to their clients and how they say it. But what evidence do I have for attributing such an important influence to suggestion? Before continuing with the discussion of repressed and false memories, let me explain why we need to control for the effects of suggestion in psychological research. I define **suggestion as the automatic acceptance of an idea by a person who then acts on the idea without any critical reflection.** In other words, what people say to you (or what they simply imply by their actions) can influence how you interpret your experience of a situation and, thereby, what you do in that situation. In most cases, this influence occurs without you even realizing it. In fact, you probably use suggestion often to influence the behaviors of others. For example, perhaps you have tried to get a child to go to bed by telling the child that he/she looks very tired. You were trying to make the child feel more tired through suggestion. Suggestion affects our beliefs about a situation and **our beliefs about a situation influence what we perceive (or observe) in that situation.** If another person defines a situation in a particular way, especially if you think of that person as an authority, you tend automatically to interpret the situation in a way different than you might have.

Suggestion has often been shown to be a problem in scientific research involving human judgements. A famous example is the research on something called “N-rays” at the beginning of the twentieth century. In 1903, soon after the discovery of X-rays and other previously unknown types of electromagnetic radiation that could not be seen with the naked eye, a French physicist by the name of René Blondlot discovered what he called N-rays (named after the University of Nancy, which was where he did his work). N-rays seemed to affect the perceived brightness of objects. For example, Blondlot claimed that N-rays increased the perceived brightness of electric sparks. A large amount of research seemed to show that N-rays were emitted from the sun, flames, and glowing objects. It was also concluded that certain substances, such as the fluids in the eye, absorbed N-rays and then emitted them later. Thus, after N-rays were beamed into the eyes, it seemed that people were better able to see in darkened rooms, apparently because the N-rays coming from their eyes increased the brightness of objects in the room. Most of these findings were supported by dozens of studies in different laboratories. It seemed certain that Blondlot had found something very important. But there were skeptics who doubted that N-rays existed. They were unable to replicate the findings in their own laboratories. They pointed to a basic problem in

the observations of the effects of N-rays. In all of the studies supporting the existence of N-rays, the experimenter judged by sight whether or not the object being bombarded with N-rays had increased in brightness. Can you see a problem with this method? If you recall the discussion of subjective versus objective observations from Chapter 2, you should immediately be able to criticize the studies supporting the existence of N-rays. The observations used to detect N-rays are highly subjective (which I defined in Chapter 2 as “observations that result primarily from a person’s thoughts and feelings”). **When observations are subjective, the effects of suggestion can have a large effect on the findings.** In this case, if the suggestion is made that N-rays are being beamed at an object, the experimenter may perceive an increase in brightness even when the brightness has not changed.

What is a good way to test for the effects of suggestion on a person’s observations of a phenomenon? Let’s look at the example of N-rays to answer this question. How could you test that suggestion is affecting the perceived brightness of objects? Think about this before you read on. One good way to test whether or not suggestion is changing a person’s perceptions in this situation is to make that person believe incorrectly that N-rays are being beamed at an object and then ask him/her if the brightness of the object has increased. In other instances, you can beam N-rays at an object but tell the person that you are not doing so. An American physicist by the name of Robert Wood performed these manipulations in Blondlot’s laboratory in 1904:

N-ray experiments had to be carried out in a darkened laboratory.... This gave Wood an opportunity to make several observations that proved Blondlot’s judgements of brightness changes were a function of his beliefs, and not of the presence or absence of N-rays. In one experiment, Wood was to block an N-ray source by inserting a sheet of lead between the source and a card with luminous paint on it [Blondlot had found that N-rays could not penetrate lead].... Without telling Blondlot, Wood changed the experiment in one slight but vitally important way. He would indicate to Blondlot that the lead sheet was blocking the N-ray source when it really wasn’t, or vice versa. If N-rays really existed, Blondlot’s judgements of the brightness of the luminous paint should be a function of whether the lead screen *really* was between the card and the N-ray source and should have no relationship to whether or not he *believed* the sheet was blocking the source.... [Wood found that if Blondlot] believed the screen was present (blocking N-rays), but it wasn’t, he reported the paint to be less luminous. If he was told the screen was not present (allowing N-rays to pass), but it really was, he reported the paint to be more luminous. (Hines, 1988, p. 10; italics added).

Thus, it was the observers' beliefs about what was happening, not what actually was happening, that influenced their judgements of brightness. Other experiments performed by Wood, similar in form to this one, gave no evidence that N-rays existed. Hence, Wood concluded that the results of all the previous studies supporting the existence of N-rays had been contaminated by the effects of suggestion. Although he could not prove the nonexistence of N-rays (just as we cannot prove that Santa Claus does not exist), he was able to conclude that there was no good evidence for believing that N-rays did exist. What is most interesting to me about this story is that Blondlot never gave up his belief in N-rays: "convinced until the end that N-rays were real, [Blondlot] pursued his research on the topic until his death in 1930" (p. 11).

Another example of the powerful effects of suggestion is seen with the "placebo effect." The **placebo effect**, which is often observed in the study of medical and psychological treatments, occurs when **the subject's belief that a treatment is being received, even when it is not, is enough to make the subject feel better**. For example, depressed people who believe that they are taking the antidepressant Prozac, but who actually are taking a "placebo" (a pill with no active substance in it), will tend to feel much better than people given no placebo. In fact, the placebo effect is about twice as strong as the effect of the antidepressant itself! It is the belief a person has about the placebo that is important, not anything in the pill itself. People may even become addicted to placebo pills if they believe that the improvement of their mental state is due to the placebo. A study of the effects of self-help audiotapes on memory and self esteem is relevant to the possible importance of placebo effects in psychotherapy. Anthony Greenwald and his colleagues (their research is summarized in Stanovich, 1998) studied self-help tapes that were claimed to act subliminally (that is, the part that was supposed to improve memory or self-esteem was presented below the level of awareness). Some subjects got a memory tape that was mislabeled "self-esteem tape," whereas other subjects got a self-esteem tape that was mislabeled "memory tape." Those subjects who received the memory tape labeled as a self-esteem tape scored higher on a test of self-esteem. Those subjects who got the self-esteem tape labeled as a memory tape scored higher on a test of memory. That is, it was the subjects' beliefs about the tape, not the actual content of the tape, that affected their scores on subsequent tests. This result implies that psychotherapies that seem to improve a client's symptoms may do so not because of the content of the therapy, but because of the client's belief that the therapy will be effective.

There is one very important point you should remember about this topic: suggestion can cause people to misinterpret their experiences to such a degree that they may later reject undeniable evidence that their interpretations were wrong. We saw this in the case of Blondlot and his N-rays. **It is a very general principle that, once people have developed a belief about their**

experiences, they tend to be very reluctant to give up this belief, even when they are presented with definite evidence that the belief is incorrect. (We saw this general principle in action in the case of the students who misremembered what they had been doing when they heard about the explosion of the space shuttle, *Challenger*). There are many causes of this general reluctance to reject incorrect beliefs; but one important cause is that people often don't understand the degree to which suggestion can affect their experiences. Thus, they continue to believe that reality is something other than what it actually is. In a sense, suggestion can result in the development of a "delusional belief" (a firmly held false belief for which there is no or even contradictory evidence) such as in the examples of false memories presented above. We all hold such "delusional" beliefs, partly because we don't always realize how we might be led astray by incorrect interpretations of our experiences caused by suggestions. That is why there is no substitute for experimental studies that control for the effects of suggestion on human mental events and behavior. When faced with evidence from such controlled research—evidence that contradicts what we thought our experience was telling us about a phenomenon—we must be prepared to give up our incorrect beliefs about the phenomenon. This lesson will be emphasized in the last section of this chapter in which I discuss research showing that hypnotic phenomena often are affected by suggestion.

SQ 4-18: Define suggestion and discuss how suggestion can influence the manner in which we interpret our experiences of the world. In your answer, describe the relevance of research on N-rays and the placebo effect for the concept of suggestion.

Hypnosis and Memory Retrieval

Most people in the United States, including many therapists, believe that hypnosis allows access to implicit memories, especially those memories that are implicit because they have been repressed. The major assumption underlying this belief is that *hypnosis is an altered state of consciousness*. In fact, it often is believed that hypnotized people are in a trance-like state or in a state in which the conscious level is split into two or more separate parts. Many therapists believe that, in some unknown way, the altered state of hypnosis allows direct access to repressed or otherwise forgotten memories. These therapists reason that, if they hypnotize their clients, "take them back" mentally to the time and place in which the traumatic events occurred, and encourage them to remember these events, then their clients will recall the events by replaying some sort of "mental recording." For example, Fredrickson (1992) stated the following: "If you are a very good hypnotic subject, and have a hypnotherapist who can help you with your own defenses, you can go beyond whatever blocks you have" (p. 148). Hypnosis, she argued, causes an altered state of consciousness in which you can enter a "world of [mental] imagery" inside your mind—a mental

state in which images of your past will emerge without being censored by your conscious mind's "critical faculty." Although the retrieval of these memories may occur in many ways, the most common method is **age regression**, a procedure in which **a hypnotized person is brought back mentally to an earlier time**:

After trance induction, it is suggested that you are getting younger and younger. You are urged to continue to move backward in time until you get to an age that seems significant to you or that the therapist suggests you stop at. You then "enter" that age and talk about what is going on in your life at that time. If abuse occurred at that age, you rely on the unconscious to move toward revealing the trauma through imagery, feelings, and words.
(p. 150)

The client is encouraged to generate visual images of the "place" at which the age regression stopped. For example, the client might be told to imagine a blank screen on which images of the scene are projected. These images, it is thought, represent fragments of the repressed memories from which a whole memory eventually will be retrieved.

Nevertheless, the assumption that hypnosis is an altered state of consciousness in which we more easily respond to the suggestions of the hypnotist is a questionable one. In fact, a large body of research strongly implies that, contrary to popular belief, **hypnosis is not an altered state of consciousness**. That is, when people are given "hypnotic inductions" (the procedures thought to cause a person to become hypnotized), they are not in a trance-like state of consciousness in which they more easily respond to the hypnotist's suggestions to change their thoughts, perceptions, emotions, and behavior. Instead, a large number of researchers now believe that people given hypnotic inductions are doing nothing more than "making believe"—they are playing a role, the details of which they have learned from their culture:

In other words, "susceptible" hypnotic subjects enact the role of a "hypnotized" person as defined by cultural expectations and cues provided by the immediate situation. This role enactment is largely accomplished by the use of strategies aimed at making hypnotic suggestions come about; for example, to experience a suggestion for arm lowering..., subjects may try to imagine that their arms are heavy; when asked to "hallucinate" an object..., subjects may try to vividly imagine such an object; and to experience hypnotic "amnesia", or analgesia [relief from pain], subjects may focus attention away from the target items or the pain. (Wagstaff, 1999, p. 189)

Spanos (1996) described in detail what he has called the “sociocognitive view” of hypnosis:

[T]he term *hypnosis* refers not to a state or condition of the person but to the historically rooted conceptions [ideas] of hypnosis...that are held by the participants in the mini-drama that is labeled the hypnotic situation. According to this perspective, hypnotic responding is context dependent [that is, it is based upon the subjects’ beliefs and expectations about hypnosis derived from their immediate social situations and their cultures]; it is determined by the willingness of the subjects to adopt the hypnotic role, by their understandings of what is expected of them in that role, by their understanding of how role requirements change as the situations unfolds, by how they interpret the complex and sometimes ambiguous communications that constitute hypnotic suggestions, by their willingness and ability to use their imaginal and other cognitive skills to create the subjective experience called for by suggestions, and by how feedback from the hypnotist and from their own responding influences the definitions they hold of themselves as hypnotic subjects and the interpretations they apply to hypnotic experiences. (pp. 19-20)

What is most fascinating about all of this is that it appears that people can become so engrossed in the role of “hypnotized subject” that they actually believe they are in an altered state of consciousness—a state in which they believe that they are responding automatically to the suggestions of the hypnotist. Thus, they do not let themselves realize that they actually are responding deliberately to the hypnotist’s suggestions by imagining and by focusing their attention elsewhere. For example, if the hypnotist suggests to them that there is a cat on the chair next to them, “hypnotized” people will try very hard to imagine such a cat. They do not let themselves realize that they are doing all the work by trying to imagine the cat. Or, if they are asked to remember the scene of a crime they have witnessed, they may imagine it with such intensity that they feel as if they are re-experiencing it. But again, they do not let themselves become aware of the fact that they are doing this.

In general, **hypnotic inductions act as suggestions that cause us to interpret our own imaginings as if they were actual occurrences.** Hypnotic inductions suggest to us that any experiences we have will be similar to the ones we have while dreaming: it is suggested that imagined visions, sounds, and movements will seem very real and will occur without any conscious willing on our part. There is a very important difference, however, between hypnosis and dreaming: when we are dreaming, we are in an altered state of consciousness (sleep) in which our experiences are actually changed whereas, during hypnosis, we are in a normal (waking) state of consciousness in which our beliefs about the social situation (that is, our beliefs about the

effects of the hypnotic induction) cause us to believe mistakenly that our experience of the world has changed. In other words, the hypnotic induction acts as a placebo: subjects' beliefs about hypnosis cause them to feel as if their experience has changed.

Many people unfamiliar with recent research on hypnosis often find such claims difficult to believe. They point to the extreme changes in emotions, thoughts, and behaviors observed in hypnotized subjects as proof that they must be in a trance-like state of consciousness. But this conclusion rests on the assumption that such changes in emotions, thoughts, and behaviors never occur in the normal waking state of consciousness. This assumption is not correct. We all experience significant changes in emotions, thoughts, and behaviors in certain situations in everyday life. For example, extreme changes in emotions, thoughts, and behavior occur in all of us when we become deeply engrossed in a movie or a book: we may start sobbing at very sad parts (remember your reaction when "Ol' Yeller" was shot?) or yell with excitement when something good happens to the main character (such as when Darth Vader saved his son from the evil Emperor). When engaged in such imaginative activities, we feel almost as if we are taking part in the story, and yet we also know that we are not. If an authority, however, suggested to us that reading books or watching movies placed us in an altered state of consciousness in which we actually feel as if we are taking part in the imagined events, we might then reinterpret our experiences: we might then feel as if the events actually were occurring in front of us (as we do during the altered state of dream sleep) instead of realizing that we simply had been watching the events on a movie screen or imagining the events while reading words in a book. Our imaginings in the hypnotic situation, however, *are* interpreted by us as actual occurrences because we have been told by many authorities in our culture that hypnosis involves a special state of consciousness (similar to dream sleep) in which imagined events are experienced as real ones:

hypnotic suggestions are communications that invite subjects to construct imaginary or "as-if" situations..., to define those as-if situations as real, and to enact behaviors that are congruent with the definition of the imaginary situation as real.... Subjects are implicitly instructed to convince themselves as well as the hypnotist that they are unable to bend their arm, that a cat is in their lap, that they are unable to recall well-known facts, that they have reverted to childhood, that they possess previously hidden selves or personalities, and so on. In effect, hypnotic subjects are asked to temporarily set aside the rules and assumptions usually used to differentiate imagined (as-if) situations from real events and, in so doing, to define the ongoing situation in terms of the as-if events described in the suggestions.

(Spanos, 1996, pp. 21-22)

Thus, hypnotized people typically are not *just* acting (that is, they usually are not trying to fool us). Instead, **they have become so involved in their roles and have been so influenced by their beliefs about hypnosis that they actually believe that their consciousness has been altered** and that they are responding involuntarily to actual experiences.

What is the evidence for the claim that hypnosis involves a normal state of consciousness in which the person has become deeply engrossed in acting the part of an hypnotic subject? The experimental research that has led us to this view of hypnosis is voluminous and goes back several decades. I have space to give you only one illustrative example (but see Spanos, 1996, and Wagstaff, 1999, for more information). There is a common belief that hypnotized people can be given “posthypnotic suggestions” that cause them to respond in particular ways to certain cues after they have been “awakened” from their hypnotic trance. A study performed in 1954 by S. Fisher (described in Spanos, 1996, pp. 46-47) showed that the subjects’ beliefs about posthypnotic responding determined whether or not the posthypnotic suggestion had an effect. Subjects were given an hypnotic induction and then were told that, after they were “awakened,” they would feel forced to scratch their ear whenever they heard the word “psychology.” After they were brought out of the hypnotic state, the subjects engaged in a conversation with the experimenter and his assistant. It was made clear to the subjects that they were still taking part in the hypnotic experiment. During this conversation, the word “psychology” was mentioned several times. All subjects scratched their ear whenever they heard the word. Following this, the experimenter and assistant acted in such a way that the subjects were likely to conclude that the experiment was over. In what seemed to the subjects to be an informal conversation with the experimenter and his assistant, the word “psychology” was again mentioned several times. About 70% of the subjects (9 out of 13) never responded by scratching their ear. When the subjects were reminded that the experiment was still in progress, only 15% of the subjects (2 out of 13) failed to scratch their ear. Spanos (1996) concluded that the results of such studies imply the following:

[P]osthypnotic responding does not occur automatically. Instead, its occurrence is determined by subjects’ beliefs about what is expected from them. As long as they believe that the experiment is ongoing and that they are still in the role of hypnotic subjects, they behave accordingly and scratch their ear when cued. However, when they interpret the behavior of the experimenter to mean that their role as hypnotic subjects is terminated, they stop emitting posthypnotic responses. (p. 46)

The lesson should be clear: it is the set of beliefs a subject has about hypnosis and the cues he/she obtains from the surrounding social situation about what behaviors are expected that determine

how the subject will respond. The person has become so swept up by playing the role of the hypnotic subject that he/she acts accordingly, oftentimes without being aware that an act is being performed

As you might expect from the preceding discussion, there is little or no evidence that hypnosis improves people's memories. By suggesting to hypnotized people that they can remember something that they are saying they cannot remember, the hypnotist creates a situation in which the hypnotized person is more likely to construct false memories. Thus, the insistence of the hypnotherapist that the hypnotized client will remember a repressed memory if he/she will only try harder causes the person to fill in the gaps in memory with inaccurate information. In fact, the *Journal of the American Medical Association*, in 1985, argued that, when people are encouraged to recall memories under hypnosis, one of three outcomes typically occurs: (1) there is no increase in the number of accurate memories recalled under hypnosis; (2) there is an increase in the number of inaccurate memories recalled under hypnosis; (3) there is an overall increase in the number of memories, but these memories are a mixture of fact and fiction. The last outcome is the most common one. This is also what we found to be most likely to occur when an un hypnotized person tries to remember a forgotten event. In general, **there is no evidence that hypnosis increases the number of accurate memories recalled.** In fact, there is some evidence that memories recalled after hypnotic inductions are often more unreliable than memories recalled without such an induction. This is because hypnotized people who believe that hypnosis enhances their memory are more likely to trust that their imaginings are actual memories of forgotten events.

SQ 4-19: Discuss the reasons for concluding that hypnosis is not an altered state of consciousness. In your answer, describe how suggestion is thought to influence the experiences of those said to be "hypnotized," the idea the people given hypnotic inductions play the role of a hypnotized person, the study of posthypnotic responding mentioned in the book, and what seems to happen when a person is encouraged to remember a forgotten event when hypnotized.

The last part of this chapter has emphasized the influence that others, such as therapists, can have on our behaviors, thoughts, and emotions. In fact, we saw that the suggestions of others can even get us to remember vividly incidents that have never occurred. Such social influence is an extremely important factor in the behaviors and mental events we experience throughout our lives. This social influence is studied within the field of psychology known as social psychology, which is the subject of our next chapter.

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Practice Test for Chapter 4

1. According to the mood-congruence effect, which personal event from the past should be easiest for a DEPRESSED person to recall?
 - A: failing an important algebra exam
 - B: winning the local bowling tournament
 - C: being praised by the boss
 - D: all of the above should be equally easy to recall
2. When a memory task requires consciously retrieving one's memories, we say that it is a task measuring ____ memory.
 - A: implicit
 - B: explicit
 - C: procedural
 - D: repressed
3. The concept of working memory is important because it
 - A: makes sensory memory unnecessary.
 - B: emphasizes that active information processing occurs in the short-term memory system.
 - C: makes the long-term system unnecessary.
 - D: all the above
4. A student asked me a question during lecture. Just after she finished asking the question, my attention was distracted by another person who stood up, walked to the front of the room, sharpened his pencil, and then sat down again. My attention came back to the question; but now I no longer could remember what I was asked just 40 seconds earlier. This was probably due to the fact that the memory was lost from the ____ because I was not able to ____.
 - A: short-term store; rehearse the information
 - B: short-term store; retrieve the information
 - C: long-term store; rehearse the information
 - D: long-term store; retrieve the information
5. When a person shows better memory for items depending upon where these items are located in a list, the person is showing something called
 - A: a habit.
 - B: controlled processes.
 - C: semantic encoding.
 - D: the serial-position effect.
6. A person who has had damage to limbic structures is LEAST likely to show impairments in the development of new
 - A: explicit memories.
 - B: episodic memories.
 - C: implicit memories.
 - D: long-term memories.
7. Which of the following sequences represents progressively deeper levels of processing?
 - A: phonemic, semantic, structural
 - B: structural, semantic, phonemic
 - C: semantic, phonemic, structural
 - D: structural, phonemic, semantic

8. Elaborative rehearsal involves

- A: repeating new information over and over.
- B: the mental activities of chunking and visual imagery only.
- C: exaggerating the importance to yourself of new information.
- D: relating information already stored in the long-term store to new information.

9. Which of the following is NOT a type of memory storage in the Atkinson and Shiffrin "standard model of memory"?

- A: sensory
- B: conceptual
- C: short-term
- D: long-term

10. Because the first items in a list tend to be rehearsed more than other items in the list, they are more likely to be in the ____ store.

- A: sensory
- B: short-term
- C: long-term
- D: all the above

11. Which of the following claims is FALSE?

- A: Hypnotized people seem to be in a normal waking state of consciousness.
- B: Repression is definitely known to occur for certain events (such as sexual abuse during childhood).
- C: False memories sometime develop after certain events (such as suggestions from therapists)
- D: Memories are reconstructed from fragments of information stored in long-term memory

12. Which of the following statements about short-term memory is FALSE?

- A: It can maintain unrehearsed information for up to about 20 seconds.
- B: The forgetting of information within it can be explained by both decay and displacement theories.
- C: There is a short-term memory system for each of the five major senses.
- D: Its capacity is limited to about seven items of information.

13. Forgetting from short-term memory is BEST explained by

- A: dissociation theory.
- B: decay theory.
- C: reconstruction theory.
- D: interference theory.

14. Interference is greatest when the competing information

- A: has been encoded phonemically.
- B: is similar to the information to be remembered.
- C: has been encoded structurally.
- D: has been ineffectively encoded.

15. When asked to describe typical college professors, people generally state something like the following: college professors are male, middle-aged, intelligent, arrogant, defensive, and unattractive. This set of beliefs about college professors represents a

- A: schema.
- B: semantic network.
- C: conceptual hierarchy.
- D: script.

16. The recovery of information from the memory system is referred to as
A: storage. B: appraisal. C: encoding. D: retrieval.
17. Subjects in a study are given the following list of numbers to memorize:
55 34 98 53 23 76 82 45 13 21 95 68 26.
If they remember best the numbers 95, 68, and 26, they are showing a ____ effect; if they remember best the numbers 55, 34, 98, they are showing a ____ effect.
A: primacy; processing C: recency; primacy
B: primacy; recency D: processing; recency
18. Some people have stated that they were able to give up unhealthy habits (such as smoking) because of the effects that hypnosis had on them. The BEST evidence we have implies that such results are examples of
A: the amazing power of the unconscious mind.
B: the placebo effect.
C: the beneficial effects that are possible from entering trance-like states of consciousness.
D: all the above
19. A schema can cause us to alter our memory for an actual event by making the memory
A: less positive. C: less consistent with the schema.
B: more positive. D: more consistent with the schema .
20. When processing verbal information, semantic encoding is
A: a moderate amount of processing involving what the input sounds like.
B: a shallow processing involving the physical structure of the input.
C: a deep processing involving the meaning of the input.
D: an intermediate processing involving the feel of the input.
21. Which of the following is NOT a method of measuring the retention of information in long-term memory?
A: rehearsal tasks C: recognition tasks
B: relearning tasks D: recall tasks
22. Interference theory explains forgetting as being due to
A: the encoding of information phonemically instead of semantically.
B: the inappropriate chunking of information.
C: the learning of other information that gets confused with the information to be remembered.
D: the removal of old information as new information is encoded into the memory system.

23. Let's say that you were asked to memorize the following list of words: dog, cap, box, lamp. If this information were being held and rehearsed in the short-term store, which of the following MISTAKES would you be most likely to make in retrieving the information?

A: canine, hat, container, light

B: frog, sap, fox, cramp

C: cat, pants, plate, night

D: People never make mistakes when retrieving information from the short-term store.

24. Which of the following methods is NOT TYPICALLY used in memory research?

A: electrical stimulation of the brain

B: the study of people with amnesia

C: problems in everyday memory (that is, normal forgetting)

D: the use of memory tasks

25. I was just remembering that Andrew Jackson was the seventh president of the United States. This memory would be called a(n)

A: episodic memory.

C: procedural memory.

B: elaborative memory.

D: semantic memory.

26. Elaborative rehearsal is MOST important for

A: holding information in short-term memory.

B: moving information from short-term memory into long-term memory.

C: perceiving information in sensory memory.

D: moving information from sensory memory to short-term memory.

27. Two groups of people (Group 1 and Group 2) drank five cups of coffee very rapidly and then learned a list of 20 words. A day later, Group 1 again drank five cups of coffee whereas Group 2 drank five cups of water. Group 1 better recalled the word list than Group 2. These results are MOST consistent with the concept of

A: state-dependent memory.

C: memory reconstruction.

B: interference.

D: context cues.

28. This morning I was trying to recall the name of a famous psychologist of the past. I knew that his name began with an "F" and was one syllable long. So I started listing possible names: "Fruit, Frolt, Fred, Freed, Frod, Froud." All of a sudden, it hit me, "Freud"! This difficulty shows that I was having problems with the ____ of a memory.

A: encoding

C: storing

B: retrieval

D: automatic processes

29. Yesterday, at a stoplight, I saw a passenger in the next car who looked very familiar to me but I couldn't seem to remember how I knew him. This morning, I saw him in my class and then I remembered: he was one of my best students who came in frequently to talk with me. What is the BEST explanation for my forgetting who he was at the stoplight.

A: I had reconstructed the memory incorrectly due to my having an inadequate schema of his face (because of retrieval difficulties).

B: There was a mismatch between the retrieval cues (seeing his face at the stoplight) and the original encoding for my memory of him (seeing his face in the classroom).

C: My memory for his face (visually encoded material) had decayed significantly and was reactivated only after seeing him in class.

D: I probably had repressed my memory for who he was because I was very anxious about the performance of my other students in the class.

30. As you read the textbook, you should be stopping yourself after each paragraph and summarizing it in your own words. In addition, you should be trying to think of good examples for each of the major concepts. If you are studying in this way, you are

A: using maintenance rehearsal to semantically encode the information in the textbook.

B: using structural encoding for maintaining this information in long-term memory.

C: bypassing short-term memory and placing the information directly into long-term memory.

D: using elaborative rehearsal to semantically encode the information in the textbook.

31. Interference seems to have its effects by affecting the ____ of information.

A: initial processing

B: encoding

C: storing

D: retrieval

32. The explanation that states that forgetting is due to the disappearance over time of a physiological "memory trace" is called

A: decay theory.

C: displacement theory.

B: interference theory.

D: reconstruction theory.

33. The type of rehearsal that requires the deepest level of processing is

A: maintenance rehearsal.

C: schematic rehearsal.

B: repetitive rehearsal.

D: elaborative rehearsal.

34. According to psychoanalytically inclined psychologists, repression of memories and impulses occurs because we try to avoid

A: negative emotions.

C: negative reinforcements

B: positive emotions.

D: positive reinforcements.

35. The input of information into the memory system is called

A: storage.

B: encoding.

C: retrieval.

D: appraisal.

36. According to levels-of-processing theory, which type of encoding of verbal information should result in the most enduring memories?
- A: structural B: phonemic C: auditory D: semantic
37. The LONGEST duration of unrehearsed information in the short-term store is about
- A: 1-5 seconds. B: 5-10 seconds. C: 15-20 seconds. D: 10 minutes.
38. The three basic mental processes involved in memory formation are
- A: sensory store, short-term store, long-term store
 B: structural, phonemic, and semantic
 C: encoding, storing, and retrieving.
 D: early selection, middle selection, late selection
39. As you listen to a show on television, the information that you are attending to is being held in
- A: sensory memory. C: long-term memory.
 B: short-term memory. D: all three memory systems.
40. I was just remembering when I got married to my first wife. I remembered that it had occurred in the rabbi's house on a very hot day. This memory would be called a(n)
- A: episodic memory. C: implicit memory.
 B: elaborative memory. D: semantic memory.
41. I write the word "proprium" on the chalkboard. If you encode this word in terms of its definition, you are encoding it ____; if you encode it by saying it rhymes with "throw thee, bum," you are encoding it ____; if you encode it by noting that it was written in lower-case letters, you are encoding it ____.
- A: semantically; phonemically; structurally
 B: structurally; phonemically; semantically
 C: phonemically; structurally; semantically
 D: semantically; structurally; phonemically
42. A(n) ____ memory is a memory for some item of general knowledge (that is, a fact about the world).
- A: semantic B: implicit C: short-term D: elaborative
43. I need to remember a list of sixteen numbers: 1812186119141941. I want to keep the entire list in short term memory for a short period of time. I realize that I can separate the numbers into four groups that represent the starting dates for wars: 1812, 1861, 1914, 1941. I have no trouble remembering these numbers because I have ____ the information.
- A: perceived. B: recalled. C: chunked. D: learned.

44. When processing verbal information, structural encoding is
- A: a moderate amount of processing involving what the input sounds like.
 - B: a shallow processing involving the physical structure of the input.
 - C: a deep processing involving the meaning of the input.
 - D: an intermediate processing involving the feel of the input.
45. Some therapists attempt to recover traumatic memories that they believe have been repressed. When clients begin to remember things that they had not remembered before, these therapists conclude that their clients have recovered a repressed memory. Others, however, believe that there are other explanations for these memories. The MAJOR ALTERNATIVE explanation for the retrieval of repressed memories during therapy is that many of these memories are
- A: actual events that the clients remembered their whole lives but were too embarrassed to talk about.
 - B: expressions of desires for sexual contact that these people had for the people they are accusing.
 - C: false ones that have been constructed by the clients in accordance with suggestions from their therapists.
 - D: distortions of the original memory traces caused by disruptions of blood flow to the limbic region of the brain.
46. Memories that are recalled under hypnosis
- A: have been shown to be always true.
 - B: often contain distortions of real events as well as events that never happened.
 - C: tend to have fewer inaccuracies than memories recalled in a normal waking state.
 - D: have been shown to be always completely false.
47. An essay test is a ____ measure of retention; a multiple-choice test is a ____ measure of retention.
- A: relearning; recognition
 - B: recognition; recall
 - C: recall; relearning
 - D: recall; recognition
48. Which of the following choices is the MAIN type of memory that includes all of the other choices?
- A: implicit memory
 - B: semantic memory
 - C: explicit memory
 - D: long-term memory
 - E: episodic memory
49. Long-term memory is NOT characterized by which of the following?
- A: It has a virtually unlimited capacity.
 - B: It encodes stimuli in virtually the same form as they were experienced originally.
 - C: It stores memories for at least one minute.
 - D: Long-term memories are stored at the preconscious and unconscious levels.

50. Hermann Ebbinghaus was a nineteenth-century memory researcher mentioned in the text who memorized long lists of items to see how quickly he would forget them. In general, he showed very rapid forgetting in the first few hours after learning each list. Since Ebbinghaus's time, research has shown that rapid forgetting is not the norm. Which of the following is the MOST likely reason for Ebbinghaus's finding of very rapid forgetting?

- A: He was using controlled processes to memorize the material.
- B: He was using his episodic memory.
- C: He had a very poor short-term memory.
- D: He was memorizing meaningless material.

CHAPTER 5
SOCIAL PSYCHOLOGY: THE INFLUENCE OF SOCIAL
SITUATIONS ON MENTAL EVENTS AND BEHAVIOR

During the Vietnam Conflict, as during any war, many acts of brutality were committed by soldiers on both sides. But people around the world were particularly appalled by one horrifying incident. In 1968, American soldiers massacred hundreds of people living in a village called My Lai. According to a participant in the shootings interviewed by a television reporter, the leader of the operation, Lieutenant William Calley, ordered his men to shoot everyone in the village:

- Q. He told this to all of you, or to you particularly?
- A. Well, I was facing him. So, but the other three, four guys heard it and so he [Calley] stepped back about ten, fifteen feet, and he started shooting them. And he told me to start shooting. So I started shooting, I poured about four clips into the group....
- Q. And you killed how many? At that time?
- A. Well, I fired them automatic, so you can't— You just spray the area on them and so you can't know how many you killed 'cause they were going fast. So I might have killed ten or fifteen of them.
- Q. Men, women, and children?
- A. Men, women, and children.
- Q. And babies?
- A. And babies....
- Q. Now, you're rounding up more?
- A. We're rounding up more, and we had about seven or eight people. And we was going to throw them in the hootch, and well, we put them in the hootch and then we dropped a hand grenade down there with them. And somebody holed up in the ravine, and told us to bring them over to the ravine.... [T]hey had about seventy, seventy-five people all gathered up. So we threw ours in with them and Lieutenant Calley told me, he said, "Soldier, we got another job to do." And so he walked over to the people, and he started pushing them off and started shooting.... And so we started pushing them off, and we started shooting them, so all together we just pushed them all off, and just started using automatics on them....

(New York Times, November 25, 1969; quoted in Milgram, 1974, p. 186)

I am certain that most of you are upset by this passage, especially by the matter-of-fact manner in which this man related the horrifying incidents of that day. Was he a sadistic psychopath who enjoyed murdering defenseless people—from babies held by their mothers to elderly women and men? I think that most people would answer “yes.” Other people probably would mention how war can do strange things to a person, or would make some other comment showing that they realize the complexity of the situation. Probably all of you, however, would assign responsibility for this man’s actions to him: he is entirely to blame for what he did that day. He could have refused and then tried to stop the others. But consider the fact that a large group of soldiers took part in the killings. Not one of these soldiers refused (at least not publicly) to take part in the killings. Not one said that the killings were wrong and that they should stop. Could they all have been psychopaths? When the man was asked why he took part in the killings, he answered that he had simply been following orders and that, for various reasons, it had seemed like “the right thing to do” at the time. He seemed to be placing most of the responsibility for his own actions on Lieutenant Calley: he was given an order by the person in charge and felt that, at that point, he had no choice. He was implying that virtually any one of us, if put in a social situation in which we were ordered by an authority to do something unconscionable, probably would do it regardless of our feelings about the immorality of our own actions. As you will see in this chapter, the man’s belief that the social situation he was in led to the massacre is probably much closer to the truth than most of us would like to admit.

I am going to change the focus of our discussion somewhat from the previous chapters. Up to now, I have talked about either particular mental abilities (for example, learning and memory), specific types of behavior (for example, sleeping), or specific causes of behavior (for example, neural activity). In this and the next two chapters, I am going to describe several major “fields” of psychology. A **psychological field is a research specialty devoted to understanding a broad topic of interest**. In Chapter 3, I spoke briefly about the field known as “experimental psychology.” Experimental psychologists traditionally have had as their major goal the understanding of basic mental abilities such as learning, memory, sensation, and perception. In Chapter 2, I talked about research within the field known as “biological psychology” (although I did not mention it by name). Biological psychologists have had as their major goal the understanding of biological causes of mental events and behaviors—causes such as genes, hormones, and neural activity. In this chapter, I will describe in some detail the field known as **social psychology**. Social psychologists desire to understand the important **social influences on the behaviors and mental events of individuals**. As we will see, social psychologists believe that **social situations, and the social roles we adopt in them, are very important determinants of the behaviors, thoughts, and emotions of individuals—a**

viewpoint I will call the **social-contextual approach**. In fact, social psychologists believe that social influences in the immediate situation can be more important for what we do, think, and feel than personality characteristics such as traits.

Discovering Social Causes of Mental Events and Behavior

A good example of research in the field of social psychology is a series of studies performed during the 1950's by Solomon Asch and colleagues. In these experiments, subjects were told that they were going to take part in a study of visual perception. They were asked to judge the lengths of several lines by comparing a "standard line" with three "comparison lines." After comparing the lines, they were told to choose the comparison line that was the same length as the standard line. Figure 5.1 illustrates one comparison subjects were asked to make. Before reading any further, see if you can choose the comparison line that is the same length as the standard line. Was that a difficult task? I doubt it. You probably saw immediately that the second comparison line was the same length as the standard line. Now, let's suppose that you had been sitting with four strangers, three of whom stated their choices out loud before you, and each of whom chose the first comparison line. What would you think? You probably would think that something was wrong with their eyes. You probably would look very closely at the lines as each person made his/her choice, trying to figure out what was wrong. When the time came to give your choice, what would you say? You probably are quite certain that you still would choose #2. But a large number of subjects chose #1 instead—the same incorrect line chosen by the others. Why did the subjects do this? For several years after the first study was performed, Asch and others tried to answer this question. They found that, in general, people tend to comply with the judgements of others. By complying, the subjects did not necessarily believe that line #1 was the correct answer: they simply didn't wish to disagree publicly with the opinions of the other subjects, even though these others were strangers with whom they would never interact again. This study shows the very strong effects others can have on our mental events and behaviors.

The Asch studies illustrate a research design often used by social psychologists to study social influence. Two or more people take part in the study, but only one person is the actual subject whose behaviors are being investigated. The other people—called **confederates** of the researcher—only pretend to be experimental subjects but the actual subject is unaware of this. The confederates are the most important part of the research situation because they represent the social influence that causes changes in the subject's behavior. Subjects are deceived about the true purpose of the study because, if they knew that the confederates were only pretending and that the goal of the study was to see how they, the subjects, would react to the confederates, the experiment could not work. By deceiving his subjects, Asch found that they often could be

influenced to conform to the confederates' incorrect judgements. He performed several experiments to see which situational factors might cause changes in the amount of conformity. Two factors of importance were the **difficulty of the judgement** and the **occurrence of disagreement** among the confederates. With regard to the first factor, when the lengths of at least two comparison lines were both close to the length of the standard line, more subjects would conform because they now were less certain of their own choice. In general, people are most likely to conform when they are uncertain of their own opinion. With regard to the second factor, when one of the confederates disagreed with the others by choosing the correct comparison line, very few subjects conformed to the incorrect opinion of the others. In general, people are most likely to conform when no one else seems to share their opinion. By performing experiments that manipulated one factor at a time, Asch and other researchers discovered several social influences that tend to cause people to conform readily to the beliefs of others.

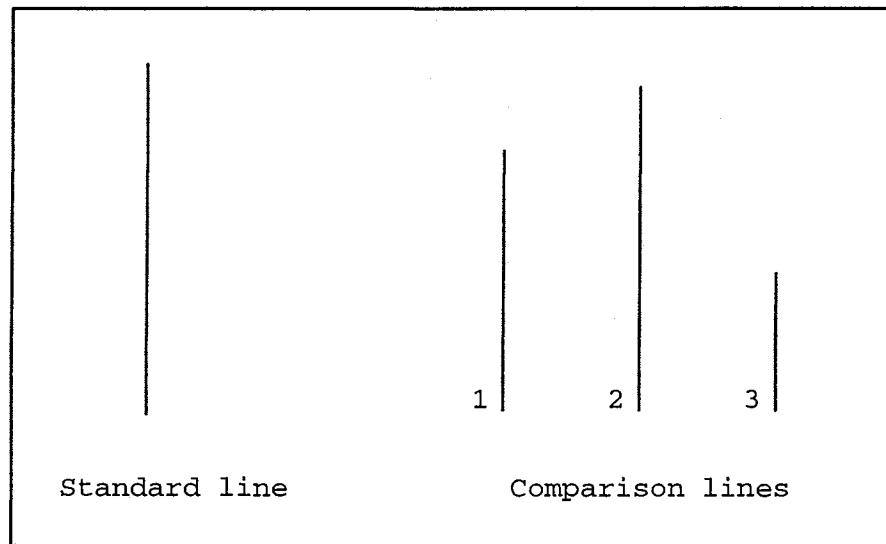


Figure 5.1 Standard and comparison lines from the studies of Solomon Asch (from Brown, 1986; p. 37)

Although there are some limitations to Asch's conformity studies, the general finding that humans tend to conform readily within particular social contexts seems to be a solid one. Asch's results, however, sometimes surprise people. Their first reaction is either not to believe the results or to find reasons why most people, at least in the present day, would not conform so easily. But there are good reasons to believe that his findings would be as strong today as they were back in the 1950's. In fact, I'll bet that many of you would agree that, in your experience, most people dislike sticking out too much from others. That is, you have probably observed that people, in

general, avoid expressing opinions that are too different from everyone else around them, especially if they are not certain of their own opinion in the first place. Nevertheless, the finding that many people will conform to an obviously incorrect opinion seems to stretch this general rule to the breaking point. If you study social psychology in more depth, you probably often will find that your everyday beliefs about yourself and others are constantly being challenged. I have found that social psychology, more than any other psychological field, contains discoveries that seem surprising or strange to me because, based on my everyday beliefs, I had expected something else to occur. But this is precisely why it has been so valuable to me: I have gained a great deal of insight into human nature through my study of social psychology. At times, you too will find that the conclusions of a series of social-psychological studies seem unbelievable because they are so far outside of your own intuitions or experiences. This unwillingness to trust findings that contradict your own beliefs is an excellent attitude to have: if you are going to make certain that the findings are accurate ones, you need to question them and find where they might be wrong. In Chapter 1, I called this attitude “skepticism.” Skepticism is an essential attitude in science. On the other hand, almost all people have a great deal of difficulty being consistently skeptical in their everyday lives. Some social and cognitive psychologists have investigated why this is so. Let’s look again at the meaning of skepticism and its importance for all of us in our everyday lives.

SQ 5-1: Define what is meant by the term “psychological field.” What does the field of social psychology study? Describe the basic study performed by Solomon Asch. What are the important aspects of the Asch study that are used in many experiments looking at social influences on behavior and mental events? Which factors did Asch find to be important in getting people to conform to the beliefs of others?

Skepticism and Knowledge

I believe that most of us wish to understand what is going on around us—to know the truth about things, whether we are scientists or not. Understanding a phenomenon involves developing a set of beliefs about it. We refer to this set of beliefs as “knowledge.” In order to develop accurate knowledge, however, we must be aware of certain intellectual limitations we all share. My goal in this section is to describe some of these limitations and help you to see the benefits of developing certain ways of thinking that will help reduce the negative effects of these limitations. One way of thinking that is absolutely essential to acquiring accurate knowledge about the universe is “skepticism.” Because of misconceptions about this term, however, at least some people believe that skepticism is somehow bad:

Some people believe that skepticism is rejection of new ideas, or worse, they confuse “skeptic” with “cynic” and think that skeptics are a bunch of grumpy curmudgeons [bad-tempered and ill-mannered people] unwilling to accept any claim that challenges the status quo [the way things are right now]. This is wrong. Skepticism is a provisional [awaiting final approval] approach to claims. **It is the application of reason to any and all ideas**—no sacred cows allowed. In other words, *skepticism is a method, not a position*. Ideally, skeptics do not go into an investigation closed to the possibility that a phenomenon might be real or that a claim might be true. **When we say we are “skeptical,” we mean that we must see compelling evidence before we believe....** (Shermer, 1999, p. 5; bold type added)

Skepticism is nothing more than thinking hard about a knowledge claim by looking carefully at the evidence. When we are being skeptical, we are trying to see if the evidence is able to support the claim.

It is easiest to understand skepticism if we use an example. We know from everyday experience that the sun rises in the east, moves across the sky, and sets in the west. There seems to be so much evidence in favor of this knowledge claim that it would be absurd to deny it. Does this claim have your final approval? Probably many of you answered, “yes.” Therefore, there is no need to be skeptical about it any longer. Everyone knows it is true. Alright, then why does the sun do this? Is the sun really moving across the sky? No, it only appears to be moving. Actually, it is the Earth that is moving: it is rotating on its axis. So, our original claim, the one to which many of you gave your final approval, was not really true after all, was it? You knew this, but you were not thinking carefully about the words. (This shows that precise communication is essential in science). On the other hand, was there ever a time when people believed strongly that the sun moved around the Earth? Yes, when the only evidence available was based on their own viewpoint standing on the Earth and looking up at the sky. It would have seemed absurd for someone to suggest that the sun was not really moving. Their personal experience seemed to lead to absolutely certain knowledge. With time, however, other evidence was gathered that contradicted their personal experience. For example, astronomers eventually discovered the rotation of other planets in our solar system by observing them with telescopes. They would have realized that, on these planets, the sun also would appear to be moving across the sky. It now seemed reasonable to these astronomers to wonder if, on Earth, the sun only appeared to move because the Earth was rotating just like the other planets. The earlier observers, therefore, had been wrong to give their final approval to the theory that the sun actually moved. If they had thought more deeply about it, they too might have realized that there were two possible theories for the apparent movement of the sun.

They then would have concluded that they needed more evidence before they could decide which theory was the better one. Thus, **all claims to knowledge are provisional**: we might accept them for now; but, **regardless of how certain we are that we are correct, we realize that new information may lead us to question the claim**. In order to practice skepticism, therefore, we must be constantly engaged in the questioning of our own beliefs: if we are never skeptical about our own beliefs, we can never gain knowledge.

I now wish to discuss some factors that make it difficult to be consistently skeptical. By becoming aware of these factors, you should be better able to guard against their effects and, thereby, to be more successful at developing accurate knowledge about the world.

SQ 5-2: Define what is meant by the term “skepticism.” Describe how this is a positive and necessary characteristic to have, not a negative one.

Feelings and Knowledge

What is the best evidence for a knowledge claim? Is it something that an authority tells you is true—perhaps a teacher in a course you are taking? Well, we must always give the opinion of an authority some weight, especially if he/she has spent a great deal of time and effort investigating the subject (this is why you go to class and listen to your professor “profess” his/her knowledge about the subject). It might lead you provisionally to accept a claim. But it still is not the best evidence. What might count as even better evidence? Is your strong belief in the truth of a claim good evidence for it? Before you respond too quickly, think a little about this question. Is there anything that you believe very deeply—some belief that you have a very strong feeling is true even though you are not certain you could prove it to someone else? I’ll bet most of you answered “yes” to this question. It is likely that your strong feeling that the belief is true involves an emotion or intuition that makes you conclude that the belief must be true. Because such a feeling cannot be shared with another, you might conclude that people simply have to have the experience if they are to accept the belief. Thus, as you think about this particular belief, you now may be more likely to agree that a strong feeling that a belief is true might be good evidence for its truth after all.

On the other hand, can you think of anything else that you once believed, something that you strongly felt at the time was true, but that you later discovered was not? For me, it was Santa Claus and the Easter Bunny. As a child, I felt strongly that they existed, with all my heart and soul. And there seemed to be evidence consistent with this belief. For instance, my parents (the relevant authorities) told me they existed. I saw Santa Claus at department stores around Christmas. And one year at Easter, my sister said she saw the Easter Bunny in our house. What better evidence did

I need? But several inconsistencies caused me to become skeptical. How could Santa be at this store when we just saw him at the other store? And this Santa looks different than the other one we just saw. My mother answered, “these are just Santa’s helpers; the real Santa is at the North Pole getting ready for Christmas.” This convinced me for a while. But then I began to see television programs in which normal people would get dressed up as the jolly elf and pretend to be Santa at department stores. And I heard rumblings from other children (a new group of relevant authorities) that there was no Santa Claus or Easter Bunny, after all. Eventually I came to believe that I had been wrong about their existence. I then reinterpreted all the evidence that had seemed to support my prior belief. For example, I decided that my sister was mistaken about seeing the Easter Bunny: she had believed so strongly in him that the effects of suggestion, which I now know to be a powerful influence on perception, caused her to experience some sort of illusion or hallucination. Do I know *for certain* that Santa Claus and the Easter Bunny don’t exist? Well, I can’t really say this, since there might be good evidence that no one has yet discovered. All I know is that the evidence that, at first, had seemed to support my childhood beliefs was better explained in other ways. Until I find evidence that cannot be explained by my present beliefs, I have provisionally concluded that Santa Claus and the Easter Bunny are mythical figures.

Observations and Knowledge

Thus, good evidence does not come from a strong feeling that something must be true, nor does it really come from authorities (since they may be mistaken or even lying to us, as parents do about Santa Claus and the Easter Bunny). Another way of thinking practiced by scientists—**empiricism** (the doctrine that knowledge about a phenomenon can only come from direct observations)—reflects the belief that, if we wish to evaluate the accuracy of a knowledge claim, we must observe directly those events related to the claim. For example, my direct observations at department stores suggested to me that Santa Claus might not really exist after all. But there is a potential problem that may make it difficult for us to be properly empirical: in our everyday lives, the manner in which we collect observations is often severely limited. The major problem with our everyday observations of the world is that **they often represent only a very small and very select sample of everything we might observe about a phenomenon**. For example, if there had been only one department store in the town in which I grew up, I would have seen only one Santa Claus each year and, therefore, might have had no reason to question my belief in him. Or, if my closest friends had continued to believe in Santa Claus until they were teenagers, again I might have had little reason to question my own beliefs about him.

As an ideal, we probably should observe every particular instance of a phenomenon being studied if we wish to be perfectly empirical in our approach. For example, if I had wanted to get evidence for or against the existence of Santa Claus, I might have asked all the people in the world about their beliefs involving Santa Claus instead of only my close friends. Of course, this was not possible. But if I had wanted to get an idea about who believed in Santa Claus, I would not have had to give every person in the world a questionnaire. All I would have needed to do was to question a relatively small group of people who were similar in important ways (such as in their religion, nationality, and age) to the entire population of the world. That is, I could have chosen a small sample of people (perhaps only 5000 or so) who were similar in makeup to the entire population of the world. By selecting such a **representative sample—a group that is similar in important ways to the wider population in which we are interested**—I could have obtained a good idea of who believed in Santa Claus. I would have found that only Christian children less than about eleven years of age in the United States and Canada believed in Santa Claus (although young Christian children in several Western countries would have believed in similar figures, such as Father Christmas in England). I probably would have interpreted this evidence as supporting the idea that Santa Claus is a mythical figure. Thus, by limiting the sample of people whom I questioned to only my friends, I was not able to get adequate evidence about the existence of Santa Claus. **In our everyday lives, it is difficult to obtain adequate evidence to test our beliefs because we usually have access to nonrepresentative samples of relevant observations.** This severely limits our ability to be skeptical. That is why college courses are so important for the development of your knowledge: they confront you with a large range of ideas, opinions, and observations that are not commonly encountered in the wider culture.

SQ 5-3: Why is your strong feeling that a belief is true not good evidence for the truth of the belief? In your answer, mention the problem of suggestion. Why are the observations you make in the everyday world not always good evidence for the truth of a belief? In your answer, talk about the importance of a representative sample.

Intuition and Knowledge

Even if we are able to obtain a representative sample of observations, however, there is another problem that makes it difficult for us to be properly skeptical about our beliefs: we often rely upon our intuition to interpret these observations. **Intuition** can be defined as **an immediate insight or understanding that occurs without conscious and deliberate reasoning**. Intuition allows us to quickly assess a situation as a whole and then rapidly make a decision about what to do in that situation. For example, one morning before sunrise, I was driving down a nearly

empty two-lane road. Looking in my rear-view mirror, I noticed that the car immediately behind me seemed to be a bit too close to the centerline. I intuited that he was getting ready to pass, which surprised me because there was a car just ahead coming towards us at a high rate of speed. So I quickly swerved onto the shoulder to prevent a head-on collision between the two cars. As I had intuited, he did begin to pass me just as I began to swerve. All of this happened within a second or two. None of this reasoning was deliberate. I simply took in the situation in as a whole and made a decision. Intuition helps us in many situations in which such quick action is required. Intuition works best when **(a) we have had much experience in similar situations, (b) those situations are relatively simple, and (c) we have been able to test the accuracy of our intuitions in those situations.** This definitely is the case when one has driven a car for many years. The kinds of situations in which we have to make driving decisions tend to be relatively simple (for example, is the person going to turn left in front of us or not?), we have a great deal of familiarity with many driving situations, and we have often had the opportunity to determine whether our intuitions in these situations are correct or not.

In more complex situations, however, our intuitions are more likely to cause us to develop incorrect beliefs, especially when we are relatively unfamiliar with the situations and when we have not had much opportunity to test the accuracy of the intuitions. Most social situations are important examples of this second kind of more complex situation. For example, when we are first getting to know a person, we often come to believe things about him or her that, as we get to know the person better, we find were wrong. Nevertheless, the resulting “knowledge” based on such intuitions (what we often call “first impressions”) can feel just as correct and obvious as the intuition I had that the person driving behind me was just about to pass. For example, let’s say that one Saturday night, while driving to a friend’s house, you see the car in front of you slow suddenly and begin to cross over the lane markings. You immediately think, “that guy is drunk,” and you start to honk your horn and yell at him to get off the road. You might be convinced that your intuition is correct because once before, when your friend was drunk, she did the same thing. Thus, the situation seems to you to be a familiar one. You feel certain that you are correct. But now, as you drive past the car, you look over and see a strange look on the elderly driver’s face—a look of terror and dread—that suggests to you that he may be seriously ill. Your first impression—your immediate intuition based on some of your past observations of the world—was wrong. Like those who believed it was obvious that the sun revolved around the Earth, you didn’t stop to think about other possible explanations for your observations and then try to decide which explanation was most likely to be true by looking for more evidence.

Social psychologists are interested in the topic of intuitive processes of reasoning because intuitions have important effects on how we interpret complex social situations. The incorrect conclusions to which we sometimes are led by intuition have been referred to as “cognitive illusions.” A **cognitive illusion is an error of reasoning that is caused by an intuitive judgement that seems, on its surface, to be very convincing.** For example, Robert Cialdini (1993) told a story about a friend of his who owned an Indian-jewelry shop frequented by tourists to central Arizona. His friend had been having trouble selling a shipment of turquoise jewelry, and had tried to increase sales by placing the jewelry in a central location and making an extra effort to tell customers that the jewelry was a good buy. But still the jewelry wouldn’t sell. Finally, in desperation, she told an employee to cut the price by one-half, and then left on a trip. The employee misunderstood the instructions, however. Instead of halving the price, she increased it by 100%. Now, each piece of jewelry cost twice as much as it had before. What do you think happened? You may be surprised to learn that the entire shipment sold out within a few days. Can you explain this result? Think about it for a minute. Why would jewelry not sell when the price was reasonable given its quality, but then quickly sell when it was twice as expensive? This is how Cialdini explained the result:

It is easy to fault the tourists for their foolish purchase decisions, but a close look offers a kinder view. These were people who had been brought up on the rule “You get what you pay for” and who had seen that rule borne out over and over in their lives. Before long, they had translated the rule to mean expensive = good. The expensive = good stereotype [a stereotype is an oversimplified belief that is rigidly held] had worked quite well for them in the past, since normally the price of an item increases along with its worth; a higher price typically reflects higher quality. So when they found themselves in the position of wanting good turquoise jewelry, but not having much knowledge of turquoise, they understandably relied on the old standby feature of cost to determine the jewelry’s merits. (p. 6)

In other words, they relied upon an intuitive processing of the information: in the past, the rule had helped them in simpler and more familiar situations—situations in which they were able to check the accuracy of their intuitions. In this much more complex and unfamiliar situation, however, their intuition led them astray.

The mistake made by the customers was not caused simply by a lapse of attention or by a lack of motivation to understand accurately a set of observations. In fact, most of them probably gave some thought to whether or not they were spending their money wisely. The problem was that their intuitive processing of information caused them to experience a cognitive illusion. Piatelli-

Palmarini (1994) stated that “a cognitive illusion is not an ordinary blunder; it does not originate in guesswork but from the formulation of a potent although mistaken intuitive judgement that, at least at first sight, convinces us within ourselves” (p. 32). Because we are so easily convinced by our intuition, we do not often try to test whether an intuitively plausible conclusion is actually correct or not. Only if the mistake is pointed out to us afterwards will we make an effort to be more careful the next time we encounter a similar situation. The problem is that typically we do not become aware that we have made a mistake. Thus, we will continue making the same mistake indefinitely, all the time thinking that we are acting appropriately. The two sets of intuitive processes that tend to lead to cognitive illusions are usually referred to as “cognitive biases” and “cognitive heuristics.” Let’s examine these two types of intuitive processing of information.

A **cognitive bias** is a **general tendency to approach any kind of problem in a particular way**. For example, when people are examining their beliefs, **they tend to look for evidence to support the belief rather than evidence that might cause them to reject it**—a general tendency that is known as the **confirmation bias**. Because most people try to confirm their beliefs by looking for information consistent with those beliefs, they tend to ignore a very important source of information—disconfirming information. For instance, when students do poorly on an exam, and make it clear to me that they felt that the exam was too difficult, they sometimes will ask me: “How many people failed the test?” Do you see the confirmation bias in this question? If I say something like “fifteen,” they often will look at me with exasperation, as if this information proved the accuracy of their belief. What if they had asked me: “How many people got an A?” Or, if they had asked: “What percentage of people obtained each of the five possible grades on this test compared to the last?” By asking these other questions, they would have been seeking potentially disconfirming evidence. But people tend not to do this. Thomas Gilovich (1991) presented a good example of the confirmation bias. When one group of people were asked which pair of countries—(a) East Germany and West Germany or (b) Sri Lanka and Nepal—were more similar to each other, what do you think they answered? What would you answer? Most people answered that the first pair (East and West Germany) was more similar. A second group was then presented with the same choices, but was asked to indicate the pair that was more different from each other. What do you think they answered? Most of the people in this second group concluded that East and West Germany were more different. That is, East and West Germany are both more similar and more different than Sri Lanka and Nepal! This is logically impossible. How could you explain the contradictory answers with the concept of confirmation bias? Well, which pair of countries do you think most Americans know more about? Americans are much more likely to know something about the European countries of East and West Germany (now united into one country, but separated at the time the study was performed) than the countries

of Sri Lanka and Nepal. (Do you even know on which continent or continents Sri Lanka and Nepal are? Both are in Asia and near India. Does this information affect your judgements of similarity and difference?) Because they knew more about the two European countries, the subjects were better able to confirm the belief that East and West Germany are more similar *and* the belief that they are more dissimilar: they had more information from which to select evidence to substantiate their belief. Thus, by not looking for disconfirming evidence for our beliefs, we are more likely to conclude that any given belief is correct even when it is not.

A cognitive heuristic is a mental shortcut that one uses to solve a particular kind of problem. The people who bought out the supply of turquoise jewelry in the example above were using the heuristic, “expensive items are of better quality than inexpensive items.” But there are many such examples in your everyday life. For instance, when you are trying to find the most inexpensive items you can at the grocery store, you tend to use mental shortcuts to quickly identify these items. Thus, if you see a sign under a product at the store that says something like “low everyday savings,” you are more likely to buy that product than if there had been no sign there. Why? The store manager is hoping that you will use your “sale-sign heuristic” to infer that the item is on sale, even though it isn’t. That is, whenever you see a sign under a product at the store, you are likely to believe that it is on sale, especially if the sign has the word “savings” or “sale” written somewhere on it. I once read about a tire company that had bought space for an advertisement in a local newspaper in order to announce a sale on tires. By mistake, the advertisement contained the regular price of the tires, not the sale price. Nevertheless, there was a large increase in customers willing to pay the regular price for the tires. Thus, cognitive heuristics are mental shortcuts that cause us to react automatically (reflexively) to a situation. Sometimes this benefits us (when a quick response is required, as in the example I gave above of a car that tried to pass me) and, at other times, this hurts us (when more deliberation would have helped us from making a mistake, as in the example of the tire company)

One kind of cognitive heuristic that is very important in social psychology is the **social stereotype**, which is **an oversimplified belief about a group of people that is rigidly held**. For example, when I ask students to describe “old people,” they typically list characteristics such as grumpy, senile, sickly, slow, hard of hearing, unattractive, and depressed. This is a very negative stereotype indeed! In fact, students from most cultural backgrounds within the United States rarely mention anything positive about elderly adults. If you were meeting a particular elderly person for the first time, do you think that this stereotype might influence your first impressions of the person? I believe that it would and, in fact, that it often has in your life. For example, if the elderly person had a hard time understanding a statement you made, I’ll bet that you

would either repeat the statement more loudly (because you inferred that the person was hard of hearing) or restate it in simpler language (because you inferred that the person was senile). Because of the cognitive heuristic most of you have about elderly people, you not only would quickly intuit one of these two explanations of the person's difficulty with understanding you, you probably also would feel very confident that you were correct. It is very likely that you would not even consider that you might have mumbled your statement or that you had used incorrect grammar. Your stereotype about elderly people causes you to act reflexively to particular elderly people whom you meet for the first time.

A social stereotype is simply a special kind of "schema." As you may remember from the last chapter, a **schema** is **the general knowledge acquired by an individual about a particular kind of event**. In the previous chapter, I discussed how schemas cause us to distort our memories so that remembered events become more consistent with the schema. Schemas, however, don't only distort what we remember about past events, they also distort the interpretations we make about ongoing events. For example, in the following two sentences, is the same action being described? (1) "The batter hit the ball." (2) "The baby hit the ball." I'm sure that you answered "no" to my question. Why? Well, when I used the word "batter," this activated a schema of a baseball batter swinging a baseball bat at a ball thrown by a pitcher. When I used the word "baby," on the other hand, a very different schema was activated. In this case, you probably pictured something like an infant sitting on the floor swatting clumsily at a plastic ball lying next to her. Both these schemas are examples of social stereotypes. This example shows that the activation of two different stereotypes can cause us to interpret nearly identical sentences in very different ways. In general, when two groups of people are given identical information, but researchers make certain that different stereotypes are activated in each group, we find that people in one group will interpret the identical information in very different ways from people in the other group. The interpretations made by people in each group will tend to be consistent with the stereotype that is activated in them. Thus, even when we try to find disconfirming evidence (that is, when we are not being influenced by the confirmation bias), **we tend to interpret evidence in ways that are consistent with the relevant stereotypes that we have developed from our prior experiences**. We often call these stereotypes (and schemas, in general), "preconceptions." Preconceptions make it very difficult for us to think carefully about new information. Instead, we often quickly intuit conclusions that are consistent with the preconceptions. I will talk more about schemas and social stereotypes later in this chapter.

Cognitive biases and cognitive heuristics cause us to approach social situations in predetermined ways and to use intuition to develop explanations and solutions to problems posed

by those situations. How can we protect ourselves from the negative effects of intuition on our attempts to gain accurate knowledge about the world and to solve problems? Research has shown that, **when a person stops and comes up with at least one alternative explanation or solution to a problem, that person becomes much less confident in his/her original answer based on intuition.** If the person does not do this, however, he/she tends to have a great deal of confidence in the intuited answer. This result shows that it is important to be skeptical of a quickly intuited belief. If you want to understand yourself and the rest of the world around you better, you need to learn that what initially appears to be obvious may not be true. Thus, in order to be consistently skeptical, this is what you need to do: **each time you believe that your explanation of a set of observations is obvious, immediately try to think of other plausible explanations.** If you take the time to do this for anything you really want to understand well, you often will find that it is easy to think of other possible explanations. Once you do this, you probably will become more skeptical of the initial “obvious” explanation. You then can look for more evidence to determine which explanation is the best one. As I stated in an earlier chapter, **the best explanation is the one that explains most of the evidence, and that allows you to predict new observations**—predictions that then can be tested.

SQ 5-4: When is intuition helpful and when can it lead us astray? In your answer, mention the problem with cognitive illusions. Define and distinguish a “cognitive bias” from a “cognitive heuristic.” What is the relation between cognitive biases and heuristics, on the one hand, and cognitive illusions, on the other? Define what is meant by the term “stereotype” and give an example. How can stereotypes be harmful in our dealings with others? What is the best way to become more skeptical about the truth of a quickly intuited explanation of something? Discuss the role of preconceptions in the evaluation of evidence.

Summary of Discussion of Skepticism

Let me summarize the three points I made concerning why we have such a hard time being consistently skeptical in our everyday lives. (1) **We often rely upon a strong feeling of certainty that a belief is correct.** When we have such a feeling, we often do not take the time to critically examine evidence for and against it. This becomes even more of a problem when it is coupled with the other two difficulties concerning skepticism. (2) **Our observations of events in the world are often limited.** Unless we have tried to sample a large number of observations that we normally would not have made, our observations usually are limited to those events that accidentally come our way. For example, although obsessive-compulsive disorder is a relatively common mental disorder (about 3% of Americans suffer from it), most of you probably believe it is rare. You believe this because most of you probably have never observed anyone

showing the symptoms of the disorder: people with the disorder usually try to hide their symptoms from everyone but family members and close friends. (3) **We often rely upon our intuition when trying to interpret our observations.** We often draw conclusions about our observations in a rapid and automatic manner without much (if any) conscious thought. These intuitions generally are based on cognitive biases and cognitive heuristics. The problem with intuitively based beliefs is that they seem obviously to be true and, thus, often lead to a strong feeling that the beliefs are true (Problem #1) and often are based on limited observations (Problem #2). As you can see, the three barriers to forming accurate beliefs about the world interact with and reinforce one another.

If you have paid close attention to this discussion, you may have realized that the fundamental difficulty with evaluating properly a knowledge claim about any phenomenon is the existence in all of us of preconceptions (schemas and stereotypes). These preconceptions affect how we look at evidence for or against a knowledge claim. For example, Gilovich (1991) investigated how the views of people concerning capital punishment affect their interpretations of research on the death penalty. One group in his study was already in favor of the death penalty and the other was against it. Thus, the first group had a different set of preconceptions with regard to the death penalty than the second group. Each group was asked to evaluate the evidence in two research reports. The research reports were phony, but the subjects did not know this. One of the reports claimed that capital punishment was associated with decreased murder rates whereas the other report claimed that capital punishment had no effect on murder rates. Each report, however, used a different method to study the question. What the investigators wanted to find out was whether or not the prior beliefs of the subjects influenced how they interpreted the findings of the research reports—especially their evaluations of the two different methods used to study the effects of capital punishment. The researchers' prediction was that those subjects who already were in favor of capital punishment would rate the report supporting this belief as being a better-conducted study, whereas those subjects who were already against capital punishment would rate the other report as being a better-conducted study. The results of the experiment supported this prediction: "the participants considered the study that provided evidence consistent with their prior beliefs—regardless of what type of study that was—to be a well-conducted piece of research," whereas "they uncovered numerous flaws in the research that contradicted their initial beliefs" (p. 54). In other words, being exposed to both reports made the subjects even more convinced of their initial beliefs because they evaluated the quality of the studies in a manner that was consistent with those beliefs. On the one hand, they carefully examined the study that went against their preconceptions and found many flaws. This allowed them to reject the findings of this study. On the other hand, they did not examine closely the study that was consistent with their preconceptions

because its results seemed to be obviously true. Thus, because they did not look for its flaws, it seemed like a very well conducted study to them. In general, the results of research such as this suggests that we tend to look at evidence in biased ways: **we are more critical of evidence against our beliefs (and we think more carefully about it) than we are of evidence in favor of our beliefs.** This very human tendency to be skeptical only of information that goes against our prior beliefs means that we cannot be consistently skeptical unless we make an effort to question all our beliefs, especially those beliefs that we hold firmly. That is why scientists and philosophers think it is so important to publicly state their views and the evidence supporting them. In this way, people with different views can find the flaws in their reasoning and evidence.

Now, why do we emphasize the importance of skepticism, as well as empiricism and naturalism, in science? Why don't we also value other ways of thinking—ways of thinking such as those encouraged in, for example, religion? The answer to this question involves the fact that the goals of science differ from those of these other human concerns. **Psychology, as a science, has a very practical set of goals: as scientists, we want to be able to predict and modify behaviors and mental events in the natural world.** Therefore, when we are trying to find explanations for human mental events and behaviors, we use those ways of thinking and those procedures that have worked previously in accomplishing these practical goals. You also use such practical ways of thinking and procedures in much of your everyday life. For example, if you are having trouble starting your car, you rely upon a skeptical approach when you consider various possible explanations for the problem. For example, you might remember that your battery is several years old. Thus, you wonder if the battery is dead. In being skeptical, you think about what evidence would support this explanation. You look to see if your lights work. You notice that they don't. This evidence supports your theory, but it by no means proves it. There are other possible explanations, so you keep searching for more evidence to support your provisional theory. This evidence consists of *observations* of your car, which means that you are being empirical. Of course, there are various observations you might make. Should you try to see if supernatural demons inhabiting the carburetor are causing your problems? I doubt that any of you would even think of making such an observation, or any other observation involving the supernatural. Instead, when trying to fix your car, you assume an attitude of **naturalism** (a doctrine that implies that only natural explanations should be considered). Why? You assume the attitude of naturalism in such a situation because you have found throughout your life that, when dealing with practical everyday matters such as car repairs, natural causes are the only set of causes you need to consider. In science, the same is true. Over the last several hundred years, we have discovered again and again that natural explanations work much better than supernatural explanations for accomplishing our scientific goals of prediction and control. Thus, if you think

that a dead battery is causing your problems, you may take the battery to a gas station to have it checked. If the mechanic finds that it is dead, you now can be very certain that your theory is correct, and you might conclude that it is a waste of your time to collect any more evidence. Are you being closed-minded about other possibilities? No, there are other things you want to do with your limited time, and the evidence you have collected supports your theory well enough for your purposes. Thus, the ways of thinking and the general procedures used in science are the same as those that you use in everyday life. Both scientists and nonscientists use them because **we all have discovered through experience that they are the ones that work best when we are trying to accomplish practical goals in the natural world.**

SQ 5-5: At what point do you think it makes sense for a person to suspend his/her skepticism and accept a belief as likely to be true? Which kinds of evidence are we more likely to examine closely in order to find its flaws? Why are skepticism, empiricism, and naturalism highly valued attitudes for scientists? When is a natural-science approach to human nature most helpful?

Studying the Influence of the Social Context

Social psychology is based on the idea that much of what we do is influenced by the presence of others, whether these others are present, are simply implied (for example, a video camera staring at you from a store's ceiling implies that someone is watching you), or are only imagined (for example, imagining what your mother might think of your behavior at a party). In order to emphasize the psychological importance of the entire set of social influences within the immediate situation, I refer to the major approach within social psychology as the **social-contextual approach**. The major assumption of this approach is that **the immediate social situation (whether real, implied, or imagined) determines our behaviors, emotions, and cognitions**. Do social situations determine our behavior and mental events in everyday life? It should be obvious to you that they often have an important influence. For example, people act differently at a funeral than they do at a wedding reception. Why do they act differently? One reason is that certain behaviors considered acceptable at wedding receptions would be highly inappropriate at a funeral. Perhaps most important, the social context gives us information about the social role we are to assume in the situation. For example, the social context of a college classroom involves the assuming of social roles that affect the behaviors, thoughts, and emotions of those taking part. Those who are assigned role of student tend to be quiet, to raise their hands to get permission to speak, to enter at an assigned time, and to leave when they are dismissed. Those who are assigned the role of teacher tend to talk often, to talk without waiting for the permission of others, and to begin and end class when they desire. Of course, there are

differences among individuals regarding the particular behaviors exhibited within these roles; but the general outlines of how people are to act are determined by the social context. Other important factors within the social context of a college classroom are things such as how the seats are arranged (you will talk more, on average, when the seats are arranged in a circle), whether or not others are watching you, and the particular activities in which the class is engaged (for example, you behave differently during a test than you do when giving an oral report).

This discussion suggests that social psychology differs from other fields of psychology (such as biological psychology, cognitive psychology, and experimental psychology) by focusing on a different set of causal factors than these other fields. Social psychologists focus on any factor in the immediate social situation that might cause differences in how people act, think, and feel. For example, Shaver (1987) illustrated with an everyday situation how the field of social psychology differs from that of experimental psychology:

Consider...the ways in which each [field]...might describe a family dinner. Depending on his or her specialty within the discipline, a general experimental psychologist might study the eye-hand coordination necessary to bring the food from the plate to the mouth, the subjective experiences corresponding to the taste and smell of the meal, or perhaps the learning processes involved in getting the children to eat their spinach.... The social psychologist, by contrast, might wonder whether the family would conduct itself the same way with invited guests present as it does when eating alone, [or] whether suggestions to the children have more impact when delivered with good food than when delivered at other times.... (p. 17)

This example should make clear that social psychologists focus on the direct causal effects of variables within the immediate social situation—variables such as the presence or absence of guests. In order to find out what it is about a particular social situation that influences people, social psychologists often experimentally manipulate such variables to discover their causal effects on behavior and mental events. Thus, in order to understand the findings of social psychologists, we need to return to the discussion of experimental research that was begun in Chapter 2.

Controlled Experimental Studies

Social psychologists often use experimental studies to test various explanations for a phenomenon. In Chapter 2, we talked about correlational and experimental studies. As I discussed there, experimental studies are much better for inferring causation than are correlational studies because, in experimental studies, we carefully control the research situation. By controlling the

research situation, we are better able to rule out alternative explanations of a phenomenon and to select the one that best explains our observations. Let's say that, in making informal observations at our own family dinners, we have noticed that everyone is more polite when dinner guests are present than when they are absent. Nevertheless, we cannot conclude that this is causing the differences in politeness because such observations are similar to correlational studies. Instead, experiments are best at ruling out alternative explanations. In our experiment, we want to test the following prediction: the *presence of guests* causes a family to *behave more politely* with each other (I have italicized the two variables). In Chapter 2, we used the terms "causal variable" and "affected variable" as labels for the two variables mentioned in the prediction. Which is the causal variable and which is the affected variable in this example? The causal variable is the "presence or absence of guests" and the affected variable is "the amount of polite behavior." The labels I used in Chapter 2 to indicate the two variables in a prediction are not the ones scientists typically use, however. What we have been calling the "causal variable," the **variable predicted to cause a change in a second variable**, is typically referred to as the **independent variable**. In the present example, the "presence/absence of guests" is the independent variable. What we have been calling the "affected variable," the **variable predicted to be affected by manipulations of the independent variable**, is typically referred to as the **dependent variable**. In the present example, the "amount of polite behavior" is the dependent variable.

In order to test our prediction, we would have one group of families, what we have been calling the "treatment group," experience the presence of a guest during dinner. We would have another group of families, what we have been calling the "comparison group," experience the absence of a guest during dinner. Again, these labels are not the ones typically used by scientists. The "treatment group," the **group of subjects who receive the experimental treatment**, is typically referred to as the **experimental group**. The "comparison group," the **group of subjects who do not receive the experimental treatment**, is typically referred to as the **control group**. Using our new terms, we can summarize the experiment as follows:

	<i>Independent Variable</i> (<i>causal variable</i>)	<i>Dependent Variable</i> (<i>affected variable</i>)
<i>Experimental Group</i> (<i>treatment group</i>)	presence of a guest during dinner	amount of polite behavior
<i>Control Group</i> (<i>comparison group</i>)	absence of a guest during dinner	amount of polite behavior

In this chapter, we will examine in detail several experiments in social psychology. We will see firsthand the advantages and disadvantages of experiments for inferring the effects of social variables on our mental events and behavior. We also will examine the particular ethical dilemmas that are encountered when doing experimental research in social psychology. Finally, we will look in detail at how the cognitive approach described in Chapter 4 has been incorporated into the social-contextual approach. In other words, the social-contextual approach assumes that social situations affect how we think of ourselves in relation to our social environment. In order to accomplish these goals, I first wish to discuss in detail three sets of classic studies that have served as part of the background against which modern social psychology has emerged. These three sets of studies have helped to shape social psychology as we know it today.

SQ 5-6: Define the four terms used to describe an experiment: independent variable, dependent variable, experimental group, and control group. Go back to the discussion in Chapter 2 and outline one of the experiments there by using these new terms.

Social Facilitation

The social-contextual approach made an early entrance into psychology with the work of Norman Triplett in the 1890's. Triplett was very interested in bicycle racing, and he had noticed that bicycle racers had faster times when they raced with others than when they raced alone. He wanted to find out if the presence of other people causes us to perform a task faster. In order to get an answer to this question, he designed what might be considered the first experiment in social psychology. How would you design an experiment to answer his research question? Triplett decided upon a very simple experimental situation. He had children wind fishing line on a reel while they were either alone or with other children who also were engaged in the task. Let's outline his experiment:

	<i>Independent Variable</i>	<i>Dependent Variable</i>
<i>Experimental Group</i>	child with others	speed of winding
<i>Control Group</i>	child alone	speed of winding

As he had predicted, Triplett found that children wound the fishing line more rapidly when other children were present than when they were absent. This phenomenon has been called **social**

facilitation, which can be defined as **the faster (or better) performance of a task when one is in the presence of others**. Triplett's study shows, in a very straightforward way, that the social situation (in this case, the simple presence of others) can determine behavior. Triplett's study also shows the applied nature of modern-day social psychology: he had a "real-life" problem he was interested in understanding (racing speeds). In order to understand it better, he designed a laboratory situation related in an important way to the real-life problem, but which left out much of the complexity of real life. The ultimate goal of most research in social psychology is to take the knowledge we gain from such studies and apply it to the real-life situations that inspired the studies in the first place. As we will see later, important areas of research in this field usually have begun with a practical everyday problem that researchers wished to understand.

The causes of social facilitation were studied for many years after Triplett's study was published in 1898. What do you think might be a good explanation for the social-facilitation effect? Before you answer, you should know that the social-facilitation effect occurs only with relatively simple tasks. When a task becomes more difficult for a person, task performance becomes worse in the presence of others. Does this piece of information help you to construct a plausible causal relationship? Perhaps you need more information. Social facilitation also works in animals, even in insects. For example, ants build nests faster in the presence of other ants, cockroaches run through mazes faster in the presence of other cockroaches, rats eat more in the presence of other rats (as do people in the presence of other people). Have you figured out what could have caused better task performance with all these different tasks and all these different species? When I first described social facilitation in the preceding paragraph, it may have occurred to you that the presence of others could make a person feel more competitive. In this case, people may work harder at a task because they want to perform better than others do. But this theory does not seem likely when we realize that cockroaches and ants also show social facilitation. It does not seem likely that insects feel competitive, does it? We also would have the same difficulty with proposing that the fear of being evaluated by others (performance anxiety) is the cause: it does not seem likely that ants, rats, and cockroaches would feel performance anxiety. Don't feel too bad if, at this point, you are not certain of an answer to my question about the cause of social facilitation. In fact, research on the social-facilitation effect had almost disappeared by the second half of the 1930's because researchers could not make much sense of the information they had collected.

During the 1960's, however, a researcher by the name of Robert Zajonc (his last name rhymes with "science") became interested in explaining the social-facilitation effect. He developed the following theory of social facilitation. The individuals making up many species become physiologically aroused when other members of the same species are present. In humans, for

example, physiological arousal in the presence of other humans can be measured by increased heart rate, blood pressure, and sweating, as well as decreased salivation and digestion. Zajonc argued that certain responses are more easily elicited when an animal is physiologically aroused. He referred to these as “dominant” responses. For tasks that are simple because they have been well learned, the dominant response elicited by arousal is the one that has become habitual because of prior learning. On the other hand, for tasks that are difficult because they have not been well learned, the dominant response is unrelated to the one that would be correct for that task. Thus, Zajonc predicted that physiological arousal helps the animal to perform better when a task has been well learned, but causes the animal to perform worse when the task has not been well learned. Let’s think a little more about this theory. What implications would this explanation have for you when taking a test? Where should you take a test if you have studied hard and know the material very well? In this case, you should take it in the classroom with everyone else because the task should be relatively simple for you and the dominant responses should be the correct answers. The presence of others should cause increased physiological arousal and, thus, help you to perform better. Where should you take the test if you haven’t studied very much? In this case, you should be alone when taking the test because the task will be more unfamiliar to you and, therefore, your dominant responses are more likely to be incorrect answers. The presence of others should cause you to make incorrect responses. Are you going to follow this advice the next time you take a test? You shouldn’t do this until you have a better idea of whether or not this explanation is a good one. Remember, if you are trying to develop your skepticism and be empirical in your approach to questions, you need to examine observable evidence supporting the theory.

How would you determine if Zajonc’s theory of social facilitation is a good one? In other words, does the presence of others cause physiological arousal that leads to the elicitation of dominant (well learned) responses? In order to answer this question, we would want to give subjects both well learned and unlearned tasks and measure their performance when alone and with others. But what else should we do? Zajonc hypothesized that social facilitation is not caused by other factors such as performance anxiety or feelings of competitiveness. Thus, when designing our studies, we would want to rule out these two factors as possible causes of any behavioral effects. Sounds pretty complicated, doesn’t it? It is very difficult to design a study that can show precisely what you want it to show. But let me try. We could increase arousal by having others present who are not performing the task themselves (thereby eliminating competition as an explanation) and who are paying no attention to the subject performing the task (thereby eliminating performance anxiety). For example, we might have others sitting in the same room doing nothing while wearing a blindfold and listening to music on earphones. When studies such as these have been performed, it has been found that social facilitation still occurs. Hence, we now

may conclude that physiological arousal caused by the presence of others explains at least some of the behavioral effects of social facilitation.

Other researchers, however, have not been satisfied with Zajonc's explanation of social facilitation. Is this because psychologists can never agree and, thus, that perhaps there is no basis for agreement? Is it really true that one person's opinion about human behavior is as good as anyone else's, regardless of the evidence? If the answers to any of these questions were "yes," this would imply that psychology couldn't be a science. But the answers are all "no." Disagreement over the meaning of evidence and its implications for a particular theory is not due to the supposed nonscientific nature of psychology. Psychology is a science, but it is a science that investigates some very complex phenomena—human behavior and mental events. In order to study scientifically such complex phenomena, we need to reason carefully about possible explanations and design research studies that adequately test these various explanations before we can feel certain that we have developed a good theory of any particular phenomenon. Criticisms are merely skeptical thinking in action, not signs that agreement is impossible.

In trying to understand the thinking of critics of Zajonc's theory of social facilitation, we must examine two possible problems with his research: (1) **There may be alternative explanations that have not been ruled out.** That is, one could argue that the experimental manipulations of Zajonc and others did not exclude other possible causes of their results. For example, it might be that, when in the presence of others, better performance on simple tasks and worse performance on difficult tasks are due simply to the fact that people distract us, thereby making it harder for us to think. It seems obvious that, if we are having difficulty thinking, we will perform more poorly on harder tasks that require more thought than on simpler tasks that do not. In this case, we would not have to claim that physiological arousal causes social facilitation at all (although it still may). In order to choose between arousal and distraction, we would have to perform further experiments—experiments that would allow us to exclude one of these explanations. In fact, most researchers of this problem now believe that distraction causes arousal, and that arousal is still the more direct cause of social facilitation. This brings me to the second problem with Zajonc's theory. (2) **There are multiple causes of any phenomenon.** That is, changes in a phenomenon can be the result of changes in any number of factors. No phenomenon has only one cause. Thus, even if physiological arousal due to the presence of other people is an important cause of social facilitation, this does not mean that other factors cannot also affect social facilitation. For example, it seems reasonable to predict that competitive feelings and/or performance anxiety still might have effects on our performance of a task even if we can rule them out in a particular experiment. What we are trying to do in an experiment is to show that a

particular factor is an important one, but we are not dismissing the possible importance of other factors. For example, think of all of the factors thought to cause cancer. In any one experiment, we want to control for the effects of these other factors, not because we think they are unimportant, but precisely because we realize their possible importance and we don't want them to act as extraneous variables that make it impossible to identify the causal effects of the factor we are studying. Thus, in regard to social facilitation, we should realize that other factors also may be important and that further studies should attempt to show how they may be related to it.

Now, why did I just spend so much time discussing a phenomenon that, although perhaps interesting, may not seem to be terribly important? First, it may be more important than you realize (for example, in your decisions about where to take a test, if your instructor allows you to make a choice). But my main reason for discussing social facilitation in detail is that it illustrates several important points: (1) It is a very simple example of the direct effect of social situations on a person's behavior. The work of Triplett and others shows us clearly how **the social situation can determine our behavior independently of our personalities**. Most people, regardless of their personalities, show social facilitation in the presence of others. (2) Social facilitation is a very simple phenomenon that has been very difficult to explain. As you may have noticed, this is true of almost all the phenomena studied by psychologists; and, in fact, it is true of most phenomena studied within any other scientific discipline (such as chemistry, physics, or biology). Although we try to design studies that will rule out all explanations but one, we realize that no one study will ever give us a definite answer to our questions about the causes of a phenomenon. In order to develop a good and comprehensive explanation of a phenomenon, **we must examine a large number of carefully designed studies**. That is why scientists often have a difficult time explaining to others why they believe something to be true: the support for any knowledge claim usually involves a large number of studies, each of which helps us to see only a very small part of the whole picture. (3) The history of thinking about social facilitation illustrates an important point: when controversies develop within science, they usually do not involve a decision about whether or not a particular phenomenon exists. For example, no psychologist doubts that social facilitation occurs, and no biologist doubts that human evolution occurs. Instead, **most controversies are concerned with which of several possible explanations of a phenomenon is the best one**. We also saw this to be true in the last chapter when we discussed the controversy over repressed/false memories. As you may recall, no one doubts that people sometimes claim to suddenly remember a traumatic event from the past—one that they had not remembered until then. What is controversial is whether these memories are accurate recollections that had been forgotten because they cause so much distress, whether they are inaccurate constructions of incidents that never occurred in the first place, or

whether there is some other explanation for them. In other words, the controversy is over how to best explain why people say that they have just now remembered a traumatic event. In Chapters 6 and 7, I will discuss in more detail the issue of why it can be so difficult to develop adequate explanations.

SQ 5-7: Describe Triplett's study of social facilitation. Describe Zajonc's explanation of social facilitation and discuss two problems with it. Discuss the points made about research in social psychology (and science generally) with regard to the topic of social facilitation.

Obedience to Authority

I opened this chapter with a description of the My Lai massacre. Several years before the incident, a social psychologist at Yale University by the name of Stanley Milgram began a series of studies that he hoped would help us to understand how such atrocities could happen. In particular, he wanted to understand how generally caring and nonviolent people could be induced to harm and even kill others. Of particular concern to him were the actions of Nazi officers and enlisted men who murdered large numbers of people in sadistic acts of extreme brutality—men who often appeared to be no different, on average, from anyone else with whom we might come into contact in our everyday lives. These men often justified their cruel actions by making statements such as, “I was just following orders.” In other words, many of them were saying that, although they had found their own actions to be personally repulsive, they felt as if they had had no other choice. Is it true that typically nonviolent people will perform violent acts simply because an authority has told them to do so? That is, is it true that, under the right circumstances, personality may have little to do with cruel and sadistic actions—that evil can be in the situation and not in the person? In 1960, Milgram began a study designed to answer such questions. In order to study this problem, he used the following general procedure: “A person comes to a psychological laboratory and is told to carry out a series of acts that come increasingly into conflict with conscience. The main question is how far the participant will comply with the experimenter’s instructions before refusing to carry out the actions required of him” (Milgram, 1974; p. 3).

In order to answer this research question, Milgram set up the following situation, which I will call the “standard condition” (as you will see, there were a number of variations on this standard condition). Two people came to Milgram’s laboratory and were told that they were going to take part in a study of the effects of punishment on learning. One person, referred to as the “learner,” was to memorize a list of paired words, whereas the other person, referred to as the “teacher,” was to help the learner memorize the words by punishing him with an electric shock

whenever he made a mistake. The learner was strapped into a chair and an electrode was attached to his wrist:

After watching the learner being strapped into place, he [the teacher] is taken into the main experimental room and seated before an impressive shock generator. Its main feature is a horizontal line of thirty switches, ranging from 15 volts to 450 volts, in 15-volt increments. There are also verbal designations which range from SLIGHT SHOCK to DANGER—SEVERE SHOCK. The teacher is told that he is to administer the learning test to the man in the other room. When the learner responds correctly, the teacher moves on to the next item; when the other man gives an incorrect answer, the teacher is to give him an electric shock. He is to start at the lowest shock level (15 volts) and to increase the level each time the man makes an error, going through 30 volts, 45 volts, and so on. (Milgram, 1974, p. 3)

With these preliminaries taken care of, the study began. (The physical set-up of the study is shown in Figure 5.2.) There were no problems until the learner had made a total of five mistakes. At this point, he was given a shock of 75 volts, which caused him to make a grunting sound. At even higher voltages, the learner began to shout that the shocks were very painful. At 150 volts, the learner yelled:

“Experimenter, get me out of here! I won’t be in the experiment anymore! I refuse to go on!” Cries of this type continue with generally rising intensity, so that at 180 volts the victim cried out, “I can’t stand the pain,” and by 270 volts his response to the shock was definitely an agonized scream. Throughout, from 150 volts on, he insisted that he be let out of the experiment. At 300 volts the victim shouted in desperation that he would no longer provide answers to the memory test. (p. 23)

At this point, the experimenter informed the teacher that a failure to respond was considered to be an incorrect answer and that he should continue to shock the learner at increasing voltages as before. If the teacher asked about physical harm the learner might be experiencing, the experimenter would assure him that, although the shocks might be painful, they would not cause permanent tissue damage. At 315 volts, the learner screamed and again stated that he was no longer participating in the study. At 330 volts, he shrieked in agony. After this point, he was no longer heard from. The teacher could only infer that the learner had either lapsed into unconsciousness or, perhaps, had died in the next room. Again, if the teacher hesitated, he was told to consider the lack of an answer to be an incorrect response. Unless the teacher refused to continue, the learner was shocked until the teacher reached the last of the switches (labeled ominously by an “XXX”). At

this point, the teacher was told to continue using the last switch. After two more failures on the part of the learner to respond, the teacher finally was told to end the experiment.

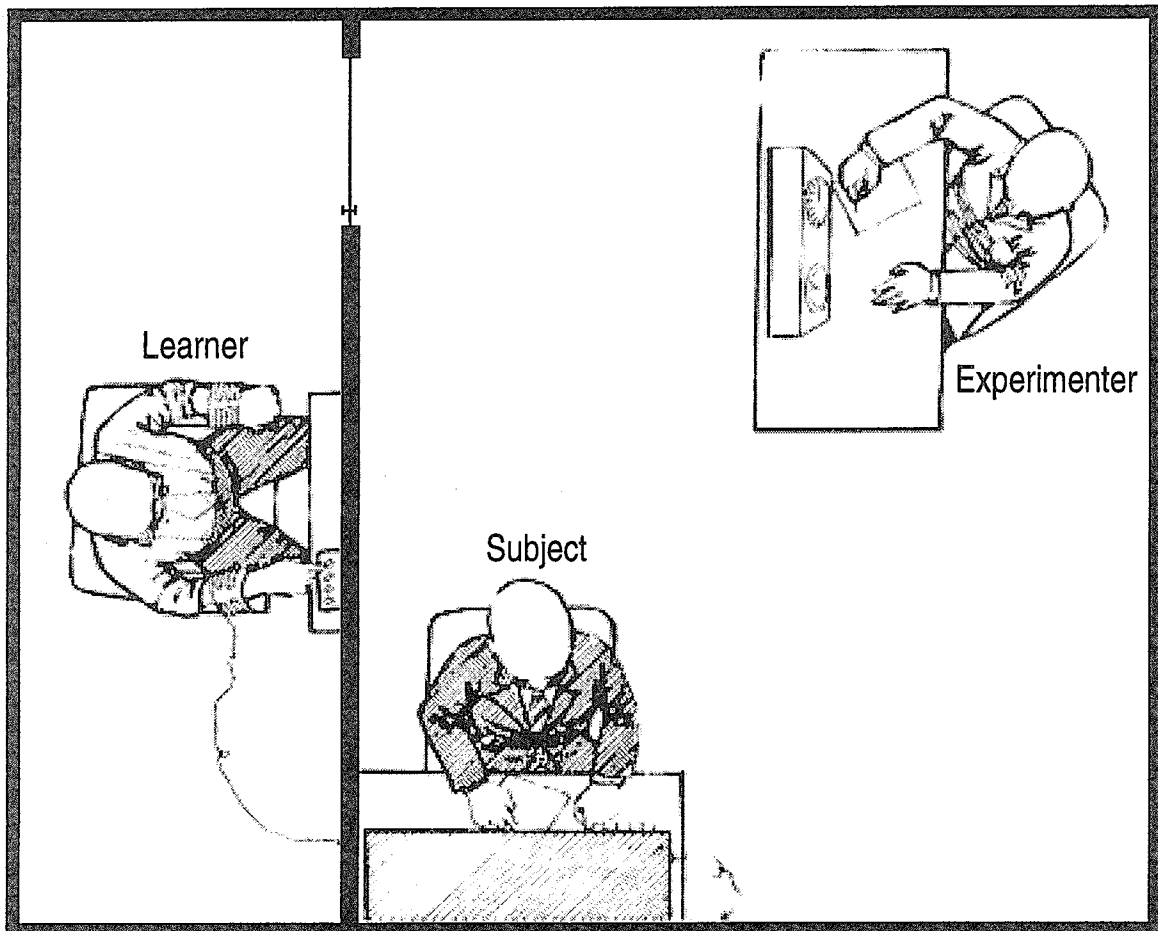


Figure 5.2 The physical arrangement of the learner, subject (teacher), and experimenter in the “standard condition” of Milgram’s obedience study (from Milgram, 1974; p. 91)

As you can see, the teacher was subjected to many requests from the learner to stop. These requests represented one important social force on the teacher’s actions. You might have predicted that some teachers would have refused as soon as they saw the shock generator with its labels implying that someone could get seriously hurt. Or, if they had begun the procedure, you might have predicted that they would have stopped by 150 volts when the learner first stated that he no longer wished to participate. Although these predictions seem reasonable, you need to remember that, in addition to the learner’s requests, there was a second social force impinging upon the teacher—the experimenter, who was sitting just behind the teacher and was issuing commands to continue whenever the teacher seemed hesitant or likely to rebel. The commands consisted of

statements such as: “please continue” (or “please go on”); “the experiment requires you to continue”; “it is absolutely essential that you continue”; and, if all else failed, “you have no other choice, you *must* go on.” Other than such relatively benign commands, however, the teacher was not coerced in any way to continue. For example, he was paid for his participation (a sum of \$4 with an additional 50¢ for carfare) at the beginning before the study was begun, and was told (if he asked about it) that he would not have to give the money back. With these two sets of social forces—very insistent and even agonized requests from the learner and relatively mild though firm commands from the experimenter—how many teachers do you think would continue shocking all the way to the highest setting of 450 volts? Think of an answer in terms of percentages (anywhere from 0 to 100) and write your answer in the following space. ____%. Now, how far do you think you would have gone if you had been a teacher in the study? At what voltage would you have stopped? Think of an answer and circle the voltage you think you would have stopped at:

15 30 45 60 75 90 105 120 135 150 165 180 195 210 225 240
255 270 285 300 315 330 345 360 375 390 405 420 435 450

Various groups of people (psychiatrists, college students, professors, and adults of various middle-class occupations) were asked to make these same two predictions. On average, these people stated that, if they had been the teacher, they would have stopped at about 150 volts, the point at which the learner refused to participate in the study. Very few believed that they would go beyond this point (the most extreme prediction was made by a psychiatrist who believed that he might have gone to 300 volts). They also predicted that most normal people would rebel against the experimenter’s authority early on in the study. They stated that perhaps only about 1% (1 out of 100) teachers would shock the learner all the way to 450 volts, and that those who did probably would be mentally disturbed. In response to these predictions, Milgram (1974) asked and answered the following question:

What are the assumptions that underlie these predictions? First, that people are by and large decent and do not really hurt the innocent. Second, that unless coerced by physical force or threat, the individual is preeminently the source of his own behavior. [People assume that a] person acts in a particular way because he has *decided* to do so. Action takes place in a physical-social setting, but [people assume that] this is merely the stage for its occurrence. The behavior itself [people assume] flows from an inner core of the person; within the core[,] personal values are weighed, gratification assessed, and resulting decisions are translated into action. (p. 31)

Milgram's unstated point here is that these everyday assumptions must be incorrect because, when he performed the study, he found that almost 65% of the teachers (25 out of 40) shocked the learner all the way to 450 volts—the highest setting on the generator! In other words, the majority of teachers continued shocking the learner well beyond the point at which he refused to participate, past the point at which he screamed in agony, and even past the point at which he may have died. Only 8 of the 40 teachers rebelled somewhere around the point at which the learner refused to participate in the experiment (150 volts). It seemed that most teachers—all of whom were men between the ages of twenty and fifty years, from a variety of professional, white-collar, and blue-collar occupations—would possibly kill another human being whom they did not know simply because an experimenter ordered them to do so.

Were these people sadistic psychopaths, did they not care about the person they apparently had severely hurt or even killed, perhaps who even enjoyed doing it? On the contrary, it seemed that many were very upset about what was happening. The following interaction between one teacher and the experimenter shows that this man felt very distressed about what he was doing. After he had shocked the learner with 180 volts, he stated:

SUBJECT: I can't stand it. I'm not going to kill that man in there. You hear him hollering?

EXPERIMENTER: As I told you before, the shocks may be painful, but—

SUBJECT: But he's hollering. He can't stand it. What's going to happen to him?

EXPERIMENTER (*his voice is patient, matter-of-fact*): The experiment requires that you continue, Teacher.

SUBJECT: Aaah, but, unh, I'm not going to get that man sick in there . . . know what I mean?

EXPERIMENTER: Whether the learner likes it or not, we must go on, through all the word pairs.

SUBJECT: I refuse to take the responsibility. He's in there hollering.

EXPERIMENTER: It's absolutely essential that you continue, Teacher.

SUBJECT (*indicating the unused questions*): There's too many left here; I mean, Geez, if he gets them wrong, there's too many of them left. I mean who's going to take the responsibility if anything happens to that gentleman?

EXPERIMENTER: I'm responsible for anything that happens to him. Continue, please.
(Milgram, 1974, pp 73-4)

This man continued all the way to 450 volts, although he grew increasingly distressed as he did so. Some other teachers felt that they were doing a job in which they had to do as they were

told—statements that were similar to those made by Nazi officials at the end of World War II. But even these task-oriented people typically seemed concerned about the learner's fate. It appeared that there were two factors of most importance for getting the teachers to complete the experiment: **(a) the presence of an authority figure giving commands to continue and (b) the presence of an authority figure taking responsibility for what was happening.** It seemed that, in the minds of most of the teachers who continued to the end, it was primarily the experimenter who was shocking the learner, not the teachers. Milgram stated that "the obedient subject does not blame himself for shocking the victim, because [he believes that] the act does not originate in the self. [Instead, he believes that it] originates in authority, and the worst the obedient subject says of himself is that he must learn to resist authority more effectively in the future" (Milgram, p. 199). Milgram was exaggerating here, however: obedient subjects typically assigned some responsibility to themselves, but they often assigned just as much or even more responsibility to the experimenter. And, most interesting of all, they assigned a significant portion of the responsibility to the learner as well: they felt that the learner, who had entered the study of his own free will and did not learn very well, was responsible to some extent for the shocks he received.

If most people put in this situation assign a large amount of the responsibility for their own actions to the authority commanding them as well as to their victim, it becomes difficult to say that their actions have much to do with their own personalities. That is, we usually don't assign the cause of an action to an individual's personality when most people act in the same way. This would be like saying that the cause of a reflex that every normal person shows (such as the "knee-jerk reflex" when a hammer strikes just below the knee) is due to their personalities. Furthermore, the people who took part in the study did not believe that their actions had much to do with their personalities: they felt that they had no choice in the matter, even when they found their actions to be abhorrent. Perhaps it was those people who refused to continue to the end who were acting according to their personalities: they were in the minority and they tended to assign most of the responsibility for their own actions to themselves, not to the experimenter (and very little to the learner). Thus, we have to wonder if there was anything different about the personalities of the disobedient subjects. To answer this question, Dr. Alan Elms administered various personality tests to a subset of Milgram's subjects. Only small differences in personality were found between those who rebelled early in the procedure and those who obeyed to the end. For example, one test suggested that disobedient subjects showed less of a trait called "authoritarianism," which means that they had less of a tendency to act according to the commands of authority figures. But this finding was a weak one. In general, it seemed that differences in personality explained almost none of the differences between subjects in terms of whether they obeyed or rebelled. One way to

understand this counterintuitive finding is to suppose that the complaints of the learner created a social situation in which most subjects were in extreme conflict about whether to continue shocking. This meant that they were sitting right on the edge of a decision, and thus could easily be pushed one way or the other by minor differences in the situation. Another way to understand it, however, is to suppose that the measures of personality used were not sensitive enough to detect personality differences that actually existed. This second way of understanding the results was the one preferred by Milgram: "I am certain that there is a complex personality basis to obedience and disobedience. But I know we have not found it" (p. 205). Nevertheless, it is beyond doubt (the results show it very clearly) that the social situation was a very powerful influence on obedience—so powerful that it tended to overwhelm any measurable personality differences. The finding that personality differences explained almost none of the differences in obedience suggests that, on average, the people who were fully obedient were not psychopaths. It seems that, instead, **the social situation was a very powerful one that led them to do something that, to most of them, was unthinkable—harming a helpless stranger.**

SQ 5-8: Describe the "standard condition" in Milgram's study of obedience to authority. About what percentage of people continued all the way to 450 V in this condition? Which two factors seemed to be most important for whether or not a person would continue shocking another person all the way to the end of the experiment? What differences in personality (if any) were found between those who obeyed all the way to the end of the experiment and those who rebelled early?

But people tend to find this idea implausible. The people asked to predict the outcome of the procedure believed that only psychopaths and other similarly disturbed individuals would shock all the way to the end. The teachers themselves seemed to have little idea as to the causes of their own behavior: they tended to blame the experimenter and the learner without realizing that their adopting of a submissive social role was the primary cause of their behavior (see below). As if to underscore this last point, Milgram warned us that the teachers' explanations of their own actions were of questionable validity:

While we must take seriously everything the subject says, we need not necessarily think that he fully understands the causes of his own behavior. A line must be drawn between listening carefully to what the subject says and mistaking it for the full story. The subject is controlled by many forces in the situation beyond his awareness, implicit structures that regulate his behavior without signaling this fact to him. And we have one enormous advantage over the subject: In each condition, we have slightly varied the nature of the circumstances which the subject confronts and thus know the importance of each of the

factors. *The participant, and he alone, has experienced the predicament, but he cannot place it in the perspective that comes only from an overview.* (pp. 44-45; italics added)

The last sentence seems to go against common sense. Who else should know better the causes of an action than the person who has performed it? Most of us assume that, if we want to know why someone did something, we need only ask him or her. What Milgram and other social psychologists have tried to show is that **our everyday assumptions and inferences about the causes of our own actions are often wrong**. That is, we tend to believe incorrectly that our actions are caused solely by internal factors such as desires and traits of which we usually are aware. We tend to believe this incorrectly because **we have a strong tendency to be unaware of the importance of social forces**. Milgram concluded that “it is not so much the kind of person a man is as the kind of situation in which he finds himself that determines how he will act” (p. 205). Thus, the moral of many studies in social psychology is that we should place much less trust in our own intuitions and “personal experiences” than we usually do: we often ignore the situational causes of our actions because they are not obvious to us. The experimental procedure of varying causal factors under tightly controlled conditions gives us much better insight into the causes of our actions than do our own uncontrolled personal experiences and the intuitions based on them. (As we will see in the next chapter on personality psychology, even when an action is predominantly caused by internal factors, there are still some good reasons for thinking that we are not always, or even often, aware of what these causes are.)

As you may have already known or guessed, no one was actually being shocked in Milgram’s study. The teacher, however, who was the actual subject of the study, did not know this. The learner, who was a confederate of the experimenter, was merely acting—he was playing a role in the experiment. All of his protests had been tape-recorded. He sat in the next room and responded to the teacher with a particular order of correct and incorrect answers (there were about three incorrect answers for every correct one) and, at predetermined points, played recorded protests. All teachers in the study received the identical pattern of correct and incorrect answers as well as recorded protests. Why did Milgram include the protests? Weren’t the labels on the shock generator enough for the teacher to know that he might be harming the teacher? In a pilot study performed before the actual study described above (in order to test the procedure and to find problems with it), Milgram did not include these protests. He was surprised by his results: “In the absence of protests from the learner, virtually every subject in the pilot study, once commanded, went blithely to the end of the board, seemingly indifferent to the verbal designations” (Milgram, 1974; p. 22). I outline this experimental manipulation in the following:

	<i>Independent Variable</i>	<i>Dependent Variable</i>
<i>Experimental Group</i>	learner protests	35% of teachers rebelled
<i>Control Group</i>	learner does not protest	0% of teachers rebelled

Thus, it was apparent to Milgram that, if he was going to get any rebellion at all, he had to do one of two things. He either (1) had to increase the social force coming from the learner, or (2) had to decrease the social force coming from the experimenter.

In variations on the standard condition, Milgram experimentally manipulated these two social forces to determine their relative effects on teacher rebellion. He varied the social force of the learner by varying the closeness of the learner to the teacher. As the learner was brought closer and closer to the teacher, the amount of obedience dropped, yet there were always some teachers who obeyed. In one condition, the learner was seated next to the teacher, and the teacher had to force the learner's hand onto a shock plate after each incorrect response. Although many more teachers rebelled here than in the standard condition, 30% still continued to obey the experimenter all the way to 450 volts. In another condition, the learner was placed in a separate room and made no protests except for one violent pounding on the wall separating the rooms at 300 volts. It is interesting that this single and somewhat ambiguous attempt at communication led to as much rebellion (35%, or 65% obedience) as the more intensive communication that occurred when the teacher could hear the learner's verbal protests continuously throughout the testing. This shows that the teacher needed only a very small indication that the learner was suffering before rebellion became an option. In a similar way, Milgram manipulated the social force of the experimenter by varying his closeness to the teacher as well as his ability to communicate with the teacher. (During this part of the study, Milgram moved to a new laboratory that was not as impressive as the original laboratory, and, hence, he again performed the standard condition so that it could serve as the baseline. He found that the less impressive quarters had no effect on the amount of obedience: 65% of the teachers continued shocking to 450 volts.) The experimenter first gave some initial instructions, and then left the room. When the teacher had a question, he could call the experimenter on a telephone. In this condition, only about 20% of the teachers continued shocking to 450 volts. And even those who did not rebel directly took the opportunity to shock at lower levels than what they were supposed to. It seems obvious that the presence of the experimenter is required if most people are to continue shocking the learner.

There were many other variations on the standard condition of the study—too many to describe here even briefly. But the overall results showed that **three situational factors** were necessary if most of the subjects were to continue shocking someone all the way to 450 volts. (1) **There had to be a salient** (“salient” means “noticeable” or “conspicuous”) **authority figure issuing commands to continue.** (2) **There had to be an authority figure who took responsibility for any problems the learner might suffer.** (3) **There had to be a learner who was not very salient** (the most obedience was observed when the learner could not be seen or heard). Milgram believed that the first factor, the presence of an authority figure, was the most important factor. Milgram explained that, **once we take on a particular social role in a particular social situation—once we have defined that social situation in a particular way—it is very difficult for us to change that definition and take on a new role.** In Milgram’s research situation, the experimenter implicitly defined himself as the relevant authority: he wore a lab coat and he instructed the teacher and learner on what they were to do. By listening to him respectfully and following his initial commands, the teacher showed that he agreed with the experimenter’s self-definition. In other words, the teacher willingly took on a social role subordinate to the experimenter, and he thought of the learner as having done the same thing: the learner had also listened to the experimenter and even allowed himself to be strapped into the “electric chair.” Thus, as far as the teacher was concerned, both he and the learner agreed to take on social roles subordinate to the experimenter and to follow his commands.

Eventually, when the teacher became concerned about what was happening, and began to question (if he ever did) the experimenter’s competence, it was not easy for him to confront the experimenter too aggressively with his concern since this would have required changing how he had agreed to define the situation. That is, we feel that we break a very important rule of social life when, in the middle of a social situation, we change how we define it. When we attempt to do this, we feel very inconsistent and “wishy washy,” and we begin to look at ourselves as we do a child who tries to change the rules of a game when he/she starts to lose. The unstated social rule that states that “we should not try to change the definition we have already given to a social situation” has a very strong moral force behind it. In fact, some teachers even became angry with the learner because of his continuous complaints about the harm that he was receiving from the shocks! Their upset can be best understood by inferring that these teachers saw the learner as breaking this moral rule underlying social interactions: by complaining and then refusing to participate, they saw him as trying to change the definition he had initially given to the situation. The teachers themselves typically were very uncomfortable when they objected to the procedure; and some never objected at all. Milgram (1974) explained the teachers’ discomfort with objecting in the following way:

The experimental situation is so constructed that there is no way the subject [the teacher] can stop shocking the learner without violating the experimenter's self-definition. The learner [Milgram meant to say "teacher" here] cannot break off and at the same time protect the authority's definitions of his own competence. Thus, the subject fears that if he breaks off, he will appear arrogant, untoward, and rude. Such emotions, although they appear small in scope alongside the violence being done to the learner, nonetheless help bind the subject into obedience. They suffuse the mind and feelings of the subject, who is miserable at the prospect of having to repudiate the authority to his face. The entire prospect of turning against the experimental authority, with its attendant disruption of a well-defined social situation, is an embarrassment that many people are unable to face up to. In an effort to avoid this awkward event, many subjects find obedience a less painful alternative. (pp. 150-51)

Another fact that supports this interpretation is that not one teacher, not even those who rebelled, got up and checked on the learner once they had finished. It is as if they felt that they would be further challenging the experimenter's authority if they left their assigned seat and checked on the learner.

In addition to the experimenter's authority, another thing that made disobedience so difficult for the teacher was that the shock levels were increased so gradually. There was no specific point at which it became obvious that something was wrong. Furthermore, the teacher had shocked the learner up to the point at which he became concerned and, thus, he had committed himself to these actions. It would have been very difficult for him to say to himself that what he had been doing was wrong. Putting all of this together, we can conclude that there seemed to be at least **three psychological factors** that made it very difficult for teachers to rebel against the experimenter's authority: (1) **Changing a definition of a social situation would involve breaking an important** (though usually unspoken) **rule of social life**. The way in which the teachers had defined the social situation also gave rise to various motivations, especially motivations to do a good job and to please the authority. (2) **The negative effects of the teachers' actions became apparent to themselves only very gradually**. There was no one point at which it suddenly became obvious that now they were really doing harm to the learner. (3) **Once they had started shocking the learner, teachers were motivated to perceive their actions as being correct**. These three psychological factors together had a very powerful effect on the teachers—so powerful that they tended to wash out any personality factors of empathy and caring for another person. It would be similar to a situation in which you, after realizing that your psychology instructor made an important mistake regarding something that

he/she had said during class, stood up and informed everyone present that you were going to withdraw from the class because the instructor was incompetent.

SQ 5-9: Milgram believed that we cannot trust the beliefs of the subjects in his study as to the causes of their own behavior. Why did he conclude this? What kind of cause did Milgram believe we often ignore when trying to explain the behavior of ourselves and others? What two aspects of the social situation did Milgram vary in his experimental manipulations? What did he find when he did this? In your answer, list the three major situational factors that were found to be important to whether a not a subject would continue shocking all the way to 450 V. Which three psychological factors made it difficult for the subject to change his view of himself as subordinate to the experimenter?

Ethical Problems: Deception and Psychological Harm

Would you have wanted to be a subject in Milgram's study? Those of you who answered "no" to this question probably were concerned about the distress felt by most of the teachers as they struggled with the conflict between defying an authority and harming a human being. Furthermore, you might have been disturbed by the fact that the teachers were lied to by the experimenter. You might even have reasoned that some teachers were embarrassed because they believed that the experimenter had made "fools" of them. None of these negative effects would have occurred if **deception (lying to the subjects about the goals of the study)** hadn't been used. It should be obvious, however, that there could have been no study if the teachers had known from the start that the actual purpose of the study was to see how they reacted to a particular social situation. Deception was necessary if this study was to work. We are in the midst of a dilemma that pits our ethical concerns about causing others distress, embarrassment, and other **psychological harms** (a term that means **any emotions or thoughts, temporary or permanent, that have negative effects on a person**) against our practical concerns about how best to test a prediction involving social influences. The use of deception may have been an important psychological harm for some subjects, and it may even have been immoral. With respect to such possibilities, critics of Milgram's study have asked questions such as the following: is scientific understanding of humans such a lofty and important goal that psychologists have the right to deceive people and cause them psychological harm, even if only temporarily? Furthermore, how can we tell if the typical goals of psychologists consist of something as noble as advancing scientific knowledge? Perhaps an important goal of many psychologists is simply to advance their own careers, thereby satisfying their ambitions. In this case, the more dramatic (and perhaps unethical) the study, the more notice and fame the researchers will receive. In fact, Milgram's study has become known around the world (a play and a television movie were written about it). If

the typical goals of psychologists are selfish ones, should we allow them to use others to satisfy these goals?

Perhaps the most important ethical problem with deception is this: **when people are deceived, they cannot really agree to participate in a study voluntarily since they do not know everything that might happen to them.** Milgram's subjects, when they first agreed to participate, did not know that the experimenter would command them to seriously harm another person. If the experimenter had mentioned this possibility, I am certain that most teachers would have refused to take part in the study. During the 1970's, an ethical requirement was established that stated that subjects must give their **informed consent** to participate in a study. This means that everything harmful that might happen to subjects during the course of a study must be described to them before they can agree to participate. The ethical problem with deception should now be obvious: are people really able to give their informed consent when they are lied to about fundamental aspects of a study? Milgram defended himself against such criticisms by pointing to the fact that almost all subjects had a favorable view of the study after they had participated in it. Milgram argued that this was the most important factor justifying the continuation of any study: "The central moral justification for allowing a procedure of the sort used in my experiment is that it is judged acceptable by those who have taken part in it" (Milgram, 1974, p. 199). He expressed this idea even more clearly in the following: "whether it is unethical to pursue truths [by creating an illusion, thereby deceiving people]...cannot be answered in the abstract. It depends entirely on the response of those who have been exposed to such a procedure" (p. 199). He stated that, if many of the subjects had expressed their outrage at having been subjected to the experimental manipulations, he would have stopped the research. Many subjects, however, found the experience to have been personally meaningful: "They viewed the experience as an opportunity to learn something of importance about themselves, and more generally, about the conditions of human action" (p. 196). Thus, his point was that deception and emotional upset are not the moral problems some critics have argued they are—not when the subjects themselves believe their experiences to have been positive and meaningful.

But a possible problem with Milgram's line of reasoning here involves an extension of something I mentioned above: when people commit themselves to a course of action, they become motivated to think of their decision as having been the correct one. Extending this idea to the present case, once people have agreed to participate in a study, they become motivated to think of their participation as having been a good thing, even if the consequences to them involved psychological harm. In fact, there is some research that shows that the more distress a person feels after agreeing to a course of action, the greater his/her motivation to think of the decision as having

been a good one. Is this the reason that almost all of Milgram's subjects evaluated the study as having been a positive experience? That is, was it just "wishful thinking" on their part or was it actually a deeply meaningful and positive experience for them, as Milgram argued? It is impossible to say. It might even have been true that their motivation to see their experiences in a positive light caused them to focus on the positive aspects of the study and to ignore its negative aspects. If this is how they then thought of their experiences, then these experiences became positive and meaningful ones for them because of the way they interpreted them afterwards. If they had chosen instead to focus on its negative aspects, perhaps because they had read what some of Milgram's critics said about his study, then it would have become a negative experience for them. Thus, it may all depend upon how others describe the experience, especially authorities who help the subjects to interpret their experiences. If this is true, then the "debriefing" session, which occurs after most studies using human subjects, is an essential component of any study: it helps the subject to make a positive interpretation of his/her participation and, thus, to reduce the potential psychological harm of the study.

In addition to the meaningfulness of the experience for the subjects, there are other benefits of research. The most important benefit is the advance in scientific knowledge that has occurred. In fact, here you are, decades after Milgram's study was completed, reading about it in a textbook because of the important advance it made in our knowledge of human nature. In general, **when we are evaluating the ethics of a proposed study, we must weigh its potential benefits against its potential harms.** If the benefits outweigh the harms, we are more likely to judge the study to be an ethical one. Nevertheless, for at least two reasons, this is not an easy evaluation to make. First, there is the problem of deciding the point at which a study becomes ethical. This cannot be stated precisely. That is, by how much must the benefits outweigh the harms for a study to be ethical? Second, it is never clear how we are to weigh the benefits and the harms of the study: such an evaluation will vary from one person to another. For example, some people may feel that it is always wrong to induce distress in another (even temporarily) and that scientific knowledge is not that important. Others may feel that scientific knowledge is so important that almost any amount of distress on the part of subjects is worth the price. It should be obvious to you that personal values are central to deciding the ethics of a study, and I'm sure that each of you arrived at a decision about Milgram's study that will differ from the decisions of others. Regardless of your own decision, this study is not one that would be possible to perform today (within the US, at least). Most colleges and universities in the United States have "review boards" that consider the ethics of proposed studies. It is very unlikely that a review board would approve any study similar to Milgram's. Some applaud this fact whereas others feel its stifling effects upon the science of psychology. In fact, some researchers believe that it is impossible any longer to do

any truly important research in social psychology. You may notice that all of the classic studies discussed in this chapter are at least several decades old. Perhaps these researchers are correct.

SQ 5-10: Why is the deception used in many social-psychological studies difficult to justify ethically? In your answer, mention the role of informed consent. How did Milgram defend himself against charges that his study was unethical? In general, how do we evaluate the ethics of a proposed study?

Internal Versus External Validity

Every study can be evaluated in terms of its worth for helping us to understand the phenomenon being investigated. This evaluation involves determining the study's **validity**—its **soundness with regard to its ability to withstand various kinds of criticism**. There are two major types of validity—"internal validity" and "external validity." **Internal validity** is the **ability of a study to provide clear support for the claim being investigated**. For example, does the Milgram study provide clear support for the claim that the commands of an authority figure can cause people to harm a stranger? When evaluating a study's internal validity, we are asking the following question: does the design of the study allow us to make observations that increase our confidence in the truth of the claim being tested? For example, let's say that we wish to test the claim that smoking causes cancer, and then we describe observations involving a case study in which a man who smoked for forty years developed cancer during the last few years of his life. Should the observations made in this case study increase our confidence in the claim that smoking causes cancer? No, they should not because this sort of study cannot test claims involving causation. As I stated in Chapter 2, there are many extraneous variables that might explain why this man developed cancer (such as heredity, too much sun, too much alcohol, viruses, a decrease in the functioning of the immune system, etc.). In addition to the problem of extraneous variables, we also have the directionality problem (changes in either smoking or cancer could conceivably cause changes in the other). Case studies do not allow us to exclude the directionality problem or the extraneous-variable problem when trying to find the causes of this man's cancer. In order for a study to have high internal validity, it must control for such problems. **The most internally valid studies are well-controlled experimental studies because they control for the directionality and extraneous-variable problems**. If they are well controlled, we can assign causes to particular factors in a clear-cut manner.

As an example of an experimental study that has high internal validity, we can look at research performed by Joseph Goldberger during the early 1900's. Goldberger wanted to find the cause of the disease called pellagra, the symptoms of which include gastrointestinal problems,

mental disturbances, and skin eruptions. Many medical doctors believed that the disease was caused by some sort of “germ” that, when passed from one person to another, would give rise to the symptoms of the disease. Because the disease was more likely to occur when a person lived in unsanitary conditions (such as homes with no plumbing), some believed that the unknown microorganism was passed through bodily wastes and fluids. Goldberger, on the other hand, suspected that the disease was caused by an inadequate diet: the correlation with sanitation, he believed, was caused by a third variable—poverty—that led to both the inadequate sanitation and the inadequate diet. Goldberger made the following prediction: eating a low-protein diet will cause the symptoms of pellagra. How would you test this prediction in a way that has high internal validity? If your experiment is to have high internal validity, you need to design a study that rules out any other explanation for the results you get. Thus, you must control for the directionality problem and the effects of extraneous variables (such as differences in sanitation). Try to think of such an experiment and then write your answer below:

<i>Independent Variable</i>	<i>Dependent Variable</i>

Experimental Group

Control Group

Now, let’s compare your study to Goldberger’s in order to see how to set up the proper research controls. Goldberger sampled prisoners from the Mississippi State Prison and split them into two groups. One group received a low-protein diet and the other group received a normal diet. His experimental design is outlined in the following:

	<i>Independent Variable</i>	<i>Dependent Variable</i>

<i>Experimental Group</i>	low-protein diet	symptoms of pellagra

<i>Control Group</i>	normal diet	symptoms of pellagra

Within five months, many of the prisoners in the experimental group developed pellagra whereas none of the prisoners in the control group developed the disease. Because of the high internal validity of the study, you should now feel more confidence in Goldberger’s claim that pellagra is caused by an inadequate diet.

Nevertheless, being “more confident” is not the same as being “certain.” Thus, Goldberger performed another study to show that the alternative theory—that a microorganism passed in bodily fluids causes pellagra—could not be true. Goldberger predicted that if the bodily fluids of pellagra victims were consumed, the person consuming them would not develop pellagra. How would you test this prediction in an internally valid manner? It seems obvious that some subjects would need to consume the bodily fluids of pellagra victims and others would need to consume the bodily fluids of normal people to see who got sick with pellagra. We can set up Goldberger’s general experimental design in the following way:

	<i>Independent Variable</i>	<i>Dependent Variable</i>
<i>Experimental Condition</i>	consume fluids of pellagra victims	symptoms of pellagra
<i>Control Condition</i>	consume fluids of normal individuals	symptoms of pellagra

Goldberger took secretions from the nose and throat of pellagra victims and placed them into his own mouth. He did not get sick. But, because the microorganism may not have been at high concentrations in such secretions, he also did the following:

he selected two patients—one with scaling sores and the other with diarrhea. He scraped the scales from the sores, mixed the scales with four cubic centimeters of urine from the same patients, added an equal amount of liquid feces, and rolled the mixture into little dough balls by the addition of four pinches of flour. The pills were taken voluntarily by him, by his assistants and by his wife. (Bronfenbrenner & Mahoney, 1975, p. 11; quoted in Stanovich, 1998, p. 76)

None of them developed pellagra after consuming these bodily fluids. The control condition never had to be performed because Goldberger and his associates never developed pellagra from the fluids of people who had the disease. Are you now more confident that pellagra is not caused by a microorganism passed in bodily fluids? If a microorganism were involved, then it seems likely that at least one or two of these subjects should have gotten sick. By comparing the results of Goldberger’s several studies, it seems very likely that pellagra is caused by an inadequate diet and not by a microorganism. Because of the care he took in controlling the research situation, his investigation definitely had high internal validity. It now should be obvious to you that Milgram’s

study also had high internal validity. By manipulating particular variables (such as the closeness of the learner to the teacher) one at a time while holding extraneous variables constant, Milgram was able to show that several variables were having an effect on obedience.

Although internal validity is necessary if we want to be confident about the conclusions we draw from a study, there is a negative aspect to it: the more we control the research situation, the more unnatural or artificial it becomes. The problem with this is that the research situation can become so unlike any natural situation we might encounter that the results may have little meaning outside of that specific situation. This is the problem of external validity. **External validity is the ability of the results of a study to be generalized to a wider range of situations, especially those found in nature.** Let's look at the external validity of Milgram's obedience study. A very important aspect of external validity is whether or not the subjects in a study are representative of the rest of the population to which the researchers want to generalize. In Milgram's study, he wanted to generalize to all humans. When he performed his first studies, he used undergraduates from Yale University and found that about 60% obeyed the experimenter all the way to 450 volts. Milgram (1974) stated that another professor at Yale "immediately dismissed these findings as having no relevance to 'ordinary' people, asserting that Yale undergraduates are a highly aggressive, competitive bunch who step on each other's necks on the slightest provocation. He assured me that when 'ordinary' people were tested, the results would be quite different" (p. 170). In other words, this other professor questioned the external validity of Milgram's study by arguing that the subjects were not representative of people in general. Milgram therefore used both white and black men who were professionals, white-collar workers, blue-collar workers, or unemployed. He found about the same levels of obedience with them (65%) as he had with the Yale undergraduates (60%). He also tested women from the New Haven (Connecticut) area and found that exactly 65% of them also were fully obedient. The study was repeated in other countries (West Germany, Italy, South Africa, and Australia). Again, the majority of subjects in these studies fully obeyed the experimenter. In fact, the percentages were even higher in these studies (for example, 85% of the West-German subjects were fully obedient). Thus, it is not necessarily true that the use of a limited sample of subjects (such as only men or only college students) reduces the external validity of a study. In general, **it is an empirical question** (that is, one for which you must make observations to see if it is true) **whether or not a particular characteristic of a study reduces its external validity.** It is very important to remember that we cannot simply dismiss experimental findings because it seems "obvious" to us that something is artificial about the experimental situation.

Well, how about the fact that Milgram's study took place in the laboratory? Isn't this obviously an "unnatural" situation that reduces the external validity of his research? In other words, isn't it true that most research conducted in a laboratory has little relevance for what goes on in the "real world"? For example, we would never expect to see in the real world many of the contrived experimental situations that I have described in this book. In experimental studies, we make certain that all variables but one are the same for both the experimental and the control groups. Furthermore, we often manipulate this one variable in unnatural ways (as Goldberger did when he combined bodily fluids with flour). In doing all this, we have made the situation very different from anything we could ever hope to find outside of the laboratory. Doesn't the artificiality of laboratory research make it impossible to generalize its findings to the real world? If the answer to this question is "yes," then external validity would be absent and we be unable to generalize the findings of any laboratory study to the outside world. Milgram (1974) stated that any person who makes such a criticism exposes his/her serious misunderstanding of science. He argued that, by creating a research situation that strips away all the complexities of the natural world, laboratory experiments allow us to discover the basic processes that must exist if a phenomenon is to occur. By constructing a simplified (and artificial) situation, we are better able to test our predictions about how the natural world operates. **In other words, because the natural world is so complex, we need to simplify the situation if we are going to test our theories.** This is not a failing of laboratory research; it is an advantage.

Stanovich (1998) made a similar argument. He stated that, contrary "to common belief, the artificiality of scientific experiments is not an accidental oversight. It is intentionally sought. Scientists *deliberately* set up conditions that are unlike those that occur naturally because this is the only way to separate many inherently correlated [that is, extraneous] variables that determine events in the world" (p. 99). For example, as we saw in Chapter 2, correlational studies performed in nature usually are impossible to interpret in terms of causation because of the directionality and extraneous-variable problems. When engaged in laboratory research, we typically are trying to recreate important relationships among specific causal factors by simplifying the situation, we are *not* trying to recreate a natural situation with all its messiness and "noise"—a situation that would make it impossible for us to observe these relationships. **In the laboratory, we are trying to test a theory, we are not usually trying to apply the results to any particular natural situation.** To the extent that a contrived laboratory situation reveals basic processes and relationships underlying some phenomenon, to that extent the laboratory results should generalize to a wide range of situations. Milgram (1974) obviously believed that the basic processes revealed by his experimental studies were applicable to a wide range of natural situations. This led him to state that the obedience of his subjects to the cruel commands of the experimenter were the result of

“the capacity for man to abandon his humanity, indeed, the inevitability that he does so, as he merges his unique personality into larger institutional structures” (p. 188). He was disturbed by this interpretation, and believed that this capacity to abandon our sympathy and empathy for others “is a fatal flaw that nature has designed into us, and which in the long run gives our species only a modest chance of survival” (p. 188).

SQ 5-11: Distinguish between internal and external validity. Describe the reasons for concluding that Goldberger’s study of pellagra had high internal validity. How did Milgram attempt to increase the external validity of his study of obedience to authority? People sometimes criticize laboratory studies for their artificiality. How would you defend the relevance of laboratory studies for explaining observations in more natural situations? Why is the external validity of a study not as important as its internal validity when our goal is to test a theory?

Stanford Prison Study

Prisons are places in which all kinds of brutal behaviors are a matter of everyday routine. Is this brutality the result of a large number of psychopathic criminals and sadistic guards all concentrated in one place? That is, is such behavior caused by the unique personality characteristics exhibited by the people who are found in prisons? After reading about Milgram’s obedience study, you probably are beginning to realize that there may be other explanations for such brutality. You probably now could suggest the possibility that the social situations found in prisons are defined by the participants in certain ways—ways that cause them to act in a more brutal manner. Thus, just as in Milgram’s study, people in prisons may adopt particular social roles that cause them to act, think, and feel in particular ways. In 1971, Philip Zimbardo and several colleagues tested this claim. Their main goal was to see the degree to which the social roles adopted in prisons affect the behaviors and mental events of people. The idea for the study originated in an undergraduate social-psychology course taught by Zimbardo at Stanford University. He divided the class into study groups of about ten to fifteen students and asked them to investigate various topics. One of these topics involved the effects of prisons on the behaviors of those who lived or worked within them. The group given this topic decided to investigate it by simulating a prison environment. Thus, over the course of one weekend, they maintained a mock prison in the basement of a student dormitory. Some of the students played the part of prisoners and others became guards. The simulation worked very well, perhaps too well. The people who were playing the role of guards seemed to take their roles very seriously. In fact, they behaved very aggressively towards the “prisoners.” Zimbardo (1975) stated that, by “the end of the weekend some long-term friendships were broken because those young men and women who were prisoners believed that in their roles

as ‘mock’ guards the ‘true’ self of their former friends were revealed, and they could no longer befriend such sadistic authoritarian people” (p. 37).

Zimbardo and the students could not understand what had happened. Why had this simulation, this “game,” become so serious? Was there something unique about the individuals who made up this group—some personality characteristic that caused them to act sadistically—or was there something about the social situation being simulated that would cause most people to act in similar ways? Zimbardo and several of his colleagues tried to develop an internally valid study that might give them answers to these questions. Their subjects were college students from around the country, many of whom were visiting the San Francisco area for the summer. Several measurements of their personalities were made with respect to relevant attitudes, past behavior, and past experiences. Based on these responses, Zimbardo and his colleagues chose only those subjects who showed no obvious tendencies toward criminal or violent behavior, and no evidence of serious mental illness. They then set up a simulated prison in the basement of the psychology building at Stanford University. The subjects were paid \$15 per day for their participation in a simulation that was to last two weeks. Zimbardo and his colleagues argued that, because they had excluded those subjects who had abnormal personalities, they would be able to conclude that any violent or sadistic behavior that occurred in the simulated prison was caused by the social context itself.

Sometimes when I describe this study in my courses, students will try to argue that Zimbardo and his colleagues should have studied actual prisoners and guards in an actual prison situation. These students believe that the researchers could simply have asked the prisoners and guards why they acted the way they did in particular situations. But think carefully about this. Why would such a study, which definitely would have high external validity (because it would take place in a natural situation), not be an internally valid one? It would not be internally valid because people who already are prisoners and guards might exhibit the personality characteristics that we would want to exclude in any study investigating the ability of the social situation to affect behaviors and mental events. Furthermore, asking actual prisoners and guards why they acted as they did would not be an internally valid procedure because, as I stated earlier in this chapter, they are not likely to be aware of the situational influences on their behavior. I hope it is becoming clearer to you that, when we are trying to test a theory, we need to create an artificial situation that contains only those elements of the natural situation we want to evaluate for their causal effects. We don’t want to recreate the entire natural situation because then we can’t isolate the effects of the various causal factors. If the study is designed well, however, we should be able to discover basic processes (in this case, situational factors) important in just about any related natural situation.

Zimbardo and his colleagues attempted to simulate the natural prison environment as closely as possible because they did not know what factors in that situation might be most important for the behaviors they wanted to study. Thus, all subjects who were to play the role of prisoner were told to be home at a certain time, and then they were arrested by officers from the Palo Alto City Police Department. Many of the subjects were not certain at first whether this was an actual arrest or a part of the study:

A police officer charged them with suspicion of burglary or armed robbery, advised them of their legal rights, handcuffed them, thoroughly searched them (often as curious neighbors looked on) and carried them off to the police station in the rear of the police car. At the station they went through the standard routines of being fingerprinted, having an identification file prepared and then being placed in a detention cell. [In the only difference from an actual arrest, each] prisoner was blindfolded and subsequently driven by one of the experimenters and a subject-guard to our mock prison.... Upon arrival at our experimental prison, each prisoner was stripped, sprayed with a delousing preparation (a deodorant spray) and made to stand alone naked for a while in the cell yard. (Haney, Banks, & Zimbardo, 1973, p. 4).

In order to make all subjects feel less like unique individuals, they were dressed in uniforms befitting each role: "For the guards, the uniform consisted of plain khaki shirts and trousers, a whistle, a police night-stick..., and reflecting sunglasses.... The prisoners' uniform consisted of a loose fitting muslin smock with an identification number on front and back, no underclothes, a light chain and lock around one ankle, rubber sandals and a cap made from a nylon stocking" (p. 4). The uniform of the prisoners was designed specifically to eliminate their masculine identity: "The prisoner uniforms resembled smocks or dresses, which made them look silly and enabled the guards to refer to them as 'sissies' or 'girls'. Wearing these uniforms without any underclothes forced the prisoners to move and sit in unfamiliar, feminine postures" (p. 8). The ten prisoners used in the study were kept in the prison 24 hours per day, whereas the eleven guards had eight-hour work shifts (three guards for each shift) and then could leave to go back to their own homes. The prisoners were housed in three "cells" (three per cell) and had no privacy during the entire length of the study. In his instructions to the guards before the study began, Zimbardo stressed the fact that physical abuse of the prisoners would not be tolerated. Other than this, however, he gave few instructions to them about how they were to behave: he wanted to see how deeply they would get into the roles on their own. The prisoners had been told before the study began that, although some of their basic civil rights would be suspended during the study, they would not be physically

harm and they would have an adequate diet, clothing, medical care, and housing. Again, other than this, he gave them little information.

Once in the prison, the prisoners quickly became very distressed by their treatment. This distress was seen in their negative emotions, a generally negative outlook, and negative evaluations of themselves and their environments. In fact, five prisoners had to be released within several days after the study began, four of them for severe depressive symptoms such as crying, rage, and anxiety (the remaining prisoner developed a severe rash that may have been due to stress). Guards also showed more negative emotions, self-evaluations, and general outlook. Nevertheless, most of them also seemed to enjoy the power of their roles. In fact, they were always on time for their shifts, and would sometimes stay for several hours after their shifts were over without extra pay and without complaint. Some individual differences that seemed to reflect the unique personalities of the participants emerged among both the prisoners and the guards. There seemed to be three kinds of guard: some acted sadistically by trying to humiliate the prisoners; some enforced the rules in a tough manner but did not often try to humiliate the prisoners; and some exerted almost no control over the prisoners and would sometimes even do them small favors (even these guards, however, sometimes acted like the more sadistic guards). There also seemed to be more than one kind of prisoner, although these differences weren't as obvious since almost all prisoners, after the first few days, became passive, depressed, and obedient. Nevertheless, two prisoners were consistently rebellious (one of whom was discharged on the second day because of an extreme emotional reaction to the simulation), about half developed symptoms of emotional disturbance, and about half became excessively obedient. Although these patterns of responding to the prison situation, especially among the guards, seemed to reflect personality differences, these differences all occurred within the confines of the social roles assigned to the subjects. That is, not one subject ever stepped outside of the social role he had voluntarily accepted. For example, although there were guards who seemed to feel sorry at times for the prisoners, and would even try to help them occasionally, none of them ever intervened to stop the humiliating tactics of the more sadistic guards. In other words, all participants accepted the particular social roles they were assigned, and defined themselves and everyone else according to these roles.

Perhaps the most disturbing reaction was an increase in group cohesiveness among the guards (they tended to stick together with respect to their abuse of the prisoners) and a disintegration of group cohesiveness among the prisoners. Because of this, the guards could act as one unit of oppression whereas each isolated prisoner, lacking any hope of effective rebellion (because he would not be supported by the other prisoners) had almost no choice but to submit to the overwhelming authority of the guards. In fact, many of the prisoners even sided with the

guards when a particular prisoner rebelled by refusing to eat. As a consequence of their virtually absolute power, the guards became increasingly abusive, and the prisoners became increasingly passive. One detail of the increasingly aggressive behaviors of the guards mirrors something we saw in Milgram's study:

many guards continued to intensify their harassment and aggressive behavior even after the second day of the study, when prisoner deterioration became marked and visible and emotional breakdowns began to occur.... When questioned after the study about their persistent affrontive and harassing behavior in the face of prisoner emotional trauma, most guards replied that they were "just playing the role" of a tough guard, although none ever doubted the magnitude or validity of the prisoners' emotional response. The reader may wish to consider to what extremes an individual may go, how great must be the consequences of his behavior for others, before he can no longer rightfully attribute his actions to "playing a role" and thereby abdicate responsibility. (Haney, Banks, and Zimbardo, 1973, p. 6)

What is surprising about the prison study, and what makes it different from Milgram's study, is that the guards abused the prisoners even though no authority figure was present to encourage or command them to do it. Once they had defined themselves as being the relevant authorities in the situation by adopting the role of "prison guard," they felt constrained by these roles to act accordingly. In fact, the guards saw the researchers in charge of the study as being too soft, and tried to conceal some of their own more abusive behaviors from them. The moral of the Stanford Prison Study seems to be this: **when a social situation becomes "internalized," when it is "brought inside" of a person in such a way that it affects how that person looks at his/her self and his/her surroundings (including other people), the person's role in that situation determines much of his/her behavior, thoughts, and emotions.**

This moral of the study is illustrated by the diary entries of one person who had been assigned the role of a guard. Before the study, he had written that he could not "see a time when I might...maltreat other living things" because he thought of himself as opposed to the use of coercive force under any circumstances. He also thought that the study was just going to be a fun game that no one would take seriously. After the study began, however, his thinking and behavior quickly changed:

First day: Feel sure that the prisoners will make fun of my appearance and evolve [decide upon] my first basic strategy—mainly not to smile at anything they say or do which would be admitting it's all only a game....

Second day: Number 5704 asked for a cigarette and I ignored him—because I am a nonsmoker and could not empathize.... Meanwhile since I was feeling empathetic toward #1037, I determined not to talk with him.... After we had count and lights out [another guard]...and I held a loud conversation about going home to our girlfriends and what we were going to do to them.

Third day: (Preparing for the first visitors' night.) After warning the prisoners not to make any complaints unless they wanted the visit terminated fast, we finally brought in the first parents. I made sure I was one of the guards on the yard because this was my first chance for the type of manipulative power that I really like—being a very noticed figure with almost complete control over what is said or not....

Fifth day: I harass "Sarge" [an extremely obedient prisoner] who continues to stubbornly overrespond to all commands. I have singled him out for special abuse both because he begs for it and because I simply don't like him. The real trouble starts at dinner. The new prisoner (416) refuses to eat his sausage . . . we throw him into the Hole ordering him to hold sausages in each hand.... We decide to...tell the new one that all the others will be deprived of visitors if he does not eat his dinner.... I am very angry at this prisoner for causing discomfort and trouble for the others. I decided to force-feed him, but he wouldn't eat. I let the food slide down his face. I didn't believe it was me doing it. I hated myself for making him eat but I hated him more for not eating. (Zimbardo, 1975, pp. 48-9)

These entries suggest that this person no longer felt any empathy for the prisoners. He now seemed to identify completely with his role as a prison guard. Zimbardo concluded that everyone, including himself as the "prison superintendent," had gotten lost in their roles—their identities had become their social roles. This process led to increasingly abusive behavior on the part of the guards and almost complete passivity, as well as severe emotional disturbances, on the part of the prisoners.

Zimbardo observed all this abuse and initially thought that nothing was wrong. In fact, he saw all of it as proof that the study was a success. He reported that he did not become aware of how bad the situation was until his fiancée expressed how upset she was about the sadistic treatment the prisoners were experiencing. At that point, Zimbardo reluctantly called a halt to the study after only six days of what was to be a two-week study:

At the end of only six days we had to close down our mock prison because what we saw was frightening. It was no longer apparent to most of the subjects (or to us) where reality ended and their roles began. The majority had indeed become prisoners or guards, no longer able to clearly differentiate between role playing and self. There were dramatic changes in virtually every aspect of their behavior, thinking and feeling. In less than a week the experience of imprisonment undid (temporarily) a lifetime of learning; human values were suspended, self-concepts were challenged and the ugliest, most base, pathological side of human nature surfaced. We were horrified because we saw some boys (guards) treat others as if they were despicable animals, taking pleasure in cruelty, while other boys (prisoners) became servile, dehumanized robots who thought only of escape, of their own individual survival and of their mounting hatred for the guards. (Zimbardo, 1972; reprinted in McIntyre, 1999, p. 114)

The guard whose diary entries were quoted above stated that he was “elated” that the study was ended early, but that he also was “shocked to find some other guards disappointed somewhat because...they are enjoying themselves” (p. 49). This person did not seem to remember that he also had been enjoying his power, and using this power in a manner meant to humiliate the prisoners. Somehow, he was able to act in sadistic ways and still see himself as a pacifist.

SQ 5-12: Why did Zimbardo decide to use a simulation, and not a real prison situation, to study the effects of prison situations on behavior? Describe briefly how the study was done. Describe the individual differences that emerged within the prisoner roles, on the one hand, and within the guard roles, on the other. Although both the Zimbardo and the Milgram studies examined social influences on aggressive behavior, there was one key difference between the two. What was this difference? What seemed to be the main cause of the abusive behavior of the guards in Zimbardo's study? Why did Zimbardo end the study early?

Comparisons to Milgram's Obedience Study

There are several similarities between Zimbardo's prison study and Milgram's obedience study. First, subjects in both studies had a difficult time ending their participation, and most continued all the way until the end. The reasons for this were the same in the Zimbardo study as in the Milgram study. (a) By agreeing to take on the roles they had been assigned, it became very difficult for the subjects to back out without breaking the implicit moral rule I spoke of earlier. (b) In addition, they did not want to appear inconsistent by refusing to continue something they had already started. (c) Lastly, the escalation in violence occurred relatively gradually, so that there was no obvious point at which they could say, “that is enough.” A second similarity to the Milgram

study was the limited effect of measurable personality differences on the behavioral differences of the prisoners and guards. Again, the only personality characteristic that seemed to have any effect was authoritarianism; and this characteristic was important only for prisoner behavior. It seemed that those prisoners who were high in authoritarianism were best able to handle the oppressive conditions in the prison and, thus, remained there the longest. At least four (and maybe five) of the initial group of nine prisoners, on the other hand, had to be released even before the study was ended because of severe stress caused by the conditions. Based on results such as these, Zimbardo argued that personality differences were much less important than the social situation. In fact, Zimbardo went even farther than Milgram had by dismissing the importance of personality characteristics for most of our behaviors in everyday life:

Individual behavior is largely under the control of social forces and environmental contingencies rather than personality traits, character, will power or other empirically unvalidated constructs. Thus we create an illusion of freedom by attributing more internal control to ourselves, to the individual, than actually exists. We thus underestimate the power and pervasiveness of situational controls over behavior because: (a) they are often non-obvious and subtle, (b) we can often avoid entering situations where we might be so controlled, (c) we label as “weak” or “deviant” people in those situations who do behave differently from how we believe we would. (p. 115)

Many social psychologists took this extreme position during the 1970's. In the next chapter, I will discuss why they argued for this position and will try to show why it needs to be modified and softened somewhat. In fact, I would imagine that Zimbardo himself would no longer make such a strong claim, although he and many other social psychologists still give social forces a large share of the control over our behavior and mental events.

A major difference between the prison study and Milgram's obedience study was that, in the prison study, only one experimental manipulation was performed—being assigned to the role of prisoner or guard. This is a major limitation because we cannot know, as we did in the Milgram study, which factors in the situation were most important for the behaviors observed. There is no doubt that each subject's self-definition as prisoner or guard was important, but it might have helped us to develop a deeper understanding of how such a self-definition can be maintained if Zimbardo and his colleagues had varied other factors in the situation. For example, would wearing normal clothes, which might have caused increased feelings of individuality, have resulted in decreased role-playing? Would a decrease in the reality of the simulation (perhaps by removing the bars on the doors, or having campus security “arrest” the prisoners) have done the same? It would

have been very interesting, for example, if we had found that none of these factors were important—that, instead, it was simply the assigning of an arbitrary social role by an authority figure and the voluntary taking on of that role by the subject that was most important for his role-playing behavior. We probably never will be able to find out because, as I will discuss in the next section, it is unlikely that anything similar to this study could ever be performed today.

Ethical Problems in the Prison Study

Zimbardo stopped the study because he felt that it was unethical to continue. In fact, years later, he was to state that the study was unethical as a whole. Based on the discussion of research ethics above, what do you think made the study unethical? Probably the most important aspect of the study making it unethical was the **psychological harm** that was done to the prisoners. For example, the prisoners were depressed and pathologically obedient because of the punishments (mostly loss of everyday privileges such as being able to go to the bathroom, eat, sleep, and so on) that were imposed by the guards. Although the argument has been made that Milgram's study also caused much psychological harm, the distress felt by the teachers in that study was temporary (the procedure lasted only an hour), and Milgram showed that almost all had either positive or neutral feelings about the study afterwards. The prison study, on the other hand, led to very negative feelings among most of the subjects that lasted for at least several months. They were brought back on several occasions after the study ended to discuss their feelings and thoughts about the study. It is evident from their statements that many or all of them were bothered very much by their own behavior and by the behavior of the other subjects. Another aspect that, in the present day, is considered to be unethical was the **dual role** of Zimbardo, who was both the "prison superintendent" and the principle researcher of the study. Taking on such a dual role made it difficult for him to monitor the progress of the study objectively. He stopped the study only reluctantly when it was pointed out to him that the prisoners were suffering terribly. In the obedience study described earlier, Milgram was never present during the actual procedure itself, and so he was able to be somewhat more objective about any harm being done to the subjects.

SQ 5-13: What lessons learned in Milgram's obedience study can help us to understand what happened in Zimbardo's prison study? What was a major limitation of Zimbardo's study when it is compared to Milgram's study? Describe the ethical problems of the prison study.

Now that we have gone through three examples of classic research projects in social psychology, we are left with an important question: how do we go about trying to explain these results in meaningful ways? In the next two sections of this chapter, I will discuss how the

cognitive approach, which we learned about in the last chapter, can help us to make sense of the findings of social psychology.

The Cognitive Unconscious

At every moment, our senses are being bombarded by a large amount of information. As we saw in the last chapter, very little of this information is ever consciously attended to. Nevertheless, there is much evidence that we register the information in some way. For example, if someone is talking to you but you are thinking about something else, that person might complain, "you haven't heard a word I've said!" At that point, you probably told the person that you were listening and, to prove it, repeated the last statement the person had made. How were you able to repeat what the person had said even though you really hadn't been paying attention? You must have been processing the information automatically outside of your awareness. As I stated in the last chapter, we have two sets of mental processes that allow us to process sensory information: controlled processes and automatic processes. Controlled processes require the use of selective attention and mental effort whereas automatic processes are performed rapidly without the use of selective attention. That is, automatic processes occur unconsciously. Many of the effects of social situations involve the use of automatic processes that quickly and unconsciously process information received from the outside world. As we saw in the last chapter, one way to think of the unconscious is in psychodynamic terms—as a set of mental processes at the unconscious level that are made up primarily of fundamental human motives. On the other hand, social psychologists typically think of the unconscious in terms of the basic assumptions and concepts of the cognitive approach.

The cognitive unconscious refers to the part of the mind that contains memories and mental processes toward which selective attention cannot be applied because the information, at least at the present time, cannot be transferred to either the preconscious or conscious levels of awareness. In essence, many memories or mental processes cannot enter consciousness because of the way the mind is constructed. As we saw in the last chapter, some memories become implicit (unconscious) because of interference or encoding-specificity problems. These memories may stay permanently at the unconscious level not because you want to forget them (which is what psychodynamic thinkers might say) but because of the way the mind works normally. Certain mental processes also typically occur unconsciously because that is their normal mode of activity. For example, if you have a name on the "tip of your tongue," you may be able to recall the first letter and the number of syllables, but little else. You know that the memory is "in there," but you simply cannot direct your attention to it. After trying

to recall the name for a few minutes, you may eventually give up and start doing something else. Perhaps five minutes later, the name that you were trying to remember suddenly “pops” into your mind. Psychodynamic theorists might claim that you did not want to remember the name (that is, that you were motivated to forget it). Cognitive theorists, on the other hand, would say that there was a temporary problem with the retrieval of the name but that automatic processes were working unconsciously to retrieve it. Because you cannot describe how you finally moved the memory from the unconscious to the conscious levels, the mental processes that allowed you to do this must exist at the unconscious level. A second example of the cognitive unconscious is illustrated by relearning information that you have learned at an earlier time but have now forgotten (that is, you cannot recall the information nor recognize it when it is presented to you). For example, perhaps you learned a second language in high school but now can remember consciously very little of it (you fail both recognition and recall tasks). You might believe that your memories of this language have disappeared. Nevertheless, you probably would find that you can relearn the second language much more rapidly than you did the first time around. This shows that there must have been some memories of vocabulary and grammatical rules present at an unconscious level in your long-term memory.

The concept of the cognitive unconscious can explain the effects of certain kinds of brain damage that cause a person to forget memories for experiences. Although the person may be unable to consciously recall or recognize a particular event he/she has experienced, we can determine that the memories are still in the long-term store by their outward effects on the person's behavior. An interesting case that illustrates this was described by Schacter (1996). In 1988, a fourteen-year-old boy named Neil was found to have a tumor growing in his brain. The problem was treated successfully, but Neil no longer could read and had complete amnesia for anything that had happened since his medical problems began:

Curiously, however, Neil performed reasonably well at school... The psychologists who tested his memory wondered how he managed to do so well. To find out, they asked him some questions about an audiotaped book he had been studying, *Cider with Rosie*, by Laurie Lee. He remembered nothing. Noting Neil's frustration, and realizing that his class performance was based on written responses, the examiner asked Neil to write down his answers, beginning with anything that he could recall from the book. (p. 65)

Surprisingly, Neil was able to write down what he had heard on the audiotape, but he did not know what he had written until someone read it back to him. It seemed that Neil could retrieve memories when writing but had amnesia when speaking. Other tests were tried. When asked about

his stay at a hospital two years before, Neil was able to remember through writing a person who shared the ambulance with him on his ride to the hospital. He also remembered many other events:

Neil's parents asked him to write down the names of the children in his class. He produced a long list, which turned out to be accurate. When his mother asked him what had happened at school that day, Neil wrote, "Mum I saw tulips on the way home." ... Neil's parents equipped him with a small notebook, and he began to communicate regularly about incidents in his everyday life. Yet he remained unable to recount these episodes orally. When he wrote them down, Neil was unable to read them, and often expressed surprise when someone told him what he had written. After an afternoon's excursion to several familiar locations, Neil was unable to remember anything when asked. But when told to write down what had happened, he provided a succinct, and accurate, summary of the afternoon's activities. (p. 65)

Neil's brain damage somehow disconnected cognitive processes that normally are in contact with one another. In intact brains, the centers that allow one to write, speak, and remember are able to communicate with one another so that we can remember whether we are speaking or writing. Neil's cognitive processes, however, were separated so that his episodic memories are unconscious when he speaks but are conscious when he writes.

A very important question is raised by the notion of the cognitive unconscious: why do we have both controlled (conscious) mental processes and automatic (unconscious) mental processes? Why don't we have just one or the other? Let's try an experiment that might help you to answer this question. Count silently to 50. I hope that that task was easy for you. You should be able to count to 50 by using automatic processes. During childhood, you developed a deeply ingrained habit for counting in this manner. In fact, you should be able to count to 50 while performing other tasks (such as driving or making dinner). Alright, now try this one. Count backwards from 100 subtracting 3.5 each time (that is, 100, 96.5, 93, 89.5, etc.). This counting task is probably much more difficult than the first one. You must perform the task using controlled processes. When a task is difficult (because we have not learned it yet or it is too complex), we process the relevant information at the conscious level by using controlled processes. This is a slow process that requires time and much mental effort. When a task is easy (because it is well learned or is otherwise very simple), we process the relevant information at the unconscious level by using automatic processes. This is a very fast and efficient process and, thus, we are able to do other things at the same time. Automatic processes produce an effect with a minimum of time and mental effort whereas controlled processes are plodding and inefficient. When we use automatic

processes, our minds are free to do other things. For example, you can easily count to 50 while driving your car through heavy traffic and listening to a song on the radio. You would have much more difficulty counting backwards from 100 by subtracting 3.5 each time while driving your car through heavy traffic and listening to a song on the radio (you still might be able to do it, but it would be harder). We prefer to use automatic processes when we can. We use controlled processes only when we have to. The conscious level may be thought of as being made up of a group of “trouble-shooting” mental processes. That is, when a problem arises, the controlled processes of the conscious level take over. Otherwise, we use automatic processes to get the job done. For example, after you have driven for a long time, you use primarily automatic processes to perform the task unless something unexpected happens, at which point controlled processes take over so that you can analyze the problem and figure out what to do. The same is true for social situations. Much of the information coming in from social situations is processed automatically. Only a small amount of the information is attended to and analyzed with controlled processes. Because we rely so heavily upon automatic processes, many of our responses to social situations occur “mindlessly.” Let’s look more closely at this idea.

SQ 5-14: Define what is meant by the cognitive unconscious. How is this concept different from the concept of the psychodynamic unconscious you learned about in the last chapter? What is a possible reason for the division of mental processes into controlled and automatic processes?

Mindlessness

Let’s say that you are at a copy machine making copies of some pages in a book when someone comes up behind you and makes the following request: “Excuse me, I have five pages. May I use the Xerox machine?” Would you let the person do it? It probably depends on several factors, such as how much of a rush you are in. When this question was asked of people using a copy machine in a university library (in a study by Langer, Blank, and Chanowitz, 1978), about 60% stepped aside to let the other person use the copier. Now, let’s say that the person made the same request but with a minor addition: “Excuse me, I have five pages. May I use the Xerox machine *because I have to make copies*?” The italicized words are “redundant,” which means that they add no new information: the person already told you that he/she wanted to copy five pages and, therefore, you knew that the person wanted to make copies. Do you think that the additional words make it more likely, less likely, or equally likely that you would comply with the request to step aside and let the person use the machine? In the study, 93% of the subjects now stepped aside! This is a very surprising result. Even though redundant information was added to the request, many more people now complied. When “nonredundant” information was added on (the person said, “may I use the Xerox machine because I am in a rush”), 94% complied. Thus, all one has to

say in such a situation is the word “because” and most people will comply automatically. This illustrates the idea of **mindlessness**, a term which refers to the tendency of humans to **automatically process information in social situations and to respond without conscious deliberation**. People tend to rely upon automatic processes when the situation is not very important to them.

If people become “mindless” when a situation is not important to them, let’s see what happens when it becomes more important. What if the person asking to use the copier said that he/she wanted to copy twenty pages, would this make a difference? Here are the results:

	Information Provided		
	Simple Request	Redundant	Nonredundant
Five pages	60% comply	93% comply	94% comply
Twenty pages	24% comply	24% comply	42% comply

When the person asked if he/she could copy twenty pages, compliance was less overall than for five pages. This should not be a surprising result. But what is surprising is that, now, the subjects (the people being asked to step aside) were no longer responding mindlessly to the redundant information: the same proportion of people (24%) responded to both the simple request and the request with the redundant information added on. Thus, when the requester asked the subject to step aside “because I have to make copies,” the subject must have thought consciously about these words and realized that no meaningful information was being provided. The most important point to remember is that **we tend to respond mindlessly to information** (that is, we tend to use automatic processes to analyze it) **when the situation is not important enough for us to devote the time and effort needed to use controlled processes**. For example, stepping aside in order to let someone copy five pages will take almost no time and, therefore, most people will think very little about a situation in which someone is making such a request. On the other hand, stepping aside for twenty pages will be much more of an inconvenience and, therefore, most people examine very closely the request being made of them. Does this help you to understand why you will sign petitions that someone hands you without even reading them or listening to the person carefully? You probably will sign one petition mindlessly. But if the person then whips out five more petitions and begins to explain them, you will begin to think more carefully about what the person is saying and doing.

SQ 5-15: Define what is meant by “mindlessness.” How is the concept of mindlessness important for our behaviors in social situations? Give an example of how you react mindlessly in an everyday situation.

Social Cognition

The concept of the cognitive unconscious and the automatic mental processes that occur there can help us to understand a great deal about our thoughts, emotions, and behaviors in various social situations. But how does the cognitive unconscious affect us in social situations? One very important way it does this is through the influence of schemas on the automatic processing of information. In the last chapter and earlier in this chapter, you learned that a schema is the general knowledge acquired by an individual about a particular kind of event. You saw that schemas can help us to remember better as well as to remember worse; and that schemas can affect how we interpret what is going on in the present situation. These effects of schemas on memory and perception occur unconsciously (for example, we are not aware that we are distorting our memories) because, **when a schema is activated by some event in the present situation, it causes us to automatically process the incoming information:**

sensory information -----> unconscious activation -----> automatic processing
of schema of information

Let's look at an example. Think back to the first day that you attended this course. On that day, most of you saw your instructor for the very first time. When your instructor walked into the room, almost all of you looked at this person closely and immediately began to evaluate him/her. On what basis did you make this evaluation? If you did not know anything about your instructor before he/she walked into the room, the only information on which you could base an evaluation was the instructor's physical appearance, the way he/she walked, and your preconceptions about college instructors. In other words, your quick evaluation of the instructor (what we usually call the "first impression") was determined by the activation of various schemas—schemas involving physical appearance (see below), walking gait, and occupation (a social stereotype). Is this a good basis for making an evaluation? It could be. For example, if a purple-haired instructor had walked seductively into the room wearing a fluorescent-green mini-skirt, sheer canary-yellow blouse, and knee-high orange leather boots, you probably would have inferred that this instructor was a somewhat "wild" person (especially if the instructor was a man). On the other hand, if your instructor dressed conventionally and walked in a normal manner, any evaluation you might have made was based on very little information. This did not stop you, however, from inferring various

personality characteristics. This process of making inferences about a social situation (including the personality characteristics of people in the social situation) is called “social cognition.” **Social cognition** refers to the **processing of information about social situations through the use of schemas and other cognitive structures** (this processing often occurs automatically). In general, when we study social cognition, we are interested in understanding **how people select, interpret, remember, and use social information to make judgements and decisions**. There are two aspects of social cognition that I am going to discuss in the rest of this chapter: person perception and attributions.

SQ 5-16: Define what is meant by “social cognition” and give an example of this concept from your own life.

Person Perception

In Milgram’s obedience study, most subjects were paired with an experimenter who “was a somewhat dry, hard, technical-looking man” in his early thirties, and with a learner who “was soft, avuncular [like an uncle], and innocuous [harmless]” (Milgram, 1974; p. 58). The experimenter, because of his physical appearance and behaviors, probably is someone you would likely obey in such a situation, whereas the learner, because of his physical appearance and behaviors, probably is someone you would not wish to hurt. Could it be that the teachers were responding more to the appearance of these two men than to their particular social roles? That is, if these two men had switched roles, would the teachers have had an easier time resisting the commands of the “soft, avuncular, and innocuous” looking experimenter, or perhaps an easier time shocking the “dry, hard, technical-looking” learner? Milgram performed an experimental manipulation that looked at this question. He used a new experimenter who “was rather soft and unaggressive” and a new learner who had “a hard bony face and prognathic jaw [that is, one that projects beyond the upper part of the face], who looked as if he could do well in a scrap” (pp. 58-9). In this experimental manipulation, obedience decreased to only 50%, whereas it had been almost 65% with the original teacher and learner. Although Milgram dismissed this result by concluding, “the change in personnel had little effect on the level of obedience” (p. 59), this change is comparable to some of the other manipulations in which he concluded that there was an effect. A change in obedience of 15% seems very large, especially when we recall that there was very little change in obedience when laboratories were moved, when women were used as teachers instead of men, and when the teacher was allowed to hear the learner instead of just hearing a single pounding on the wall at 300 volts. Thus, I conclude that changing the physical appearance of the experimenter and learner led to a large drop in obedience. Why did this change occur? It seems likely that the teachers felt differently towards the new experimenter and the new learner because of their appearance. That is,

they probably attributed different personality characteristics to them because of the difference in appearance. It is very likely that the stern looks of the original experimenter made them hesitant to defy his orders because he seemed more authoritative, but that the softer looks of the new experimenter made them more likely to defy his orders because he seemed less threatening. In a similar way, it is likely that the friendlier appearance of the original learner compared to the new learner caused the teachers to react differently to them and to be more likely to shock the second one. These differences in the ways the teachers responded to experimenters and learners were due to the evaluations the teachers made as a result of processes of “person perception.”

Person perception, which is one very important aspect of social cognition, involves a **set of automatic processes that are used to assign personality characteristics and other internal qualities (such as emotional states) to others**. When making inferences about the internal qualities of people whom we are meeting for the first time, we tend to use superficial kinds of information such as physical appearance, facial expressions, bodily movements, mannerisms, what they say, how they say it, and what we have heard about them from others. Person perception typically occurs unconsciously through the activation of schemas. Of particular importance to person perception are the schemas referred to as social stereotypes, which I defined earlier in this chapter as “oversimplified sets of beliefs about groups of people that are rigidly held.” The inferences that you make about others based on such stereotypes tend to be inaccurate because they are both “oversimplified” and “rigidly held.” If this is true, then why do we use stereotypes at all? Although, it is true that we will be wrong to some degree when we rely upon social stereotypes to make inferences about individuals, the use of stereotypes (and other schemas) to automatically process information about people often allows us to quickly respond to social situations in adaptive ways. For example, consider the *college-professor stereotype* we discussed in the last chapter. This stereotype is activated whenever you see someone identified as a college professor. If you are a student in that person’s course, you will have some idea of how to interact with him/her based simply on your beliefs about college professors in general. Because of this stereotype, you will not have to spend time and effort getting to know more about the person before you can interact with him/her in adaptive ways. This suggests that at least some social stereotypes can lead to relatively accurate inferences about people. The use of a social stereotype can lead to accurate inferences about a person when two things are true: (1) the person has chosen to be a member of the group, which makes it more likely that he/she has personality characteristics, beliefs, and values similar to those of the group; and (2) the person has been a member of the group for some time, which makes it more likely that he/she has conformed to the beliefs and values of the group. Your inferences about individual college professors based on their group membership tend to be accurate because they have chosen to be members of the group of college

professors. They have chosen to be members of this group because they tend to share the personality characteristics, the beliefs, and the values that characterize college professors as a group. Nevertheless, by using a social stereotype to evaluate your instructor on the first day of class, you also made inaccurate inferences about him/her. This is because your instructor is a unique individual who deviates from your stereotype about college professors to some degree.

Other stereotypes tend to lead to a larger number of incorrect inferences about individuals. In such cases, the inferences we make about particular individuals because of the influence of these stereotypes tend to be so inaccurate that it would be better if we did not use them at all. As an example, let's look at the **physical-attractiveness stereotype**—the **belief that physically attractive people have primarily positive personality characteristics**. In general, when people compare a physically attractive person to an unattractive person, it is very likely that they will judge the attractive person to be more sociable, successful, happy, self-confident, sensitive, warm, kind, poised, intelligent, competent, and friendly. This is a very strong effect that occurs in many everyday situations. For example, teachers tend to believe that attractive students are more intelligent than unattractive students, and are more likely to conclude that unattractive students will perform poorly. As another example, advertisements typically show attractive people because those viewing the advertisements tend to have positive emotional responses to them. Compared to physically unattractive people, we evaluate attractive people as having more positive characteristics from infancy to old age—an effect that occurs in all cultures studied.

Although the effects of the physical-attractiveness stereotype on person perception are very strong, almost all the inferences we make about attractive and unattractive people are incorrect, on average, because there is little correlation between attractiveness and personality. In order to show this, let's look at studies in which subjects were asked to judge the before and after photographs of people who received plastic surgery. It should be self-evident that the “after photos” of people who have received plastic surgery will be more attractive, on average, than their “before photos,” yet their personalities should be the same. Although their personalities have not changed, those who view the “after photos” tend to judge the pictured person as having more positive personality characteristics than those who view the “before photos.” The fact that the individual's personality has not changed but that others judge his/her personality to be different because of the physical change shows clearly that, although physical attractiveness has a large influence on our judgements about personality, it has little relation to personality. The only accurate judgements made with regard to attractiveness tend to involve the personality characteristics of sociability and success: attractive people tend to be more sociable and more successful than unattractive people. Can you think of why this might be true? It probably has to do with the fact that others treat attractive people

better. For example, studies show that attractive people are more likely to be offered jobs than unattractive people, even when both the attractive and unattractive people give the same answers to questions in job interviews. As a second example, when a person speaks on the phone with someone whom they believe to be attractive, they speak in a friendlier manner than when they believe they are speaking with an unattractive person. Thus, the few correct inferences about the characteristics of attractive people seem to be due to the positive responses of others to attractive people. This general phenomenon is known as the **self-fulfilling prophecy**, which occurs when **one's expectations about future behavior actually elicit that behavior** (either in oneself or in another). In this case, the expectations we have that attractive people will be more successful and more sociable than unattractive people tend to cause those expectations to come true. On average, however, attractive people are neither happier than unattractive people nor do they have higher self-esteem.

SQ 5-17: How did Milgram's study illustrate the effects of person perception? What kinds of information are used in person perception? How do social stereotypes and other kinds of schemas affect person perception? Do you think that controlled processes can be used in person perception? Explain the concept of "self-fulfilling prophecy. Think of an example from your own life.

Attributional Theories

Person perception is related to the topic of "attribution." An **attribution** can be defined as **the inference made about the cause of an event**. When we are engaged in person perception, we are trying to discover internal causes of an individual's behavior based mostly on observable characteristics of the individual. But we also make attributions of other kinds, as well. In fact, whenever something interesting happens to us, we typically try to think of a likely cause for that event. For example, if you get a high score on a test in this course, you probably will explain this event by inferring that you are intelligent, or that the test was easy, or that you are a hard worker, etc. These inferred causes are attributions and they will determine how you will act in the course in the future. For instance, the attribution you make about a test grade will affect your decision about withdrawing from the course, your strategies for studying in the future, and whether or not you seek out help from others. As another example, let's say that you just heard a news story that described a person who walked into a crowded restaurant with an automatic weapon and calmly shot people as he moved slowly from table to table. What would you say is the cause of this event? Was it caused by the fact that the gunman had a bad day at work? Or that he was having financial problems? Or that he had an argument with his wife the night before? I'm sure that none of you even thought of such possibilities. Your first thought probably was something like, "the man was crazy!" You have made an attribution. That is, you have concluded

that the man’s behavior was caused by a mental disorder. The fact that you can very quickly reach decisions about the cause of a person’s behavior shows that, each and every day of your life, you constantly are developing psychological theories that explain for you the actions of yourself and others. You are an amateur psychologist who makes observations of people’s behavior in order to develop what seem to be reasonable explanations of that behavior. But you are a “naive psychologist.” What I mean by this term is that you typically develop your theories by using automatic mental processes that quickly and unconsciously process information. As you will see, the automatic nature of attributional processes allows various biases to enter into your processing of information—biases that lead you to make inaccurate inferences about the causes of behavior. Because attributions are made automatically, however, you rarely are aware of these biases and, therefore, you incorrectly believe that your inferences are rational (and even the product of common sense).

SQ 5-18: What are attributions and how do they affect our thoughts, emotions, and behaviors? Think of an example to illustrate your answer.

One influential theory about how we make attributions was developed by Harold Kelley during the 1960’s. He stated that, whenever we try to explain a behavioral event, we consider several types of information. In order to explain Kelley’s theory, it will help if I first introduce some simple terminology. In doing this, I will use the following example: “Jeff cannot start his car.” This example has three components. First, there is an **action**, which is defined as **the behavioral event we are trying to understand**. Second, there is an **actor**, which is defined as **the individual who is performing the action**. Third, there is a **situation**, which is defined as **the particular environmental context in which the action occurs**. We can outline the present example using these three terms:

<i>Actor</i>	<i>Action</i>	<i>Situation</i>
Jeff	cannot start	his car

In trying to make an attribution, we are trying to figure out why the car won’t start. How would you determine this? The first thing you probably would want to know is whether the cause involves something about Jeff (for example, perhaps he forgot to bring his keys) or something about the car (for example, perhaps the battery is dead). In other words, the first thing we want to do is make an “internal” versus an “external” attribution. When we make an **internal attribution** about an action, we infer that **the cause of the action is something inside of the actor**—some “personal factor” such as a trait or a desire. In the example of the gunman, you made

an internal attribution for his actions: you inferred that the cause of his actions was his internal mental disturbance. On the other hand, an **external attribution** is an inference that **the cause of the action is something outside of the actor**—some “situational factor” such as loud music or a comment made by another person. If you had inferred that the gunman had killed people because his boss had yelled at him earlier that day, you would have been making an external attribution. In this example, it probably sounds ridiculous to make an external attribution. But if you were asked why a soldier killed a large number of enemy soldiers in a battle, an external attribution would be the best one to make: he killed them because he had been ordered to shoot at others.

In the example of “Jeff cannot start his car,” how would you decide whether to make an internal or an external attribution? You would need more information before you could do this. Perhaps you would jump in and try to start the car yourself. You would be trying to get **consensus information**. That is, you would be asking the question, “do most actors perform the same action in the same situation?” In getting consensus information, you might even ask others to try to start the car. If everyone but Jeff could start the car, what kind of attribution would you make? You probably would conclude that the cause was something about Jeff—you would make an internal attribution. On the other hand, if no one could start the car, you probably would conclude that the cause was something about the car—you would make an external attribution. In general, **we make an internal attribution when there is low consensus** (most actors do not perform the same action in the same situation) **and we make an external attribution when there is high consensus** (most actors perform the same action in the same situation). You make one or the other attribution even though you do not know precisely what the cause of the action is. Thus, what Kelley was trying to understand in developing his theory about attributions was how we, in our everyday lives, make inferences about the causes of actions—what kinds of information we use to reach such decisions. Regardless of whether these attributions are correct or incorrect, they are important components of our interpretation of the social situation in which the action is occurring. It is our interpretation that determines the mental events we experience and the behaviors we express within that social situation. The internal/external type of attribution is typically the most important for us in our everyday lives, and it definitely is the first kind of attribution we make whenever an event captures our attention.

Not only do we want to know if the cause of an action is in the actor or in the situation, we also want to know whether or not that cause will occur in the future. That is, we often make “stable” versus “unstable” attributions. When we make a **stable attribution** about a person’s behavior, we infer that **the cause of the behavior** (whether internal or external) **will endure**

for a long period of time. For example, if you concluded that the gunman's mental disturbance was due to the presence of a slow-growing brain tumor in his amygdala, you would be making an internal attribution that was also a stable one: the mental disturbance should last as long as the tumor remains in his amygdala. When we make an **unstable attribution**, we infer that **the cause of the behavior should endure for only a short period of time.** For example, if you concluded that the gunman's mental disturbance was caused by the amphetamines he had been taking in high doses for the last several weeks, you would be making an internal attribution (drug-induced psychosis) that was also an unstable one. This is an unstable attribution because you would be claiming that, as soon as he stops taking the amphetamines, his behavior will return to normal. In the example of "Jeff cannot start his car," how would you decide whether to make a stable or an unstable attribution? You would try to get information that told you whether the cause continued to have effects over time. For example, after Jeff was unable to start his car the first time, you probably would ask him to try to start the car again. If he failed a second time, you might tell him to wait a few minutes and then try again. In this way, you are obtaining **consistency information** by trying to answer the following question: "does the same actor perform the same action in the same situation on more than one occasion?" If Jeff continued to have trouble starting the car, you would make a stable attribution. If Jeff started the car on the third try, you would make an unstable attribution. In general, **we make a stable attribution when there is high consistency and an unstable attribution when there is low consistency.**

Lastly, we might also want to know if the cause (whether it is internal or external and whether it is stable or unstable) will have effects in other situations related to the one we are investigating. In this case, we would be interested in making "general" versus "specific" attributions. When we make a **general attribution**, we infer that **the cause of the action would have an effect in other similar situations**—situations related to the particular one in which the behavior occurred. For example, if you say that the gunman killed a large number of people because he was "crazy," you would be making an internal and probably stable attribution that also was a general one: you would be concluding that this man would act crazy in other related situations. On the other hand, if you say that the gunman killed these people because he had evidence that they were trying to kill him, you would be making a "specific attribution": you would be inferring that the man would act this way only in a specific context (only when he thought that others were trying to kill him). When we make a **specific attribution**, we infer that **the cause of the action would not have effects in other similar situations.** In trying to make a general versus a specific attribution with regard to the example of "Jeff cannot start his car," you might want to know whether Jeff has trouble starting cars other than the one he is having trouble with right now. In this way, you are obtaining **pervasiveness information** by trying to answer

the following question: “does the same actor perform the same action in different but related (that is, similar) situations?” **We make a general attribution when there is high pervasiveness** (the actor performs the same action in similar situations) **and a specific attribution when there is low pervasiveness** (the actor does not perform the same action in similar situations).

Let’s take these concepts and apply them to another everyday example. Let’s say that you want to make an attribution about the cause of a student’s grade (an “A”) in her psychology course:

<i>Actor</i>	<i>Action</i>	<i>Situation</i>
student	got an “A” in psychology	in the course

In order to make an internal versus an external attribution, we would try to get consensus information. What would you want to know to get this kind of information? Think about it for a minute. You would want to find out how other actors—other students—did in the same course. Let’s say that, out of fifty students, this particular student was the only one who got an “A.” This would be an example of low consensus. When consensus is low, we make internal attributions. Thus, we would say that the cause of the action involved a personal factor (perhaps this student is intelligent). In order to make a general versus a specific attribution, we would want to get pervasiveness information. What would you want to know in order to get this kind of information? One thing that could tell us about pervasiveness would be to look at this student’s grades in other courses she took this semester. Let’s say that she has gotten a “D” in every other course (chemistry, public speaking, literature, and art history). This would be an example of low pervasiveness. When pervasiveness is low, we make specific attributions. Thus, the cause of the action is an internal factor that is specific to psychology (perhaps she is intelligent with regard to the topic of psychology but nothing else). Lastly, in order to make a stable versus an unstable attribution, we would want to get consistency information. What would you want to know to get this kind of information? One thing that could tell us about consistency would be to look at this student’s grades in previous psychology courses. Let’s say that she has gotten an “A” in every psychology course she has taken (three other courses). This would be an example of high consistency. When consistency is high, we make stable attributions. Thus, the cause of the action is an internal and specific factor that is stable (again, perhaps this student is intelligent with regard to the topic of psychology). This example shows that, by examining consensus, pervasiveness, and consistency information, we try to determine the probable cause of an action.

SQ 5-19: Distinguish between an internal and an external attribution. What kind of information do we gather from the social situation in order to make this kind of attribution? Think of an example from your own life (use the terminology of actor, action, and situation to describe this example). Distinguish between a stable and an unstable attribution. What kind of information do we gather from the social situation in order to make this kind of attribution? Think of an example from your own life (use the terminology of actor, action, and situation to describe this example). Distinguish between a general and a specific attribution. What kind of information do we gather from the social situation in order to make this kind of attribution? Think of an example from your own life (use the terminology of actor, action, and situation to describe this example).

Although this discussion of Kelley's attributional theory might seem to you to be obvious and perhaps even trivial, we will see in a later chapter that it can help us to understand where people have gone wrong in their reasoning about various events. For example, if a person does not get a job for which he has applied, he might become overly upset about it because he believes incorrectly that he is stupid and incompetent, which is an internal, stable, and general negative attribution that he has made about himself. In this case, we might try to get him to change the attribution by having him examine consensus information (how many other people applied for the job and did not get it), consistency information (does he consistently not get jobs for which he applies), and pervasiveness information (does he often fail at other important life tasks). By getting him to consider this other information, we may succeed in persuading him to change the negative attribution he has made about himself.

Attributional Biases

A major theme in this chapter is that, in everyday life, almost all of us regularly ignore the influence of social situations on behavior. Instead, we tend to explain the behavior of others by pointing to various personal characteristics as the major causes of their behavior (that is, we tend to make attributions that involve their personalities). In fact, even when we know that the situation must be exerting an influence on a person's behavior, it often is very difficult for us not to assign the cause of the behavior to that person's personality. For example, many people assume that actors playing a part in television shows or movies actually have the personalities of the characters they are portraying. Lippa (1994) called this the "Mr. Spock Effect":

[I]s Leonard Nimoy, the actor who played Mr. Spock in *Star Trek*, cold, logical, and unemotional in real life? Many of us falsely assume so. Somehow, we irrationally believe that Nimoy's behavior in an acting role is externally caused and thus tells us something about his true personality. Even though we know that Nimoy's behavior is strongly

determined by external factors (he's playing a role), we still fail to adequately discount the internal explanation for his behavior. (p. 169)

I remember once seeing an interview of Leonard Nimoy in which he described being shown around a NASA facility by astronauts. The astronauts explained to him the workings of the spacecraft he was being shown in technical language unfit for a lay person (which he was): the astronauts seemed to assume that "Mr. Spock" would understand this technical language. The tendency to assign the cause of behavior to internal factors (that is, to personality), even when we know that the behavior is caused by external factors, is a deeply ingrained one for all of us. In this section, I want to describe this and other attributional biases.

An **attributional bias** is defined as **the tendency to ignore important information** (such as consensus, consistency, and pervasiveness) **when making particular kinds of attributions about behavior**. This tendency to ignore important information makes it more likely that we will be mistaken in our inferences about the causes of behavior (both our own behavior as well as the behavior of others), as the astronauts were when they automatically inferred that Leonard Nimoy's seeming expertise regarding spacecraft on his television show was due to an actual knowledge about spacecraft. There are many important kinds of biases, but most of them can be grouped under two headings: cognitive biases and motivational biases. Earlier in this chapter, I defined a cognitive bias as "a general tendency to approach any kind of problem in a particular way." That is, our minds tend to process information in particular ways (we sometimes refer to such habitual ways of processing information as "mental ruts"). A major influence on attributional cognitive biases involves attention: we tend to pay attention to particular aspects of the environment and to ignore others, which affects where we place the cause for actions. For example, it is very difficult to pay attention to our own behavior because we cannot see ourselves unless we are looking in a mirror or watching ourselves in a video. In this case, whenever something is happening around us, where do you think we tend to place the cause of the action? Because our attention is directed away from ourselves, we tend to assign the cause of an action to something outside of ourselves (such as other people), even when the major cause of the action was something we did ourselves. A **motivational bias**, on the other hand, is **the tendency to make desired attributions**. For example, if you dislike a particular person, then you are more likely to place the blame for a negative event in which that person was involved on him/her. If that person fails a test, for instance, you are likely to infer that the person failed the test because he/she is stupid or lazy. On the other hand, if you like the person, you are likely to infer that the person failed the test because the test was too hard or the teacher failed to prepare students for the test. In the following, I present one cognitive bias and two motivational biases involving attributions.

Fundamental Attribution Bias. The **fundamental attribution bias** is a cognitive bias that involves the **tendency of the observer of an action to ignore important situational factors, thereby attributing the cause of an action to personal (internal) factors of an actor**. For example, if a person pulls out in front of you and “cuts you off” when you are driving your car, you (the observer of the other driver’s action) are likely to think that the driver (who is the actor, in this case) is an “idiot.” In this case, you have made an internal attribution. But you have not even considered possible external causes of the other driver’s actions. Perhaps a tree was in his way or the sun got in her eyes. A study by Ross, Amabile, and Steinmetz (1977) provides a good example of the fundamental attribution bias. In this study, college students were asked to take part in a “quiz show” similar to shows like *Jeopardy* on television. Students were paired up and one was assigned randomly to take on the role of the “questioner” whereas the other was assigned the role of the “contestant.” The questioner was asked to develop ten “challenging but not impossible” questions in order to test the general knowledge of the contestant. The contestant then was asked to answer the ten questions. Because the questioner typically developed difficult questions in his or her own area of expertise—questions that most people would not know how to answer (such as, “what is the longest glacier in the world?”)—the contestant in each case generally was able to answer only a few of the questions. On the other hand, the questioner, in each case, could answer all of them. Who has more general knowledge: the questioner or the contestant? If you think carefully about my question, you would have to answer that, on average, we should expect the questioner and the contestant to be about equally knowledgeable. This is because the students were randomly assigned to be either the questioner or the contestant and, hence, they were assigned to their roles without regard to how much general knowledge they had.

Nevertheless, when asked the same question (“which one of you has more general knowledge?”), the contestants typically said that the questioner knew more. People who simply observed the interactions between the questioners and the contestants also concluded that the questioners had more general knowledge than the contestants did. In other words, both contestants and observers ignored an important situational cause of the outcome of the contest (the fact that the questioners developed difficult questions to which they already knew the answers) and instead focused on a possible internal cause (the idea that questioners had more general knowledge—were “smarter”—than the contestants). It seems safe to assume that they were wrong in making this attribution: if the roles were reversed so that the questioners became the contestants and vice versa, the former questioners now would be unable to answer the questions developed by the former contestants. In general, we all tend to attribute the causes of events to personal factors internal to actors and to ignore important situational factors. This is what happened to the participants in the

Stanford Prison Study described above: they (and perhaps you as you read the description) ignored the important situational factors (the assigned social roles) determining the behaviors of others in the study and assigned the causes of their behaviors to personal factors.

Self-serving Bias. The **self-serving bias** is a motivational bias that involves the **tendency of an actor to make an internal attribution for a success and an external attribution for a failure**. For example, if you do well on a test, who or what usually gets the credit? Why you do, of course! And if you don't do well on a test, who or what usually gets the blame. Something external to you (perhaps the teacher) is often to blame for your poor grade on a test. In this case, you are the actor and the action is the grade you received. I think you can see that our desire to feel good about ourselves (our desire to "maintain or enhance our self-esteem" in the jargon of psychologists) is the most likely cause of the self-serving bias. Although this bias tends to be fairly common, some people show the opposite tendency, which is referred to as the "self-effacing bias." People who show the **self-effacing bias** tend to **make an external attribution for success and an internal attribution for failure**. It has been suggested by some that this bias is related to depression. We will talk about such issues in Chapter 7.

SQ 5-20: Define what is meant by an attributional bias. Define the two major subdivisions of attributional bias—cognitive and motivational biases—and present your own examples of each. Describe the fundamental attribution bias, the self-serving bias, and the self-effacing bias.

In this chapter, we have examined closely how the situation affects our mental events and behavior independently of our personalities. We have seen that, in general, we tend to be unaware of these situational determinants—a fact that can cause much trouble for us whenever we incorrectly assign characteristics to our own or others' personalities. In the next chapter, we will look at the other side of the equation by examining the influence of personality characteristics.

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Practice Test for Chapter 5

1. Which of the following **INCREASED** the external validity of the Stanford Prison Study?
 - A: having subjects arrested at homes by real police officers
 - B: placing people at random into either the prisoner or the guard roles
 - C: excluding from the study those people who showed signs of personality disturbances
 - D: placing the prison in the basement of the psychology building at Stanford University
2. Solomon Asch studied conformity by having subjects judge the lengths of lines. In this study, Asch found that subjects were not likely to conform when
 - A: everyone in the group agreed about the judgement.
 - B: the judgement was an easy one.
 - C: the experimenter ridiculed the group's wrong answers.
 - D: they were highly intelligent.
3. The results of Milgram's (1963) study of obedience to authority suggest that
 - A: in the real world, most people will refuse to follow orders to inflict harm on a stranger.
 - B: many people will obey an authority figure even if innocent people get hurt.
 - C: most people are willing to give obviously wrong answers when ordered to do so.
 - D: most people stick to their own judgment, even when group members unanimously disagree
4. In an experiment, the group that serves as the comparison group (the group that allows us to determine if a treatment has had an effect) is called the
 - A: hypothetical group.
 - B: correlational group.
 - C: experimental group.
 - D: control group.
5. Research on physical attractiveness has shown that
 - A: most people disregard physical attractiveness when forming first impressions of people
 - B: judgments of women's personalities are affected by their physical attractiveness, but judgments of men's personalities are not
 - C: we tend to assign desirable personality characteristics to physically attractive people
 - D: men are more likely than women to make biased judgments of others based on physical appearance
6. Stanley Milgram found that the closer in terms of physical proximity the learner was to the subject of the experiment,
 - A: the **MORE** likely it was that the learner would disobey.
 - B: the **MORE** likely it was that the subject would disobey.
 - C: the **LESS** likely it was that the learner would disobey.
 - D: the **LESS** likely it was that the subject would disobey.

7. You are likely to attribute your own failing grade on a test to _____; a stranger is more likely to attribute your failing grade on a test to _____.
- A: an unfair test; your poor study habits
 - B: your poor study habits; an unfair test
 - C: a poor teacher; an unfair test
 - D: your own stupidity; a poor teacher
8. Let's say that we have been hired to reduce thefts in a chain of supermarkets. We predict that, if people BELIEVE they are being watched, they will be less likely to steal. To experimentally test this hypothesis, we place the following sign at the entrance of half of the stores: HIDDEN VIDEO CAMERAS HAVE BEEN INSTALLED IN THIS STORE. In the other half of the stores, we place a different sign: SHOPLIFTERS WILL BE PROSECUTED. We measure the amount of shoplifting at each of these stores. **In this example, the experimental group is**
- A: the people who shop at the stores in which the following sign has been placed: HIDDEN VIDEO CAMERAS HAVE BEEN INSTALLED IN THIS STORE.
 - B: the people who shop at the stores in which the following sign has been placed: SHOPLIFTERS WILL BE PROSECUTED
 - C: the type of sign placed at the entrance of the store.
 - D: the amount of shoplifting that occurs at the store.
9. In an experiment, the variable that we believe is being affected by changes in another variable is called the
- A: independent variable.
 - B: dependent variable.
 - C: manipulated variable.
 - D: controlled variable.
10. The other day, I saw a television commercial in which a man in a white lab coat stood next to a Bunsen burner and stated that a certain brand of pain killer was more effective than another at getting rid of headaches. Because I thought he was a scientist, I figured he knew what he was talking about, and made a mental note to buy the pain killer. The next commercial showed this very same man, but now he was a father of two taking his children to a fast-food restaurant. Therefore, in the first commercial, he must have been an actor. My incorrect conclusion that he was a scientist was due to my use of a(n)
- A: internal validation procedure.
 - B: cognitive heuristic.
 - C: external validation procedure.
 - D: cognitive bias.
11. In general, we tend to think more about evidence in everyday life when
- A: it supports our belief about something.
 - B: it does not support our belief about something.
 - C: it is internally valid.
 - D: it is externally valid.

12. According to the results of Stanley Milgram's study of obedience to authority, which of the following is NOT likely to be a reason for the subjects' obedience?
- A: Subjects who obeyed the authority tended to be "people pleasers": they will do almost anything to get people to like them.
 - B: Subjects probably felt that it was wrong to try to change the way they initially had defined the social situation.
 - C: There was a strong motivation on the part of the subjects to think of their actions as being correct.
 - D: The negative effects on the learner of the subjects' actions became apparent only gradually.
13. Why is it often difficult, in our everyday lives, to get adequate evidence for our beliefs?
- A: We tend to perform only experimental studies in our everyday lives.
 - B: We can not think scientifically in everyday life.
 - C: We usually have access to nonrepresentative samples of observations in everyday life.
 - D: Everyday life has no external validity.
14. When Milgram's study was repeated with subjects from different cultures, it was found that
- A: obedience to the experimenter is absent in most cultures.
 - B: there was some variation across cultures in rates of obedience.
 - C: obedience was highest in the United States.
 - D: all the above
15. The interpretation that Milgram made after reviewing the results of his study was that
- A: only psychopathic people will harm others.
 - B: the scientific study of obedience to authority was not possible because of ethical considerations.
 - C: normal people will seriously harm another if they are ordered to do so by an authority.
 - D: electric shocks, in the form of electroconvulsive therapy, could be helpful to people who were experiencing severe depression.
16. According to the book, intuition works best when all of the following BUT one is true. Which of the following is FALSE with regard to intuition?
- A: Intuition works best when reason cannot lead us to the answer.
 - B: Intuition works best in relatively simple situations.
 - C: Intuition works best in situations with which we have had much experience.
 - D: Intuition works best when we have been able to test its accuracy.

17. Which of the following statements about stereotypes is FALSE?

- A: Stereotypes are a type of cognitive heuristic.
- B: Stereotypes are fixed and oversimplified beliefs about people based on their group membership
- C: Stereotypes are a type of schema.
- D: Stereotypes cause us to think carefully about incoming information (that is, they cause us to use controlled processed).

18. Let's say that we want to measure the attitudes of Americans to various kinds of sexual behaviors. We know that we cannot talk to every single American, so we decide to take a sample of Americans and interview them about their attitudes. We decide to go to Christian churches on Sunday and interview people as they leave the service. What is the major problem with this procedure?

- A: We are not being skeptical enough.
- B: We are not using a representative sample.
- C: We are not being empirical.
- D: We don't have an experimental group.

19. Scientists deliberately set up artificial conditions in their experiments because

- A: it is the BEST way to identify those factors that cause the phenomenon being studied.
- B: they tend to UNDERestimate the importance of natural conditions.
- C: it is the best way to increase the EXTERNAL validity of a study.
- D: they tend to be UNconcerned about what is going on out there in the REAL world.

20. In Asch's conformity studies (in which subjects were asked to compare the lengths of lines), one major determinant of conformity was found to be

- A: the subjects' intelligence.
- B: the group leader's personality.
- C: the amount of encoding performed by subjects.
- D: a lack of disagreement in the group.

21. The Stanford Prison Study was stopped after six days because

- A: the investigators believed that it would be unethical to continue the study to its end.
- B: funding for the study was stopped by university administrators.
- C: all the participants in the study refused to go on with it.
- D: the investigators had found what they had wanted to find and, thus, could see no reason to continue it any longer.

22. In the study by Milgram on obedience to authority, what was one dependent variable?
- A: the voltage level at which the subjects stopped
 - B: the group of people who took part in the experiment
 - C: the group of people who did NOT take part in the experiment
 - D: the subjects who were not told to continue when they refused to go on
23. Major controversies within science TYPICALLY involve
- A: whether or not a particular phenomenon occurs.
 - B: which of several possible explanations of a phenomenon is the best one.
 - C: whether or not the scientific method works.
 - D: which of several possible scientific procedures is the best one to use.
24. The study by Stanley Milgram shows that people without any obvious personality disturbances can be made to physically harm another person when an authority
- A: threatens them if they don't harm the other person.
 - B: deceives them into thinking they really are not harming the other person.
 - C: takes responsibility for the actions of these people
 - D: takes the lead by harming the other person first.
25. It makes sense to no longer be skeptical about a knowledge claim when
- A: our intuition tells us that it is likely to be true.
 - B: a scientist tells us it is true.
 - C: there is a great deal of evidence in favor of it and against competing knowledge claims.
 - D: when a single experiment supports its truth.
26. Skepticism, empiricism, and naturalism are highly valued attitudes among scientists because
- A: they help us to predict and control events in the natural world.
 - B: they help us to achieve practical goals.
 - C: our experience tells us that they work.
 - D: all the above
27. Stanley Milgram found that the easier it was for the experimenter to communicate with the subject of the experiment,
- A: the MORE likely it was that the experimenter would disobey.
 - B: the MORE likely it was that the subject would disobey.
 - C: the LESS likely it was that the experimenter would disobey.
 - D: the LESS likely it was that the subject would disobey.

28. I find that I explain things better when I am standing in front of a classroom of students than when I am alone in my office practicing a lecture. My better performance in front of students compared to when I am alone is BEST referred to as

A: an unstable attribution. C: internalized behavior.

B: social engagement. D: social facilitation.

29. When people believe something to be true, they often look only for evidence to support the truth of this belief and not for evidence that might show it to be false. This problem is known as

A: internal validity. C: the confirmation bias.

B: skepticism. D: a schema.

30. The other day, a student told me that he had studied over 40 hours for the last test but he still could not get an "A." I immediately concluded that he was lying or had misremembered. The mental process that leads to such an immediate insight without any conscious reasoning is known as

A: empiricism. B: naturalism. C: schematization. D: intuition.

31. If you want to maintain a consistently skeptical attitude, the best thing to do when your intuition tells you that a particular explanation is probably true is to

A: try to think of other plausible explanations.

B: listen to your intuition because it often is correct about most things.

C: look only for that evidence which will support the explanation.

D: reject the explanation because it is probably false.

32. Deceiving subjects about the true purpose of a research study makes it very difficult for the subjects to

A: attribute the causes of their actions to their personalities.

B: attribute the causes of their actions to the social situation.

C: give their informed consent to participate in the study.

D: all the above

33. As we increase the _____ of a study, its _____ decreases.

A: validity; reliability C: internal validity; external validity

B: ethics; usefulness D: controlled processes; reliability

34. The self-serving bias is defined as our tendency to

A: attribute our successes to situational factors and our failures to personal factors

B: overestimate the number of times we have been successful at a task

C: attribute our successes to personal factors and our failures to situational factors

D: protect ourselves from anxiety by blaming the victims of unfortunate circumstances

35. Which of the following types of research study tends to have the MOST internal validity?
- A: case studies
 - B: experimental studies
 - C: correlational studies
 - D: statistical studies
36. If we are concerned with whether a study's design is adequate for testing a particular prediction, we are wondering about its
- A: internal validity.
 - B: external validity.
 - C: theoretical reliability.
 - D: hypothetical reliability.
37. If we conclude that the possible benefits of a study are much greater than the possible harms it may cause, we are likely to judge the study to be
- A: ethical.
 - B: internally valid.
 - C: externally valid.
 - D: reliable.
38. The most important assumption of social psychologists is that
- A: social situations determine mental events and behavior.
 - B: personality is not an important cause of any behavior or mental events.
 - C: biological factors, learning, and unconscious processes have little or no effects on behavior.
 - D: all the above
39. Which of the following is NOT what we mean by the word "skepticism"?
- A: the application of reason to the evaluation of an idea
 - B: not believing a claim until there is compelling evidence for it
 - C: the belief that all knowledge is false
 - D: a method for investigating the possible truth of a claim
40. Attributions are
- A: the judgements that people make about whether they like or dislike an event.
 - B: the inferences that people draw about the causes of an event.
 - C: the errors made by observers who tend to ignore the influence of the situation.
 - D: the tendencies that people have to ignore themselves when they experience a failure and to ignore the situation when they experience a success.
41. In making an attribution, we FIRST tend to decide if an event (action) was caused by ____ factors.
- A: subjective or objective
 - B: usual or unusual
 - C: positive or negative
 - D: internal or external

42. Let's say that we have been hired to reduce thefts in a chain of supermarkets. We hypothesize that, if people BELIEVE they are being watched, they will be less likely to steal. To experimentally test this hypothesis, we place the following sign at the entrance of half of the stores: HIDDEN VIDEO CAMERAS HAVE BEEN INSTALLED IN THIS STORE. In the other half of the stores, we place a different sign: SHOPLIFTERS WILL BE PROSECUTED. We measure the amount of shoplifting at each of these stores. **In this example, the independent variable is**

- A: the people who shop at the stores in which the following sign has been placed: HIDDEN VIDEO CAMERAS HAVE BEEN INSTALLED IN THIS STORE.
- B: the people who shop at the stores in which the following sign has been placed: SHOPLIFTERS WILL BE PROSECUTED
- C: the type of sign placed at the entrance of the store.
- D: the amount of shoplifting that occurs at the store.

43. In Milgram's (1963) study of obedience to authority, when subjects could hear the learner yelling through the wall, about what percentage continued shocking the learner all the way to the end of the experiment?

- A: 5%
- B: 25%
- C: 65%
- D: 100%

44. The concept of the PSYCHODYNAMIC unconscious emphasizes the importance of

- A: controlled processes.
- B: schemas.
- C: motivations.
- D: person perception.

45. The way in which we think about ourselves and others in social situations is referred to as

- A: social cognition.
- B: the situational approach.
- C: social facilitation.
- D: cognitive heuristics.

46. Which of the following statements about social facilitation is FALSE?

- A: Social facilitation occurs only when there is a large number of other people present.
- B: Social facilitation works only with relatively simple tasks.
- C: Social facilitation occurs in various species of animal.
- D: Social facilitation is thought to occur, at least in part, because the presence of others increases physiological arousal.

47. Social psychologists have discovered that, when people describe the causes of behavior, they

- A: tend to focus too much on personality.
- B: usually have little difficulty making an attribution.
- C: are often unaware of the importance of the social situation.
- D: all the above

48. What were the authors of the Stanford Prison Study trying to show?
- A: whether or not prisons are as bad as many people say they are
 - B: whether or not the taking on of different social roles is a good explanation for the different behaviors of people in prison
 - C: whether or not prisons help the local economy of a community
 - D: whether or not the observation of aggression in prison environments leads to more acts of aggression
49. The fundamental attribution bias refers to the tendency of
- A: observers to favor external attributions when explaining the behavior of others.
 - B: observers to favor internal attributions when explaining the behavior of others.
 - C: actors to favor external attributions when explaining the behavior of others.
 - D: actors to favor internal attributions when explaining the behavior of others.
50. Actors tend to attribute their own behavior to _____ factors; observers tend to attribute the behavior of the actor to _____ factors.
- | | |
|--------------------------|-----------------------------|
| A: personal; personal | C: situational; personal |
| B: personal; situational | D: situational; situational |

CHAPTER 6

PERSONALITY PSYCHOLOGY: INTERNALIST THEORETICAL APPROACHES IN PSYCHOLOGY

People who are not psychologists usually describe it as a profession that treats maladaptive behaviors, thoughts, and emotions caused by abnormal mental factors. The goal of the profession of psychology, according to this popular view, is to help people with such problems overcome them, usually by helping them to become aware of the abnormal mental causes of their maladaptive behaviors, thoughts, and emotions. The roots of this popular view of psychology, the view that probably most of you held until you took this course, will be examined in this chapter. As you will see, the most important influence on this popular view of psychology is an approach to the treatment of mental disorders that first emerged over a century ago. This approach has spawned many related therapeutic approaches, all of which have been embroiled in various controversies. In this and the next chapter, I will try to show you that these controversies involve different ideas about what science is all about. I hope you will come to see that a good deal of the controversy within the field of personality psychology has been caused by the widespread acceptance of unscientific ways of understanding personality. That is, much of this controversy is caused by the ignorance of scientific methodology on the part of some mental-health workers (and even its rejection by a small number of them). The field of personality psychology has been the battleground for this clash between psychologists of scientific and unscientific orientations.

In the previous chapter, we discovered that social situations are important causes of our behaviors and mental events. In this chapter, I am going to discuss the view that “personal dispositions” (a **personal disposition** is an **internal tendency to act, think, or feel in particular ways**) are important causes of our behavior. In fact, except for the last chapter, this entire book has been emphasizing the importance of personal dispositions for our behaviors and mental events. Even in the last chapter, in the discussion of schemas and social stereotypes (two important personal dispositions), we found that we cannot focus on external causes of behavior without also considering internal causes. The emergence of the social-contextual approach has thereby served as one bridge between the field of social psychology and that of personality psychology. The most important difference between the two fields can be described by using what you have learned about attributional theory. In the language of attributional theory, we can say that both social and personality psychology are similar in that they focus on behaviors that show high consistency (and, therefore, are due to stable causes). But the two fields differ in that **social psychology focuses on those behaviors that show high consensus and low pervasiveness** (which we tend to attribute to external and situationally specific causes) whereas

personality psychology focuses on those behaviors that show low consensus and high pervasiveness (which we tend to attribute to internal and situationally general causes). Although researchers within both fields realize that personal dispositions and situational factors are important for all behaviors, social psychologists tend to focus on behavioral differences caused mostly by situational factors whereas personality psychologists tend to focus on behavioral differences caused mostly by personal dispositions. The study of the effects of personal dispositions on behavior and mental events is the study of personality.

SQ 6-1: What is the major difference between social psychology and personality psychology? Which field (if either) is more important for understanding the causes of our behaviors and mental events? Explain your answer.

A Definition of Personality

When you use the word “personality,” what do you mean? Some of you will answer by saying something such as, “it’s the way that people act.” By the word “act,” you must mean something like “a behavioral response to an environmental event.” All animals, however, respond to the environment. Would you say that all animals have personalities? You might claim that your dog or your cat has one. But would a hamster have a personality? Perhaps you answered “yes.” Well then, how about a fly, or an earthworm? Do they have personalities? Both of these groups of species respond to environmental stimulation, but I doubt that you would insist that they have personalities. Thus, the ability to take action can be only a part of what is meant by “personality.” What do we have to add to the definition? It seems that, when we are able to **predict how an individual is going to respond to a particular situation**, and when **that way of responding is unique** to that individual, then we say that the individual (whether a human or a nonhuman animal) has a personality. For example, if I sneak up behind you and crash a pair of cymbals together, I can predict that you will jump. Being able to predict your response satisfies the first requirement of a personality. But does this response show that you have a personality? No, because we would expect that anyone able to hear would respond in the same way. That is, there is nothing unique about this response and, therefore, the second requirement of a personality is not met. On the other hand, if I sneak up behind you and call you softly by name, and you fall to the ground, curl up into a ball, and lay there quivering and crying, this definitely says something about you as an individual. I probably would infer that you have a “jumpy” or a “nervous” personality. In general, we say that **an individual has a personality when that individual expresses unique and stable reactions to a wide range of environmental events**. Because the individual’s reactions are unique and stable, we can make predictions about how he/she will respond to future events. Thus, if an individual shows stable and unique reactions to the

environment, we can infer that he, she, or it has a personality (a human, a dog, a cat, and perhaps even a hamster, but probably not a fly or an earthworm).

Because personality psychologists use so many different approaches to the study of personality, it is impossible to give a definition of personality that would be accepted by all of them. Nevertheless, based on what was said in the previous paragraph, we can come up with a definition that many probably would find acceptable. **Personality can be defined as an integrated pattern of thoughts, emotions, and behaviors that has three characteristics.** (1) **It distinguishes each individual from others** (it exhibits **uniqueness** or low consensus). (2) **It endures over a long period of time** (it exhibits **stability** or high consistency). (3) **It is similar in many different situations** (it exhibits **generality** or high pervasiveness). Let's examine this definition more closely. First, let's look at the three characteristics of personality—uniqueness, stability, and generality—by considering a statement made by the serial killer, Henry Lee Lucas:

I hated all of my life. I hated everybody.... I was treated like what I would call the dog of the family. I was beaten; I was made to do things that no human being would want to do.... I started to steal, do anything else I could do to get away from home...but I couldn't get away from it. I even went to Tecumseh, Michigan, got married, and I started living up there, and my mother came up there, and we got into an argument in a beer tavern...that's when I killed her. (Norris, 1989, pp. 109-110)

In this short statement, you get a very good idea of the central features of this man's personality. First, he obviously had thoughts, emotions, and behaviors that were unique. I don't believe that most of us hate others so deeply and feel so much rage that we would kill our own mothers after an argument. He stated: "I was bitter at the world.... I hated everything. There wasn't nothin' I liked" (p. 115). In fact, he eventually decided to kill as many people as he possibly could. His victims included his girlfriend, whom he had known from the time she was nine years old (he had been 40) and whom he had taken care of in the role of a surrogate father. Second, Lucas' thoughts, emotions, and behaviors were very stable: they existed over long periods of time (in fact, over much of his life). He stated that, in his early teenaged years, he would slash the throats of animals before having sex with them, or he would simply skin them alive for pleasure. He committed his first murder at the age of fifteen (he killed a 17-year-old girl whom he had attempted to rape). He claimed to have killed hundreds of people before being placed on death row in Texas at the age of 46. Third, his thoughts, emotions, and behaviors were expressed in a relatively general manner: he exhibited them in many different situations. For example, his murderous rage might be expressed

towards a total stranger or towards an intimate, such as his girlfriend. Nevertheless, he also could appear normal enough that people would hire him for odd jobs. At such times, it was almost as if he were two different people because, in different situations, Lucas had the ability to act in very different ways.

The case of Henry Lee Lucas shows us that the generality of thoughts, emotions, and behaviors may not be as important a characteristic for defining personality as are uniqueness and stability. In fact, among personality and social psychologists, generality is the most controversial of the three basic characteristics of personality. As we saw in the last chapter, social psychologists have argued that our thoughts, emotions, and behaviors are highly dependent upon the social situation in which we find ourselves. If they are correct, then this implies that our mental events and behaviors will vary somewhat across situations. Some psychologists believe that we even can think of ourselves as having several overlapping personalities, with particular ones emerging in particular situations. In support of this idea, I'll bet that you have found yourself acting in different ways in different situations. Perhaps with your family, you seem to have one personality but, with your friends, you seem to have a different one. Although I hope that none of us go to the extremes shown by a highly disturbed person such as Henry Lee Lucas, it should be obvious that anyone can act, think, and feel differently in different situations. Nevertheless, there also is abundant evidence that external factors are not the whole story. First, even though you may think, feel, and act differently in different situations, the differences probably are not very large. That is, internal personality factors seem to interact with the situation to produce only slightly different mental events and behaviors in many cases. Second, different people placed in the same situation still act differently. For example, I am sure that your various instructors don't all act the same when they are speaking in front of a classroom full of students. This means that they must have their own unique personal dispositions that cause them to act differently in the same situation. Later in this chapter, I will discuss in more detail the debate between those who have emphasized the importance of social situations and those who have emphasized the importance of internal factors for our behaviors, thoughts, and feelings.

Let's now examine the rest of the definition I presented above. The word **integrated** refers to the idea that the components of personality are organized into a whole—that they “stick together” and interact in a way that is typical for that person. When we say that someone is “acting out of character” or is “acting strangely,” we are suggesting that this person's particular actions do not seem to be well integrated with the rest of his/her personality. The extreme of this might be the mental disorder known as *dissociative identity disorder*, abbreviated as DID (and formerly known as *multiple personality disorder*), in which an individual's actions seem to be caused by several

separate fragments of personality. Let's look at an example of DID in order to illustrate what is meant by the word "integrated." During the late-nineteenth century, Weir Mitchell reported the case of Mary Reynolds—a person whom, today, we probably would diagnose with DID. In 1811, she

was found one morning, long after her habitual time for rising, in a profound sleep from which it was impossible to arouse her. After eighteen or twenty hours of sleeping, she awakened, but in a state of unnatural consciousness. Memory had fled. To all intents and purposes she was as a being for the first time ushered into the world. (quoted in James, 1890/1950, p. 381)

She seemed to know very little about her former life or about the world around her. For example, she appeared not to recognize her family or friends; and she apparently could not speak, read, or write. It was as if she had been born for a second time, with only the knowledge that an infant would have. After being taught to communicate, she claimed not to realize that she had been alive before the day on which she had awakened from her long sleep. When she again had learned all the knowledge that someone of her age should have, it became obvious that her personality had undergone striking changes:

Instead of being melancholy [depressed] she was now cheerful to extremity. Instead of being reserved she was buoyant and social. Formerly taciturn [talking very little] and retiring, she was now merry and jocose [joking and playful]. Her disposition was totally and absolutely changed. While she was, in this second state, extravagantly fond of company, she was much more enamoured of nature's works, as exhibited in the forests, hills, vales, and water-courses.... She knew no fear, and as bears and panthers were numerous in the woods, and rattlesnakes and copperheads abounded everywhere, her friends told her of the danger to which she exposed herself, but it produced no other effect than to draw forth a contemptuous laugh.... (p. 382)

This new personality continued for some time until she fell into another long sleep and awoke again with her first personality. She alternated between these two personalities for about fifteen years until the final twenty-five years of her life, during which time she seemed to develop a third personality—one that shared many similarities with the second personality, but with some important differences:

The most of the twenty-five years which followed she was as different from her melancholy, morbid self as from the hilarious condition of the early years of her second

state. Some of her family spoke of it as her third state. She is described as becoming rational, industrious, and very cheerful, yet reasonably serious; possessed of a well-balanced temperament, and not having the slightest indication of an injured or disturbed mind. (p. 383)

In this unusual case study, it seems as if there were three personalities (with the third being an offshoot of the second) that were not integrated with one another. As I will discuss in Chapter 7, many modern cases of DID may be due to suggestions made by therapists and the media. That theory, however, seems to have some difficulties explaining cases such as that of Mary Reynolds. It may be that Mary's unusual behaviors and mental events were caused by other problems, such as organic (brain-related) ones. Regardless of the particular cause or causes of her problems, it seems likely that, for some people, a breakdown in the normal integration of personality can sometimes occur.

What is being integrated in a normal personality? In the definition of personality presented above, I referred to the integration of **thoughts, emotions, and behaviors** that represent our reactions to environmental events. In other words, we think, feel, and act in particular ways in various situations—ways that “stick together” in such a manner that they form our characteristic pattern of responding to environmental events. It is this integrated pattern of mental events and behaviors that constitutes (makes up) our personalities. But what causes this pattern of characteristic reactions to the environment? What is the basis for the personalities that we express? Many personality psychologists believe that there exists a number of personal dispositions that underlie each individual's personality. We will divide these personal dispositions into three broad categories: **traits, schemas, and motives**. Each disposition is thought to give rise to particular mental events or behaviors when they interact with particular environmental events. We will group traits, schemas, and motives under the general term **personality dispositions** so that we can distinguish them from all other personal dispositions (such as memories or perceptions).

SQ 6-2: Discuss in detail the concept of personality. In your answer, define what is meant by the term “personality” and describe three important characteristics of personality. What would be the particular personality problem suffered by someone diagnosed with dissociative identity disorder?

Personality Dispositions: Traits, Schemas, and Motives

A **trait** is a **behavioral tendency that has a general and direct influence on behaviors and emotions**. By using the term “behavioral tendency” to define traits, I mean to imply that a trait is something that causes us to respond automatically and without thought to

environmental events—something like a reflex. In fact, I like to think of a trait as a “mental reflex” that causes us to respond in very general ways to a broad range of environmental situations (unlike the more specific responses to specific events that make up actual reflexes). For example, a person who acts very relaxed in most situations would be said to be a “calm” person—he/she would be exhibiting the trait of “calmness.” We would not say, however, that this person had the trait if he/she acted calmly only at religious services and nowhere else. Thus, a trait is a special kind of behavioral tendency—one that causes us to express a range of closely related behaviors and emotions in response to a wide range of environmental events. Which behaviors are involved in the trait of “calmness”? Think of a particular person who you think is calm. Which behaviors lead you to say that this person is calm? Write them in the space below:

My example of a calm person is Mister Rogers, who until recently appeared in a television show meant for preschoolers. He exhibits several behaviors that lead me to conclude that he is a calm person: he speaks in a very soft voice, walks and moves slowly, wears very bland clothing, and never seems to become upset. For me, such behaviors typify what is meant by “calmness.” No one of these behaviors, however, would be sufficient to infer that a person is “calm.” Someone who speaks in a soft voice may simply wish to avoid attention. Someone who walks and moves slowly may be suffering from an illness. Someone who wears bland clothing may feel that it is vain to worry about one’s appearance. Someone who never becomes upset may simply be suppressing his/her anger and frustration. How, then, do we decide whether or not we are observing behaviors and emotions caused by a particular trait? In general, we look to see if a person expresses, over long periods of time and over many situations, a set of behaviors each of which is related to all the others in some way. For example, I would not call Mister Rogers calm if he exhibited these behaviors and emotions only when he was performing: if he actually has the trait of “calmness,” then calm responses must occur in many situations. In other words, “calmness” is a trait because it has a **general influence** on behavior and emotions, which means that it has high pervasiveness—it **causes a similar set of behaviors and emotions in many different situations**. It also has a **direct influence** on behavior, which means that its **effects cannot easily be suppressed or hidden from others** (unlike other kinds of personality disposition, as we will see below). Because we typically can observe easily the effects of traits on a person’s behaviors and emotions, we often describe other people in terms of a collection of traits. For example, if you were to describe your favorite teacher, what would you say? You might use words

such as “knowledgeable,” “caring,” “friendly,” and “serious.” These are all trait terms because they involve dispositions that have a general and direct influence on behavior.

A **schema**, as defined in earlier chapters, is **the knowledge acquired by an individual about a particular class of events in the world**. A schema is a set of beliefs about something that endures over long periods of time and that becomes activated whenever certain environmental events occur. For example, you might have a schema involving beliefs about yourself, such as “I am intelligent” and “I am funny.” Whenever you are in a situation in which intelligence is required (at school, for example), this schema is activated and gives rise to thoughts, emotions, and behaviors which are consistent with it. Not all (or perhaps even most) schemas are going to be important causes of personality, however. For example, your schema about college professors, since it is activated in only a small number of situations and probably only during the few years in which you will be coming into contact with college professors, is not an important cause of your personality. Instead, it is long lasting and central schemas, such as **self-schemas (beliefs a person has about his/her own skills, abilities, and other personal characteristics)**, that are going to have the most important effects on your personality.

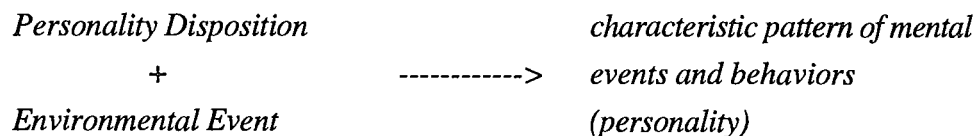
Schemas differ from traits in many ways. One important difference is that schemas, but not traits, can be hidden from others. For example, if I had a negative schema concerning people who are Druids (Druidism was an ancient religion practiced millennia ago in present-day Great Britain and France) then every time I met a Druid, I would have negative thoughts and feelings towards that person. Nevertheless, I could keep my thoughts and emotions hidden from Druids and even act in a friendly manner, which could come in handy if I had to deal often with them. Schemas also differ from traits in that they do not necessarily have a general influence on behavior. That is, as I said above, schemas may give rise to behaviors and mental events in only a limited range of situations. For example, if I have a schema made up of the belief that people generally are honest and sincere in what they say, this schema probably will not be activated when I go shopping for a car. In this situation, a second schema (“sales people are not to be trusted no matter what they say”) is activated. Thus, I might act brusque and even rude to a sales person (actually, I don’t), although usually I am considerate and friendly to other people. My “sales-person schema” will affect my mental events and behaviors only in specific situations. **Schemas, therefore, do not necessarily have either a general or a direct influence on behavior, although certain ones—such as self-schemas—may have such influences.** The schemas that have the most general effects on mental events and behaviors (the ones that have high pervasiveness) are the ones with which we will be most concerned in this chapter.

A motive is an internal force that compels (pushes or pulls) a person to accomplish a goal. A drive such as hunger creates an internal physical tension in you that “pushes” you to seek out stimuli that will reduce the tension. A wish for your future, such as a desire to get a bachelor’s degree in some area, “pulls” you to seek out situations (for example, to take classes) that will get you closer and closer to that goal. Thus, biological drives and wishes are motives, as is any other internal factor that compels you to accomplish a goal. But we must remember an important point when speaking of motives as parts of your personality—**only those motives that exhibit stability and uniqueness are important components of your personality.** For example, a motive to become famous, if it is long lasting one, is also unique enough to be a part of your personality. On the other hand, a motive to get something to drink because you feel thirsty after roller blading on a hot day is not a part of your personality: it will end just as soon as you drink enough and anyone would get thirsty in such circumstances. In addition, **motives that have a general influence on behavior and mental events are the most important ones for causing personality.**

We distinguish motives from the other two personality dispositions because, although schemas and traits influence our behavior, they do not serve as internal forces that push or pull us to act in particular ways. For instance, if my self-schema contains the belief that I have a good sense of humor, I might be more likely to tell jokes at a party, but only when there is a motive that can be satisfied by doing so. Such a motive might involve a desire to be liked by others or a desire for attention. If, instead, my self-schema contained a belief such as, “I am intelligent,” I might have tried to satisfy these same motives by talking about the book I am writing. On the other hand, motives are similar to schemas in that they, too, can be hidden from others. For example, if you are having strong sexual desires for a person whom you have just met, it often makes sense to keep these desires hidden from that person (at least until you get to know him/her better). Motives also differ from traits. Traits are typical ways we have of responding (behaviorally and emotionally) to situations—they are our unique, stable, and general behavioral tendencies. Thus, such behavioral tendencies will be used whenever we are trying to satisfy our motives, but the traits are not the motives themselves. In fact, your traits may make it difficult for you to satisfy certain motives. For example, let’s say that you are an “energetic” person (you have the trait of being vigorous and forceful). Many motives will be more easily satisfied by the fact that you have this trait, but not all. The satisfaction of the motive of sleepiness, for example, may be hampered by the fact that you have energetic traits: you may put off sleep until you are ready to collapse. Motives differ from traits in another way: we can hide our motives from others, but we cannot hide our traits (although we may be able to suppress them temporarily). For example, you might act in a helpful manner towards another person, not because you have the trait of being a “helpful” person,

but because you want that person to do something for you. If you were truly a helpful person, you would express this trait regardless of your motivations. However, in the present example, you simply are trying to make the other person think that you have this trait. Your motivation for acting in this manner is being hidden from the person. You keep it hidden because, if this person discovered that you are being helpful only because of your (ulterior) motive, he/she probably would not be inclined to do you the favor. Think about your own behavior with regard to this example. I will bet that you often try to get others to think that you have particular traits when, in fact, your behavior is being generated by a hidden motive. As we will see later in this chapter, psychoanalysts argue that we hide some of our most important motives not only from others, but also from ourselves.

How does our personality emerge from these three personality dispositions? It is the interaction between traits, schemas, and motives on the one hand, and environmental events, on the other hand, that gives rise to the thoughts, emotions, and behaviors that make up our personalities. Personality, then, **is caused by the interaction of unique, stable, and (often) general personality dispositions with various environmental situations:**



It is important to keep in mind that, in this view, personality is not the set of personality dispositions. Instead, personality is the observed outcome (the integrated set of thoughts, emotions, and behaviors) of interactions between unique, stable, and general dispositions on the one hand, and the immediate environment on the other. Another thing to keep in mind is that personality dispositions are what cause you to act in unique ways. For example, when driving your car, you may have a disposition that causes you to get angry when another driver follows you too closely. In fact, most people have such a disposition. When speaking of personality, however, we are not interested in the dispositions that most people share, but only in those that make a particular person unique. In addition, we are not interested in short-lived personal dispositions (such as your feelings of hunger if you have not eaten for some period of time), but only in those that affect your mental events and behaviors over years of your life. Lastly, those dispositions that are general—those that are activated in a broad range of situations—are typically thought to be more important for personality functioning than those that are specific. But again, as I will discuss later, the characteristic of generality has been a controversial one in personality psychology.

SQ 6-3: Describe the three dispositions that influence an individual's personality. In your answer, discuss how these dispositions differ from one another. Give an example of each type of personality disposition. How does personality emerge from these three dispositions?

There are two important questions that many personality psychologists have tried to answer. (1) What causes the development of personality dispositions in individuals? (2) Is one kind of personality disposition most important for causing individual differences in personality? Researchers' attempts to answer these two questions are reflected in the particular theoretical approaches they adopt. I am going to discuss three major theoretical approaches in the rest of this chapter: the psychodynamic, trait, and cognitive-learning approaches. Each of these theoretical approaches emphasizes the importance of a different personality disposition. The psychodynamic approach focuses on motives; the trait approach focuses on traits; and the cognitive-learning approach focuses on the learning of schemas and other cognitive factors. Within each approach, researchers try to explain how their preferred set of personality dispositions develop over the life spans of individuals and how these dispositions have their effects on mental events and behaviors. Before I describe these three theoretical approaches, however, I first need to answer a question that I have put off until now: what is meant by the term "theoretical approach"?

Theoretical Approaches in Psychology

In the chapter on learning, we examined two very different ways of explaining mental events and behavior—behaviorism and evolutionary psychology. As you may recall, behaviorists have focused on explanations emphasizing how individual humans, within their life spans, become adapted to their environments, whereas evolutionary psychologists have focused on explanations emphasizing how the human species, over many generations, becomes adapted to its environment. In developing their explanations, behaviorists have focused on mechanisms of learning and the influence of environmental stimuli, whereas evolutionary psychologists have focused on mechanisms of evolution and the influence of genes. We refer to behaviorism and evolutionary psychology as "theoretical approaches." A **theoretical approach** is a **set of assumptions and concepts with which one begins to construct explanations (theories) of some phenomenon**. In other words, it is the general viewpoint or perspective one takes when constructing the descriptions and explanations making up a theory. In order to help you understand this better, let's look at a set of observations and try to explain them. On average, we find that women are more likely to become jealous when their partner becomes emotionally involved with another woman, whereas men are more likely to become jealous when their partner has sex with

another man. Why would this average difference occur between men and women in the events that make them jealous? You probably can come up with several reasons right away. If I asked each person reading this to state their preferred explanation for these observations, we probably would find that different people come up with very different explanations. For example, some people might focus on cultural explanations (since these patterns of jealousy vary among cultures), and others might focus on hormonal explanations (since the average levels of hormones vary between the sexes). The major reason for differences in the explanation offered is that each person begins his/her attempt at explaining research findings from a different theoretical approach.

Let's consider how a behaviorist might explain the gender difference in the types of jealousy felt by men and women. Think carefully about what a behaviorist might say and then write your answer in the following space:

In the theoretical approach of behaviorism, the following assumption is made: the responses of an organism are determined by environmental stimuli. Behaviorists also make use of concepts having to do with learning. Putting all of this together, the basic approach taken by a behaviorist is that humans (and all other animals) learn to respond to environmental stimuli. Thus, a behaviorist would focus on the learning histories of males and females when trying to understand their different reactions to a partner who is becoming overly involved with another. For example, many of us have been taught that "boys will be boys." Females who are taught this may not get very upset about their mate's sexual infidelities. On the other hand, many of us have been taught that females should be pure and chaste. Males who are taught this would tend to get much more upset about their mate's sexual infidelities. But why would females get more upset than males when their mate is getting emotionally involved (as in a close friendship) with someone of the opposite sex? How could learning explain this difference? Perhaps we have learned through observation that, when a male develops a friendship with a female, he often begins to develop romantic feelings for her (and, thus, may leave his partner), but that the reverse is less likely to occur. That is, we may have observed that females are more able to have friendships with males in which they have no

romantic feelings. Because of this learning, a woman is likely to feel more threatened when her partner develops a friendship with another woman than a man would feel if his partner developed a friendship with another man (as long as he detected no signs of a sexual relationship). Any answer that reflects such points would be what I was looking for. Whether or not these explanations are correct is not important here. What is important is that you begin to see how taking a particular theoretical approach can affect the sorts of theories you develop when trying to explain a set of observations.

Now let's consider how an evolutionary psychologist might explain the jealousy example. Think carefully about what an evolutionary psychologist might say and then write your answer in the following space:

In the theoretical approach known as evolutionary psychology, the following assumption is made: the mental events and behaviors of humans are determined by brain structures that are activated by particular environmental situations. Evolutionary psychologists also make use of concepts having to do with genetics and evolution. Putting all of this together, the basic approach taken by an evolutionary psychologist is that humans (and all other animals) have evolved certain ways of responding to environmental stimuli. Thus, an evolutionary psychologist would focus on the problems that can potentially decrease the reproductive success of males and females. For example, males never know for certain whether or not a baby is their biological offspring (because the baby does not develop inside of them), whereas females always know when a baby is their biological offspring. Thus, we might expect males to evolve brain structures that would cause them to respond quickly to signs that their partner is having sex with another male: if she is, then he may unknowingly end up raising another man's child, thereby failing to reproduce. On the other hand, females need a partner to help provide resources for a baby and, so, females might have evolved brain structures that cause them to respond quickly to signs that their mate is becoming emotionally involved with another female. If he is, then he might leave her and she might have to bring up the children herself, a nearly impossible feat for human mothers until recent times. Any answer that

reflects such points would be what I was looking for. Again, it is not important for now whether these explanations are correct or not, as long as you understand how accepting a particular theoretical approach can affect the sorts of theories you develop.

As I hope you can see from these examples, when we try to explain some phenomenon, we first need to have assumptions and concepts that help us to know where to start looking for possible causes. A researcher typically will emphasize one or a few sets of explanatory factors in his/her theory (for example, factors based on learning or on neural activity). The theoretical approach adopted by the researcher reflects his/her decision about the set of factors most important for explaining the phenomenon being studied. When developing a theory, a researcher using a biological approach is not going to emphasize unconscious mental conflicts, and a researcher using a behavioral approach is not going to emphasize brain activity. The theoretical approach adopted by the researcher limits him/her to emphasizing the causal factors of that approach. Yet, the researcher does not worry about these limitations because he/she believes that the particular approach chosen is the best one for answering questions about the phenomenon being studied. For example, most researchers studying schizophrenia have adopted a biological approach rather than a behavioral approach because schizophrenia is much better explained by the effects of biological factors (such as genes) than it is by learning. If, at some point, researchers become convinced (because of new evidence) that learning also is important, they can add the behavioral approach to their theories of schizophrenia. This is an important point: **we can use as many different theoretical approaches as we need to fully explain a phenomenon.** We never are required to choose one approach over all others.

It also is important for you to realize that, although there are a number of theoretical approaches used in psychology, this does not mean that psychologists are unable to agree with one another. There are at least two reasons why there are so many theoretical approaches: (1) As I just stated in the previous paragraph, **a given theoretical approach or set of approaches may explain a particular set of phenomena better than others do.** For example, biological approaches seem to be best at explaining the development of schizophrenia. Biological approaches in combination with behaviorism seem to be best at explaining the development of phobias. Cognitive approaches seem to be best at explaining how memories are formed and retrieved. Thus, when we are trying to solve a particular problem (such as what causes a phenomenon or how we can modify it), we often will find that certain approaches work better than others do. (2) The second reason for the large number of theoretical approaches in psychology is that **any particular behavior or mental event has many different causes.** Human behavior and mental events are complex: they are caused by many different factors that often interact with one

another. Thus, it should be obvious that different approaches focusing on different sets of causes all would have a place in psychology. For example, as I discussed in the first chapter, we can think of any particular event as being caused by a long chain of interconnected causes going back in time. In other words, any particular event has both proximate (near in time) and ultimate (distant in time) causes. If the event was a napkin falling on the floor, we can identify many causes: it fell because the fan blew it off the table, which had been turned on because I was hot. I was hot because it is 110° out today, which was the case because a high-pressure zone is over Arizona and it is summer. It is summer because the Earth is tilted on its axis and we are in a certain position with respect to the sun. The Earth stays tilted on its axis because the gravitational pull of the moon holds it in a relatively stable position....and so on. Some theoretical approaches in psychology focus on ultimate causes whereas other approaches focus on proximate causes. Thus, different theoretical approaches often complement one another: they are focused on different sets of causes that, when considered together, form a relatively complete picture of the most important proximate and ultimate causes of a phenomenon.

In order to make all this a little clearer, I will consider an approach that, although not used by personality psychologists (because there is no scientific evidence in favor of it), is a popular one in American culture today—an astrological approach. Astrologers believe that the positions of the planets and stars, especially at birth, are of utmost importance in determining one's personality and behavior. Thus, astrologers tend to focus on more ultimate causes of human behavior. When attempting to explain any phenomenon, therefore, a theorist using an astrological approach would focus on the relative positions of the planets and stars in his/her explanation. The theorist will use the concepts of astrology (for example, the signs of the zodiac, ascendancy, or the planet Jupiter) whenever he/she is trying to explain specific phenomena. As I already have stated, however, personality psychologists reject the astrological approach. This is because the theoretical approaches used in scientific psychology have been developed in accordance with those basic scientific tenets of which I spoke earlier—empiricism, skepticism, and naturalism. Although astrology may be thought of as a naturalistic approach (it focuses on physical bodies in nature as the main causes of our behavior), and perhaps as an empirical approach (it focuses on observations of human behavior), there is no evidence that consistently supports it. That is, when we test the claims made by astrologers (skepticism involves the testing of claims), we find that this approach has nothing to offer. Astrology, therefore, is not a scientific approach to understanding human nature. **Theoretical approaches, in order to be scientific ones, must lead to theories that (a) can be tested by making observations (empiricism), (b) are supported by evidence (skepticism), and (c) propose natural processes as causal factors**

(**naturalism**). As we will see in this chapter, some approaches used by psychologists are not considered to be scientific ones because they don't satisfy one or more of these requirements.

SQ 6-4: Define in your own words what is meant by the term “theoretical approach.” How is a theory different from a theoretical approach? Discuss why there are so many different theoretical approaches in psychology. What makes a theoretical approach scientific? How do the theoretical approaches of personality psychologists differ from those of social psychologists?

Now that you have a better understanding of what a theoretical approach is, I can proceed to a discussion of some of the theoretical approaches used by personality psychologists. Over the past 100 years, many different approaches to the study of personality have been developed. Each of them represents a particular way of looking at human nature. That is, each tries to answer specific questions about what it is to be human. Do various internal forces determine our behavior or do we shape our own behavior through the use of conscious free choice? Is human personality influenced primarily by mental processes at the unconscious or the conscious level? Is human personality made up primarily of inherited dispositions or learned dispositions? If our experiences are important for personality development, are certain ones (perhaps those from childhood) more important than others? There are many such questions we can ask about the development of personality. Each theoretical approach attempts to supply answers to these basic questions. Let's now look in detail at a few of the major theoretical approaches in personality psychology starting with those that emphasize motives.

Motives: Psychodynamic Approaches

Josef Breuer (1842-1925) was a physician who published a case study of great importance in the history of personality psychology. In this study, Breuer described his treatment of a young woman he referred to as “Anna O.” (her actual name was Bertha Pappenheim). During the early 1880's, Anna developed a variety of unusual symptoms while she was caring for her father, who was ill with tuberculosis. In a book that he published with Sigmund Freud in 1895, Breuer wrote that Anna:

became very weak, anemic, and evinced a disgust for nourishment, so that despite her marked reluctance, it was found necessary to take her away from the sick man. The main reason for this step was a very intensive cough about which I was first consulted. I found that she had a typical nervous cough. Soon, there also developed a striking need for rest,

distinctly noticeable in the afternoon hours, which merged into a sleep-like state, followed by strong excitement. (quoted in Spitzer, et al., 1994, pp. 512-513)

These symptoms intensified and eventually became so severe that Anna became an invalid. Over a short period of time, she also began to develop new physical ailments that baffled Breuer: pains on the left side of her head, strabismus (cross-eyes), visual problems, partial paralysis of the throat muscles, and a lack of feeling in parts of the right side of her body. She eventually developed a set of problems that looked like multiple-personality disorder:

There were two entirely separate states of consciousness, which alternated very frequently and spontaneously, moving further apart during the course of the disease. In one of them she knew her environment, was sad and anxious, but relatively normal; in the other, she hallucinated, ... she scolded, threw the pillows at people..., and tore with her movable fingers the buttons from the covers and underwear, etc. If anything had been changed in the room during this phase, if someone entered, or went out, she then complained that she was lacking in time [that is, she stated that she had forgotten the immediately preceding period of time].... In very clear moments she complained of the deep darkness in her head, that she could not think, that she was going blind and deaf, and that she had two egos [selves], her real and an evil one, which forced her to [do] evil things. (p. 513)

Anna's father eventually died. Her problems continued and she became suicidal at times. Breuer treated Anna for almost two years. His major method of treatment was to have her talk about her life, especially about distressing events that had occurred in her past. After doing this, Anna often would feel better and some of her symptoms would improve or even disappear for a short time. For example, at one point, Anna had a disturbing symptom of being unable to drink anything at all:

For 6 weeks during the hottest time of the year, she did not drink a single drop and quenched her thirst with fruit and melons. At the same time of course she complained about her tormenting thirst, but when water was brought to her lips, she could not be persuaded to take a single drop, without giving any explanation. At last one evening she told how she had seen her lady-companion's small dog, which disgusted her, drink from a glass of water, and how she had said nothing, in order not to appear rude.... 5 minutes [after narrating the story of the dog,] ... she complained of thirst, drank 1/2 a bottle of water and from then on her inhibition about drinking disappeared. (Hirschmüller, 1978; quoted in Macmillan, 1996, p. 7)

Breuer's treatment was one of the first examples of **psychotherapy (a treatment that uses talking in an attempt to change the functioning of the mind)**. Although this "talking cure" seemed to help Anna, the improvement in her symptoms never lasted for long. Sigmund Freud (1856-1939), Breuer's younger colleague and close friend, often claimed that Breuer's efforts had cured Anna; but the reality was that for almost ten years after Breuer stopped treating her, she continued to show severe abnormalities in her behaviors, thoughts, and emotions. (Later in this chapter, I will talk briefly about the many exaggerations and distortions that Freud made about the evidence for his claims.) Eventually, when she was about 30 years old, her symptoms apparently disappeared completely. After this time, Anna became a successful social worker (in fact, she founded the profession of social work in Germany) and an influential feminist leader.

Anna's case apparently had a profound impact on Freud. From his discussions with Breuer, Freud became very interested in understanding the cause or causes of the symptoms of "hysterics" such as Anna. **Hysteria** is an old (and now virtually obsolete) term that refers to any **disorder characterized by memory disturbances and physical symptoms that seem to have no physical cause**. It appeared to Freud and others that hysterical symptoms might have mental causes involving pathological (dysfunctional) memories—memories of upsetting experiences from the hysterical patient's past. Based on Breuer's experience with Anna O. and other evidence, Freud concluded that becoming aware of and talking about these experiences had positive effects on hysterical symptoms. Beginning with these ideas, Freud and his colleagues began to develop, around the turn of the twentieth century, the **psychodynamic approach**. The major assumption of this approach is that **human thoughts, feelings, and behaviors are determined by mental forces in conflict with one another**. The term "dynamics," which was borrowed from physics, refers to the motion and balance of forces in a complex system. For example, the description of plate tectonics given in the first chapter can be viewed in terms of forces both within the earth and on its surface that, through a complex set of interactions, cause the continents to change their relative positions over time. The concept of psychodynamics refers to mental forces that interact in complex ways. Freud proposed that these mental forces constantly compete with one another to gain dominance and control of mental life. For Freud, the most basic mental forces involve motives. Although Freud was most interested in biological motives (see below), later psychodynamic theorists often focused their attention on other motives. In this chapter, I will discuss in detail the psychodynamic approach developed by Freud and his followers—an approach called "psychoanalysis." I do this for two reasons: (a) psychoanalysis has been of great historical importance for personality psychology and (b) it has had a strong influence within modern American culture, especially on how Americans think about the mind and behavior.

SQ 6-5: Briefly describe the case of Anna O. and discuss how it influenced Sigmund Freud to develop his approach to understanding and treating particular kinds of mental disorder. Define what is meant by the term “hysteria.” Name a modern mental disorder of which you are aware that might be an example of hysteria.

Psychoanalytic Approach

During the first third of the twentieth century, Freud constructed a very complex approach to personality, the details of which he often changed over the years. The following sketch, thus, can give only the briefest outline of his approach. The major assumption of the **psychoanalytic approach** is stated in the following: **human thoughts, emotions, and behavior are determined primarily by unconscious conflicts among biological motives and societal constraints on the satisfaction of these motives.** Freud focused on biological motives because he was strongly influenced by the evolutionary thinking of Charles Darwin and others. As you already know, Darwin proposed that humans evolved along with the rest of the animal kingdom; and he and others accumulated much evidence in support of this idea. Based on this evidence, Freud became convinced that our primary motivations are the same as those of other animals. In other words, Freud argued that humans are motivated primarily by biological impulses such as hunger, thirst, and sex. These biological motivations consist of physical tensions that, if they are to be satisfied, require certain kinds of stimulation from objects found in the external world. For example, the satisfaction of the sexual motive, which consists of physical tensions in the genitalia, requires enough stimulation of the genitalia to produce orgasm. Animals must find objects in the external world that can provide the stimulation needed to satisfy this and other biological motives. The basic problem for all animals (including humans) is that the external world does not often allow biological motives to be easily satisfied because the required stimuli are either limited in supply or located at some distance from the animal. For example, when a sexual partner is not available, the sexual motive may not be satisfied for long periods of time. This leads to frustration and to an increase in the physical tension of the genitalia. The tension will continue building until an appropriate stimulating object is found.

Freud believed that an animal's responses to the external world—its behaviors, thoughts, and emotions—are directed primarily towards finding objects that can satisfy fundamental biological motives. For example, the longer a human goes without the release of sexual tension, the more he/she thinks about sex (usually by fantasizing about it) and the more he/she engages in behaviors designed to encounter others who can give the appropriate stimulation. Thus, **our entire mental life, according to Freud, has as its major goal the satisfaction of biological motives.** Because an individual's personality is made up of those behaviors,

thoughts, and emotions that are unique, stable, and general, **the person's attempts to satisfy biological motives, to the extent that they have unique, stable, and general effects on mental events and behavior, are the cause of his/her personality.** For Freud, the most important biological motive causing personality was the sexual motive. Why did he focus on the sexual motive? Again, this was due to the influence of evolutionary biology on Freud's thinking. According to the theory of evolution by natural selection described in Chapter 3, what is the most fundamental goal of all organisms? According to this theory, the most fundamental goal of all organisms is reproduction. It should be obvious that the sexual motive is essential if an organism is to reproduce: if there is no sexual desire, an animal will not engage in the behaviors leading to reproduction. Based on such reasoning and his interpretations of case studies, Freud claimed that, **for humans, the frustration of the sexual motive and the attempts to overcome this frustration are the most important determinants of personality development.** Freud was not alone in focusing on the importance of the sexual motive: many other thinkers of his time also believed that sexuality was an important cause of both normal and abnormal personality. If you examine your own sexual feelings and their effects on you, it probably will become obvious that those who argue for the influence of the sexual motive on what we think, feel, and do are correct. For example, most of us spend a relatively large portion of our lives looking at, thinking about, and/or trying to attract people whom we find to be sexually attractive. Thus, it should not be controversial to suggest that the sexual motive is an important influence on mental events and behavior. What is controversial was Freud's claim that the sexual motive is the most important cause of personality development. Many other psychodynamic theorists have disagreed with Freud by arguing that, in addition to the sexual motive, there are other motives of equal or greater importance for personality development.

SQ 6-6: Describe the basic assumption of the psychoanalytic approach. According to Freud, what is the major goal of mental activity? According to Freud, what are the major determinants of personality development? Explain how psychoanalysis differs from other psychodynamic approaches.

Psychoanalytic Theory of the Mind

Because he was a therapist who treated hysterical disorders, Freud initially was most interested in explaining the causes of hysteria. In using the psychoanalytic approach to help people with hysteria, he assumed that abnormal functioning of the mind and behavior was often the result of his patients' attempts to deal with frustrations involving the sexual motive. The external world, especially the many rules surrounding sexuality imposed on us by society, causes frustration of the sexual motive. As the distress caused by the frustrated sexual motive increases, Freud claimed, the

individual begins to act, think, and feel in increasingly abnormal ways. In other words, Freud believed that hysteria (and many other mental disorders) was the result of malfunctions that occurred in the normal human mind. Before you can understand Freud's explanation of hysteria, however, you will need to know more about his view of the normal human mind. In the rest of this section, I want to examine Freud's view of the human mind, its structures, and their functions.

Libido. Freud believed that the mind is similar to an engine that requires “fuel” to keep running. For Freud, this “mental fuel” was made up of the energy associated with the sexual motive, which he referred to as “libido” (libido refers to the feelings and tensions associated with sexual desire). Because he thought of libido as the basic energy source for all mental life, Freud believed that libido is needed in order for any particular mental function to work. Until later in his career, when he introduced another fundamental motive—aggression or the death motive—as a second major cause of personality development, Freud believed that much of what we do, think, and feel is associated with the desire to reproduce (as well as the desire to survive). In this way, Freud conceived of the human mind as a vast system powered by libidinal energy. To be more specific, Freud claimed that **libido is expressed in various interacting and conflicting urges and desires that we constantly are trying to satisfy.**

Levels of Awareness. As I discussed in Chapter 4, Freud divided the mind into three levels of awareness: the conscious, preconscious, and unconscious levels. The conscious level consists of the mental events of which we currently are aware—the short-term (working) memory system I spoke of in that chapter. The preconscious level consists of the mental events of which we could easily become aware, but that are not at the conscious level at present. Many long-term memories are at the preconscious level, as are many sensations occurring throughout the body (such as the tactile sensations caused by the clothes you are wearing as you read these words). Lastly, the unconscious level consists of the mental events of which it is very difficult or impossible to become aware. In other words, the unconscious level contains those mental events that are outside the reach of selective attention. As I discussed in Chapter 4, the psychoanalytic conception of the unconscious focuses on the importance of motivations for keeping mental events outside of awareness. In other words, psychoanalysts believe that we are motivated (we desire) to keep certain material at the unconscious level because it would upset us to become aware of it. They claim that repression is the most important cause of the placement of mental events in the unconscious. I will come back to this point again later since the concept of repression is the foundation upon which much of the rest of psychoanalysis is built.

SQ 6-7: According to Freud, what is the nature of the energy that powers mental activity? List and define the three levels of awareness in the psychoanalytic approach.

Three Mental Systems. The mind, for Freud, was divided not only into several levels of awareness, it also was divided into three sets of mental functions that, in the English-speaking world, are referred to as the id, ego, and superego. The **id**, which is at the unconscious level of awareness, is the place where libido originates. Thus, the id can be thought of as our basic animal nature: it is the part of the mind that contains the biological motives that allow for our survival and reproduction. According to Freud, the human mind consists at birth of only the id. Hence, a newborn baby can be thought of simply as an unthinking animal full of biological urges pushing for satisfaction. The id works according to the **pleasure principle**, which means that it **demand immediate satisfaction of biological motives without regard to any constraints or limitations** imposed by the outside world. In order to understand the meaning of this principle, think again of a newborn baby. As you all know, a baby does not want to be kept waiting: it wants its desires satisfied right now. For example, when a baby is hungry, it wants to be fed immediately. It doesn't care that its mother just got home from work and that she wants to relax for a few minutes. It may cry and scream until the dominant biological motive of the moment is satisfied. The id, however, has a significant limitation. Because the id is at the unconscious level, it is not in direct contact with the outside world and, thus, it cannot directly satisfy its own desires. That is, the id is unable to plan and implement actions that will bring it into contact with external sources of stimulation (just as a newborn baby cannot). Instead, according to Freud, it uses **primary process thinking** in an attempt to satisfy its own desires. Primary process thinking is **an irrational type of thinking characterized by fantasy**. The best way to understand this type of thinking is to think of the mental events you experience during dreams. Freud claimed that a dream is fundamentally the expression of the id's primary process thinking. In his view, you dream about whatever unsatisfied motives are dominant at the moment. For example, if you go to bed hungry, you probably will start dreaming (fantasizing) about eating food. In general, according to Freud, the major function of dreams is that of "wish fulfillment": our dreams represent attempts to satisfy the current desires of the id. And it seems to be the case that fantasy can satisfy briefly our desires. For example, if you develop an urge to urinate while you are sleeping, you probably will dream about using a bathroom, which often leaves you feeling slightly satisfied for a moment. Thus, primary process thinking seems to be able to temporarily satisfy the desires and urges of the id.

The id, because it is unconscious and because it uses an irrational type of thinking to satisfy its motives, is fundamentally helpless. The id must be cared for just as a newborn baby is cared for

by its parents. As children get older, however, parents increasingly demand that they learn to do this for themselves. According to Freud, a “parent-like” part of the mind develops to take over the parental role. This second part of the mind, which Freud claimed first emerges at about six months of age, is referred to as the **ego**. The ego is made up mostly of conscious and preconscious thoughts, memories, judgements, and perceptions. Because it is at the conscious level, the ego is in contact with the external world and, thus, is able to take actions that directly satisfy id impulses. The ego works according to the **reality principle**, which means that it **takes account of the limitations and constraints imposed by the outside world when trying to satisfy id impulses**. Let’s go back to the example from the previous paragraph: during the middle of the night while you are sleeping, your bladder becomes full. The urge to urinate would be a biological impulse originating in the id. Your id begins to use primary process thinking to satisfy this urge: you begin to dream about getting up, walking to the toilet, and then urinating. Suddenly, you wake up and realize that you didn’t really go into the bathroom, and you quickly begin to touch the sheets around you to see if the bed is wet. When you woke up, your ego, working on the reality principle, quickly realized that you are in bed and that the bathroom is down the hall. The id, on the other hand, working on the pleasure principle, simply wanted immediate satisfaction of its urges. The id didn’t care that the bathroom is down the hall (in fact, it was not even aware of this fact). The ego uses **secondary process thinking** to satisfy impulses arising from the id: **it uses logic and a knowledge of the outside world in order to plan actions** that can overcome obstacles getting in the way of satisfaction. Thus, in our example, the ego can develop a logical plan of action to satisfy the id’s need to urinate: get up and walk around the bed, go through the bedroom door, down the hallway, and turn right into the bathroom. In general, the ego figures out realistic ways to satisfy the motives originating from the id. As one continues to experience the world and to gain more knowledge, the ego continues to develop and mature.

The id and the ego seem to be a pretty good team. The id drives all mental life but it is unable to satisfy its needs directly in the outside world. The ego, which can take action in the outside world, figures out ways to satisfy the id’s impulses, thereby reducing the distress caused by frustrated desires. For example, the id is hungry and the ego decides to get up, go to the refrigerator, take out the leftovers from last night’s dinner, and heat them up in the microwave oven. The id is thirsty and the ego decides to get a glass, walk to the kitchen faucet, turn on the cold water, fill up the glass, and take a drink. The id feels sexual desire and the ego goes to a bar, buys a potential sexual partner a large number of drinks, takes the person home, whispers romantic words into the person’s ear, gives the person more to drink, and then takes the person into the bedroom and has sex. This last example should suggest a problem: the combination of the id and ego is “amoral” (it has no moral standards). That is, an id and an ego together have no sense of

what is right and wrong. The ego is simply a rational planner of actions: it tries to figure out realistic ways to get id impulses satisfied. In doing this, the ego fears punishment (since punishment leads to various kinds of harm), but it will engage in behaviors that normally are punished if it can figure out a way to avoid the punishment. For example, my dog seems to have only an id and an ego. If his id is hungry (it always seems to be) and there is food on the coffee table, his ego will stop him from jumping on the coffee table as long as I am around (since I punish this behavior). As soon as I leave the room, however, he is up on the table as quick as a hungry pug can manage. He feels no guilt about this behavior even though he seems to realize that it is against the rules. Thus, my dog is a psychopath, which is what we might call anyone who has only an id and an ego.

What is wrong with being amoral? Isn't the goal of life simply to get one's desires and needs met? It is true that some have seemed to argue for this; and it definitely is a viewpoint that is popular in American culture today. But think more carefully about it. If everyone tried to get their own needs satisfied regardless of the consequences for others, and if everyone engaged in morally correct behavior only when they believed that they might get punished for doing otherwise, what kind of society would we have? We would have a society in which everyone was out only for themselves—a society in which others were important to us only when they could help us satisfy our desires. In such a society, people would relate to others mostly by trying to gain power over them. It should be obvious that there would be a complete breakdown of the social order if most people lived this way. In other words, civilization would be impossible if humans consisted of only an id and an ego: only the threat of punishment from external sources would keep us from constantly forcing or manipulating others to satisfy our own needs. Thus, Freud argued that a third part of the mind is necessary if humans are to have the complex social arrangements that characterize a civilized society—a part he called the **superego**.

The superego, which Freud believed develops at about five or six years of age, represents **the internalization of societal values and standards of behavior**. It has effects at the unconscious, preconscious, and conscious levels that oppose or constrain the expression of id impulses. The superego does this by serving as an internal source of punishment or self-satisfaction. In other words, the superego causes the ego to feel either good or bad about itself with regard to the actions it has taken (or is planning to take). First, when the ego engages in behaviors that go against internalized societal standards, the superego punishes the ego by making it feel guilty. Second, when the ego engages in behaviors that go along with internalized societal standards, the superego makes the ego feel good about itself. These two emotional effects correspond to two parts of the superego: the **conscience** (the part that makes the ego feel guilty)

and the **ego ideal** (the part that makes the ego feel good). (Although many analysts have thought of the ego ideal as separate from the superego, I here consider it to be a part of the superego because of its effects on our moral behavior.) By affecting the emotions felt by the ego, the conscience and the ego ideal keep the effects of id impulses in check even when there are no external sources that can do so. For example, most of us don't shoplift in stores even though it often would be very easy to stick items in our pockets without being noticed. Freud would say that our conscience makes most of us feel bad for even thinking about stealing. The concept of the ego ideal also can help us to understand why people who find large amounts of money sometimes will bring the money to their local police station, even though they could easily have kept the money without anyone knowing. Freud would say that their ego ideals make them feel good about themselves for acting in accordance with their internalized moral standards. Thus, according to Freud, a well-developed superego allows us to rise above our animal natures, thereby making us fundamentally different from all other animals. In Figure 6.1, I present a basic outline of our discussion of Freud's theory of the mind.

SQ 6-8: Discuss the major characteristics of the id, ego, and superego. In your answer describe the pleasure principle, the reality principle, primary process thinking, secondary process thinking, the conscience and the ego ideal. At which ages are the id, ego, and superego first thought to develop? At which levels of awareness are the id, ego, and superego?

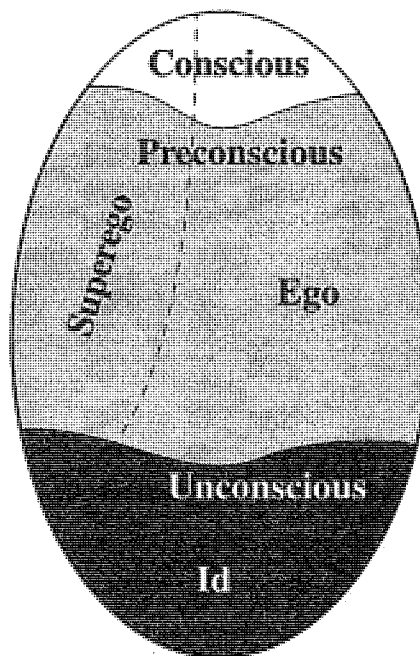
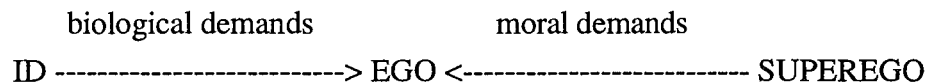


Figure 6.1 Freud's basic model of the mind (from Ryckman, 1997; p. 41)

The Ego and Anxiety

As we have just seen, Freud developed a theory of the human mind that proposed that two sets of often opposing demands are made upon the ego. On the one side are the demands of the id to satisfy its biological motives involving survival and reproduction. On the other side are the demands of the superego to meet moral demands that allow us to live in a complex social world:



Freud stated that there also exist conflicts between the id and the outside world, since the limitations and dangers of the outside world cause problems for the ego when it is trying to satisfy the demands of the id. According to Freud, when a conflict occurs between the demands of the id, on the one hand, and the demands of the superego or the constraints of the outside world, on the other hand, the ego begins to feel anxious. He claimed that the ego feels anxious because it fears losing control of the conflict between the id and the superego. But why would the ego feel the need to stay in control? Why can't it sometimes just relax and allow one of the other two parts of the mind to take over? The ego does sometimes allow this. Every night when we go to sleep, the ego relaxes and lets the id take over. I hope that this example suggests to you why the ego cannot allow this to happen when we are awake: when the ego is not in control, we are helpless. That is, if the individual is to survive and reproduce, the ego must stay in control because it is the only part of the mind that both is rational and knows what is going on in the outside world. Anxiety is a signal to the ego that, if it hopes to stay in control, it must do something either to satisfy the opposing demands of the id and the superego or to overcome the constraints imposed by the outside world. The ego cannot ignore for long the demands of the id because the id is the energy source for all mental life (libido originates in the id). The ego also cannot ignore for long the demands of the superego because the ego will feel increasing amounts of guilt the longer it does so. Lastly, the ego cannot ignore the constraints imposed by the outside world: if it ignored reality, it would not be able to satisfy id impulses.

With regard to the id-superego conflict, the anxiety felt by the ego motivates it to find a **resolution of the conflict—to find a solution that both satisfies the id and is acceptable to the superego**. For example, let's say that you have an important test tomorrow. Your superego may tell your ego that you should study because good performance in school is an important moral standard. Just as you are about to sit down to study, however, a friend calls and asks if you want to go dancing at a club. Your id may tell your ego that this would be a lot of fun.

Your ego now feels anxious because the demands of the id and the superego are in conflict. It must figure out a way to satisfy both of these competing demands if it is to reduce its anxiety. What should your ego do? Perhaps it will decide to bring your books to the club so that you can study when you are not dancing. If this seems like a successful solution to the problem raised by the conflict, then you have resolved the conflict successfully (that is, your ego has ended the conflict by finding a solution that seems reasonable). This example, although perhaps somewhat silly, does illustrate an important point about the psychoanalytic approach. According to this approach, **personality is predominantly the result of the ego's resolutions of conflicts between the biological demands of the id and the moral demands of the superego.** How your ego resolves these conflicts will determine the thoughts, emotions, and behaviors you have in response to various situations. For example, the situation you are in right now is causing your id and superego to make conflicting demands on your ego. Your id wants your ego to stop reading and do something more fun. Your superego, on the other hand, wants your ego to keep reading because it wants the ego to learn the material (perhaps because it thinks that hard work is good for a person). The manner in which your ego resolves this conflict will determine your personality at this moment. Some of you might try to ignore the id impulse completely and work for very long periods of time. Others may decide to keep reading for another fifteen minutes and then take a break to watch a half-hour television show. Others may decide to turn on television while continuing to read. And still others may not have picked up the book in the first place and, instead, have been watching television all day. Each of us resolves our id-superego conflicts in different ways. What causes these individual differences? As I will discuss later, Freud believed that both heredity and past experiences, especially experiences from early childhood, are the most important causes of how we resolve id-superego conflicts during adulthood.

Freud concluded that, because we constantly experience “intrapsychic conflicts” (that is, conflicts existing within the mind, in this case between the id and superego), the best that we can hope for in our lives is to be unhappy. Why did he conclude this? He reasoned that the only way we can ever be completely content and happy is if every biological desire we ever have is immediately satisfied. Of course, this is not possible because the external world typically makes the easy satisfaction of id impulses very difficult. Even in this case, however, we can achieve some measure of happiness and contentment if we constantly try to satisfy our urges. As humans, however, we also have an internal constraining force, the superego, which is forever saying “no” to the demands of the id. In addition to the id-superego conflicts, there often are conflicts between different desires—conflicts in which the satisfaction of one desire makes the satisfaction of other desires unlikely or impossible. For example, in order to satisfy a desire to be in a romantic relationship with a particular person, you must restrain your desires to have sexual relations with

others because the ego realizes that your partner may end the relationship if you try to satisfy these desires. Again, the ego feels anxious because its goal is to satisfy all desires coming from the id and, in this case, it can satisfy only one. Thus, according to Freud, constant intrapsychic conflicts lead to a constant internal battle—a battle that causes us to be forever unhappy. Id-superego conflicts are the most important for personality because they are the most difficult to resolve to the satisfaction of both the id and the superego. Although Freud believed that we would be much happier if we did not have a superego, he also felt that we then would be no different from other animals. Thus, he saw the superego as a “necessary evil” that allows us to achieve the highest human accomplishments while causing us to experience endless misery at the same time. You can see that Freud had a very pessimistic view of the human condition. The goal of his therapy was to help people to become less miserable (but never happy, which he apparently thought was impossible) by learning to accept the difficult situation created by human nature. Of course, the fact that Freud’s approach is pessimistic doesn’t mean that his view is false. Later, I will discuss other reasons why we should be skeptical of the psychoanalytic approach to understanding personality.

SQ 6-9: According to Freud, what causes the ego to feel anxiety? Why does the ego need to stay in control of mental activity? Why does the ego need to consider the demands of the id and the superego when making decisions? According to Freud, what is the major cause of the personality you have right now? Why did Freud conclude that the best we can hope for is to be unhappy?

Anxiety and Neurosis

We are now ready to use Freud’s theory of the mind to understand the development of hysteria and other mental disorders. In trying to explain the development of hysteria, Freud emphasized the importance of the anxiety suffered by the ego in response to conflicts between, on the one hand, the id and, on the other hand, the superego and the outside world. He assumed that **the human nervous system has difficulty dealing with negative emotions** such as anxiety. From this assumption, he concluded that the ego must find ways to quickly reduce its anxiety if disturbances of the nervous system are to be prevented. Freud believed that, as long as the ego is relatively mature, it should be able to find adaptive ways to resolve intrapsychic conflicts—ways that directly satisfy id impulses within the constraints imposed upon it. On the other hand, if the ego is immature, it more often will find maladaptive ways to resolve intrapsychic conflicts. Maladaptive resolutions often make it difficult for the ego to find adequate ways to directly satisfy id impulses and, thus, anxiety will become a chronic problem. Freud believed that chronic anxiety leads to dysfunctions of the nervous system, which causes various mental disorders. In general, therefore, Freud’s theory claimed that **abnormal mental events and behaviors are caused ultimately by poorly resolved intrapsychic conflicts**. He used

this theory to explain the development of hysteria and other mental disorders that make up what are called the “neuroses.”

Just before and after the turn of the twentieth century, a **neurosis** was thought to be **any mental disorder involving symptoms of anxiety and depression caused by a disturbance of the nervous system**. Hysteria was one kind of neurosis. Some other examples of neuroses would be phobias, depression, obsessive-compulsive disorder, and generalized anxiety disorder. Let me explain the psychoanalytic theory of neurosis by looking at a case of phobic disorder published by Freud in 1909 (a phobia is a strong and irrational fear of an object, event, or situation). In this case study, Freud described the phobia suffered by a four-year-old boy whom he called “Little Hans.” The boy’s father discussed the boy’s problems in a letter he sent to Freud: “during the last few days he [Little Hans] has developed a nervous disorder, which has made my wife and me most uneasy, because we have not been able to find any means of dissipating it.... He is afraid *that a horse will bite him in the street*” (quoted in Spitzer, et al., 1994, p. 517). It seems that this fear first developed after Hans, who was walking down a city street with his mother, saw a large horse fall down and begin to kick violently. How would someone using the behavioral approach explain the phobic fear shown by Little Hans? You might recall from Chapter 3 that behaviorists explain the development of learned fears with the concept of classical conditioning. In the case of Little Hans, the sight of a horse (the CS) was paired with the sights and sounds of a horse kicking violently (the UCS). The UCS elicited a reflexive response of fear and, because it followed the CS, the CS also began to cause fear in Little Hans. Psychoanalysts might agree with the behaviorist’s explanation but would want to go further: they would want to know why Little Hans was susceptible to developing this particular phobia. That is, they would point to the fact that many other children viewing the same event did not develop a learned fear of horses. Why did Little Hans?

In accordance with the theory I sketched out above, Freud believed that hysteria, phobias, and other neuroses are caused by **maladaptive attempts made by the ego to deal with the anxiety resulting from intrapsychic conflicts**. To be specific, Freud believed that a neurosis is caused by the ego’s failure to resolve adequately conflicts between id impulses, on the one hand, and constraints on the satisfaction of these impulses, on the other. These constraints could come from the superego, from other id impulses, or from the outside world. In the case of Little Hans, who would have been too young to have a superego (as I stated earlier, the superego is not thought to develop until a child is about five years old), the intrapsychic conflict involved conflicts between his id and the outside world. That is, Hans feared that certain events would occur that would make it difficult for him to get certain id desires satisfied. But which desires and which

events? Psychoanalysts would argue that the incident of the falling horse symbolized, in some important way, the particular conflict with which Little Hans' ego was struggling. In order to find out what this conflict consisted of, a psychoanalyst would begin to ask Hans or his parents about Hans' experiences, concerns, dreams, and so on. In this way, psychoanalysts hope to discover clues leading them to the particular conflict causing the problem. Hans' father told Freud that the problem first became obvious when Hans awoke crying one morning and said to his mother: "When I was asleep I thought you were gone and I had no Mummy to cuddle with" (quoted in Spitzer, et al., 1994, p. 517). Within several days, Hans showed more problems. He would sometimes cry when walking down city streets and appeared to be frightened of horses. He expressed anxiety about being separated from his mother and wanted to be cuddled by her when he was frightened. He became afraid of going on walks and expressed a fear that a horse would come into their home. After suffering from the flu and having his tonsils removed, his phobia became so bad that he often was unable to leave the house. About a month later, he was persuaded to go to the zoo with his father and expressed much fear when he was near the large animals. His problems, Freud thought, seemed to center around his desire to be with his mother as well as his fear that his mother and father would leave him. But what was this meaning of these fears? Where did they come from?

As I stated earlier, Freud believed that all neuroses ultimately are caused by maladaptive attempts to satisfy the sexual motive. In the case of Little Hans, Freud used his concept of the **Oedipus Complex** to explain the source of the boy's fear of horses. The Oedipus Complex refers to the notion that, **from about three to five years of age, children develop intense sexual feelings for their opposite-sexed parent and aggressive feelings for the same-sexed parent.** In other words, according to Freud, a little boy wants to be his mother's sexual partner and wants to be rid of his father so that the father no longer will be a competitor for the mother's affections (the opposite would be true of girls). The name was derived from the myth of Oedipus who, without realizing it, killed his father and married his mother. Thus, according to Freud, Hans wanted to be his mother's husband and wanted his father to leave, perhaps by dying. (I will discuss the evidence for and against such ideas later when I talk about the scientific status of psychoanalysis.) But Little Hans also feared his father because the boy (unconsciously) reasoned that, if his father found out about Hans' desires for his mother, the father might try to harm him. Hans' father, then, was the external source of danger that led to Hans' intrapsychic conflict (his desires to be his mother's sexual partner and for his father's death were in conflict with Hans' fear of his father's wrath). Freud believed that the horses that Hans saw in the street symbolized for him his father: the horses were large and had facial hair just like his father. By avoiding these animals and by running to his mother when he was afraid, **Hans**

was playing out in symbolic form the intrapsychic conflict that was tormenting him. In general, this case shows clearly Freud's approach to understanding the neurotic behaviors and mental events of his patients. Freud would try to obtain as much information as he could about the patient's experiences and then would attempt to interpret this information in terms of some underlying conflict that the patient had resolved poorly. With adults, Freud would try to cure the neurosis by making the patient's ego aware of the conflict so that it could figure out a better, more adaptive, resolution.

SQ 6-10: What did Freud think was the major cause of abnormal mental events and behavior? Define the term "neurosis" as it was used during Freud's time. What causes neuroses, according to Freud? Briefly discuss the case of Little Hans with regard to the major cause of neurosis. In your answer, define the term "Oedipus Complex" and state how it may have been important for the development of Hans' fear.

The Defense Mechanisms and Neurosis

This sketch of the nature of the neuroses raises at least two important questions. (1) Why is the person unaware of the intrapsychic conflict causing his/her neurosis? (2) And why does this conflict often get expressed in a symbolic form (that is, in the form of neurotic symptoms that symbolically represent the conflict)? With regard to the first question, we must recall what I said earlier about Freud's theory of the mind. There are two major sources of potential conflict with which the ego must deal if it is going to satisfy id impulses: (a) the external world, which places limitations on the satisfaction of id impulses or contains dangers that threaten the survival of the individual; (b) the superego, which makes moral demands that often come into conflict with id impulses. In general, **the ego must satisfy id impulses given the constraints imposed by the outside world; and it must do this in a manner that meets the standards of the superego.** In explaining the development of the neuroses, Freud emphasized the importance of id-superego conflicts since these seem to be the most difficult conflicts to resolve well. Thus, I will focus on id-superego conflicts in the remainder of this discussion. When the id and superego are in conflict, the ego becomes anxious. As I stated above, anxiety is a signal to the ego that it must resolve the conflict. If the ego figures out a way to resolve the conflict to the satisfaction of both the id and superego, anxiety is reduced. But what do you think would happen if the ego cannot figure out a way to resolve the conflict? For example, if your friend calls to ask you to go dancing when you have to study, most of you probably will say, "no." But what if your superego is so strong that you never feel as if it is all right to have fun—that, instead, you should always be doing something "productive"? In this case, your ego, if it listens only to your superego, will never be able to resolve the conflict. It should be obvious that, in this case, the ego's anxiety will

continue to increase. What can it do to reduce anxiety? According to Freud, there is only one path left open to it: the ego must make itself unaware of the desires arising from the id. If it becomes unaware of these desires then, as far as the ego is concerned, there is no longer a conflict. The lack of awareness of id impulses, therefore, should lead to a reduction of anxiety.

How can the ego become unaware of id impulses? The primary way of accomplishing this, according to psychoanalysts, is through the use of **repression**. Repression refers to **the pushing of desires arising from the id into the unconscious**. From his extensive reading of the psychoanalytic literature, Holmes (1990) stated that repression involves the following three characteristics:

- (1) repression is the selective forgetting of materials that cause the individual pain; (2) repression is not under voluntary control; and (3) repressed material is not lost but instead is stored in the unconscious and can be returned to consciousness if the anxiety that is associated with the [repressed material]...is removed. (p. 86)

From these characteristics, we can infer that, although repression reduces the ego's anxiety by making it unaware of unacceptable id impulses, this comes at a price: the repressed id impulses still exist and, thus, are still trying to get satisfied. In other words, a repressed id impulse uses its energy to try to force the ego to satisfy the desire. Thus, the ego must use some of its own energy to make sure the repressed impulse remains in the unconscious. The stronger the id impulse, the more energy the ego must use to keep it repressed. The greater the number of conflicts that the ego tries to resolve in this way, the more energy it must use to keep the repressed id impulses at the unconscious level, and the less energy it has available to use for more adaptive purposes. Furthermore, because repression occurs involuntarily and unconsciously, the ego cannot "decide" to stop repressing id impulses. The overall result of this is that **the ego becomes less aware of reality when it uses repression to reduce anxiety and it has fewer resources available to respond adaptively to the outside world**. That is, people using repression not only are unaware of their true desires, they also are less able to adjust themselves well to the demands of the environment because their mental energy is being sapped by repression.

Repression is one of a group of strategies known as the **ego defense mechanisms**, which are defined as **a set of mental processes within the ego that unconsciously defend against anxiety by distorting reality**. The ego defense mechanisms are the only processes within the ego that occur at the unconscious level. This is because, in order for them to work, we need to be unaware that we are using them: if the ego defense mechanisms occurred at

the conscious level, we would be aware that we were trying to use them to forget unacceptable id impulses. Repression is the most important defense mechanism, but other defense mechanisms are also used by the ego. Whenever the ego is motivated to forget an id impulse, it first uses repression. But, as I stated above, the id impulse is still using its energy to get the impulse satisfied. Thus, the ego must push even harder to keep the desire in the unconscious. Because of this, the ego may add other defense mechanisms on top of repression. For example, it may use **reaction formation**. This is a defense mechanism in which **the ego transforms the repressed desire into its opposite**. At the conscious level, the ego experiences a set of emotions and desires that are the opposite of what the person feels unconsciously. For example, as Little Hans got older, the thought of having sex with his mother probably repulsed him. According to Freud, this would be a reaction formation against Hans' repressed sexual desire for his mother. The ego also might use **projection**, which is **the attribution of one's own repressed desire to another**. In this case, the ego mentally places the unacceptable id impulse into an external source, which allows for a mental distancing of the person from the impulse. For example, when Little Hans became an adolescent or adult, he might have felt that older women were constantly trying to seduce him. The older women would have symbolized his mother for him; and his incorrect belief that they were trying to seduce him would have resulted from his own repressed desire for his mother. Another ego defense mechanism is **displacement**, in which **the ego expresses a repressed desire in ways that seem acceptable**. Thus, displacement allows some satisfaction of the repressed desire. For example, as an adult, Little Hans might have been attracted to older women and may often have dated them. According to Freud, Hans would have been satisfying his Oedipal desires for his mother symbolically by dating and having sexual relations with women who reminded him (unconsciously) of his mother.

With his concept of defense mechanisms, Freud finally was able to explain the development of neuroses: **neurotic symptoms, Freud claimed, involve a battle between the id and the ego for control**. That is, repressed id impulses are using their energy to try to force the ego to become aware of them (so that they can be satisfied), which forces the ego to exert its own energy in order to keep the repressed impulses hidden in the unconscious. This battle for control leads to the development of neurotic symptoms in one of two ways. (1) When the ego does not have enough energy to keep the id impulses repressed (for example, when the person is tired or is concentrating hard on something else), **repression may weaken and the repressed id impulse may burst out in unusual ways**. For example, the person may experience a "slip of the tongue" (a "Freudian slip"), as in the case of the man with repressed Oedipal desires who said to his mother, "oh mother, sometimes you are so sexy . . . I mean silly!" (2) When the ego uses other defense mechanisms (in addition to repression), **the person may show neurotic**

symptoms that symbolize the repressed conflict. For example, in the case of Little Hans, the use of displacement caused him to engage in unusual behaviors that represented in symbolic form the unconscious feelings he had for his father: his fear of his father was displaced onto the horses that represented his father. By transforming the conflict into this symbolic form, Hans was better able to keep the conflict at the unconscious level by avoiding horses. In general, according to Freud, **neurotic symptoms reflect the ego's attempts to keep repressed id impulses from entering consciousness.** In other words, **a person's neurotic symptoms are either direct or symbolic expressions of his/her repressed id impulses.**

SQ 6-11: Define the concept of "ego defense mechanism" and state when they are most likely to be used. At what level of awareness are the ego defense mechanisms? What are the three characteristics of the defense mechanism called repression? Define and give examples of the defense mechanisms of reaction formation, projection, and displacement. Use the concept of ego defense mechanisms to explain the development of neurotic symptoms.

The Importance of Early Childhood

According to Freud, most neuroses begin with experiences that occur during the first five to six years of life, especially experiences we have with our parents (or other caretakers). Why did he believe this? The biggest influence came from the evolutionary biology of Freud's day. During the late-nineteenth century, many biologists believed that a developing organism goes through stages in which it shows characteristics of ancestral species from its evolutionary past. For example, during the development of embryonic humans, there is a brief period during which we have structures that look like "gill slits"—openings through which fish obtain oxygen. Nineteenth-century biologists believed that, at that point in embryonic development, humans are going through a "fish stage." Although it is true that developing organisms show some bodily characteristics that are present in other distantly related species (such as gill slits), we now know that we do not repeat our evolutionary history as we develop. Nevertheless, this idea was very influential for several decades leading into the twentieth century; and it had a large influence on Freud's thinking. Based on this idea, he and others reasoned that, because sexual reproduction evolved many millions of years ago, sexuality must appear very early during human development. In fact, they inferred that sexual feelings must appear even before birth because the ancestral species we supposedly are developing through early in prenatal development were sexual (such as ancestral fish). Thus, they reasoned that children are born with the ability to have sexual feelings. In addition, many scientists of the late-nineteenth century claimed that sexual reproduction in ancestral species sometimes involved body parts other than the genitalia. Thus, some believed that long ago the mouth was involved in sexual reproduction; and that later within the evolutionary line leading to modern

humans, the anus was involved in sexual reproduction. Finally, these scientists claimed, the genitalia evolved. If this were true, they reasoned, then humans must show periods during development in which they obtain sexual pleasure from the stimulation of the mouth, the anus, and finally the genitalia. Freud took these ideas from the biology of his time and developed what has been called the **psychosexual stage theory** of personality development. In this theory, Freud claimed that humans go through several stages in each of which pleasure-seeking primarily involves a particular part of the body. Psychosexual development, Freud claimed, begins with the mouth, moves to the anus, then to the penis or clitoris, and eventually to the penis and vagina. In this way, he divided personality development into five stages:

- (1) *oral stage* (birth to about one year) in which pleasure-seeking involves the mouth;
- (2) *anal stage* (from about one to three years) in which pleasure-seeking involves the anus;
- (3) *phallic stage* (from about three to six years) in which pleasure-seeking the penis or clitoris;
- (4) *latency period* (from about six to puberty) in which pleasure-seeking is repressed;
- (5) *genital stage* (the remainder of life) in which pleasure-seeking involves the penis or vagina.

Freud believed that, at each stage, the child feels sexual pleasure through the stimulation of the body part indicated because libido is centered there.

According to Freud, experiences during the first three psychosexual stages (the first five to six years of life) were the most important ones for personality development. Why did he believe this? Again, it was because of claims made by evolutionary biologists during the late-nineteenth century. A large number of these biologists believed that experiences during an individual's life somehow modify the reproductive cells (sperm and ova). For example, according to this idea, if you read many books during your life and become highly educated, your efforts should help your children: they will inherit some of your superior acquired knowledge and thinking skills. Or, if you learn to play and become expert at a musical instrument, your children will inherit an increased musical ability. Again, we now know that this idea, which we may call the "inheritance of acquired characteristics," is wrong: a person's reproductive cells are not affected by experiences that the person has had during his/her lifetime. Nevertheless, this idea continued to have supporters until about 1930. Freud never gave up his belief in the inheritance of acquired characteristics even after it had disappeared from the rest of science. Until his death in 1939, Freud believed that such inheritance explained many important evolutionary changes in humans. Because of this belief, he claimed that memories of traumatic events experienced by our ancestors are passed down through the generations. In each generation, Freud argued, these inherited memories are activated by certain situations thereby causing individuals to feel anxiety similar to the anxiety they would have felt if

they had experienced the original ancestral events. This would be similar to you becoming terrified at a certain point late in your life because you have inherited the memories of one of your ancestors who fought in a series of bloody battles during the Civil War. According to Freud, the situations that activate the inherited memories do not have to be as extreme as the ancestral event: they can be fairly mundane and even trivial situations. For example, if early in the evolutionary history of humans, males were often castrated by vengeful fathers who were angry with them, these memories would be inherited by future generations. In the present day, Freud claimed, these memories might be activated in a young boy experiencing a father who is angry with him because he won't eat his peas. The boy might then overreact by developing a phobia of peas.

Freud believed that many of these traumatic ancestral experiences occurred very early in the evolution of humans. By coupling the inheritance of traumatic memories with the idea that we repeat our evolutionary history during development, Freud inferred that **young children develop through psychosexual stages in which they relive the traumatic experiences of our early human ancestors**. In other words, Freud thought that young children have inherited particular inborn tendencies to react strongly to minor experiences that are related to traumatic events of a sexual nature experienced by our ancestors. This theory led Freud to infer that experiences during early childhood have profound effects on the development of personality. Freud claimed that these experiences might cause personality development to become disrupted or even to stop (to become "arrested") at an early psychosexual stage. He called such disturbances in development **fixation**, and defined it as **an unconscious preoccupation with the pleasure-seeking of a stage**. What kinds of experience might cause fixation? In general, according to Freud, if the pleasure-seeking of an early stage is satisfied too much or too little, a child is likely to become fixated at that stage. Freud believed that when one is fixated in an early stage, one's adult personality will be affected: the adult will try constantly to satisfy (often symbolically) the dominant desires of the stage at which fixation occurred. For example, Freud believed that an adult who is fixated in the oral stage will express various behaviors involving the mouth such as drinking too much alcohol, engaging predominantly in oral sex, becoming a wine-taster, playing wind instruments, or developing into a great public speaker. An adult fixated in the anal stage may become "anal-retentive" (a personality type in which Freud thought the person is unconsciously withholding his/her feces), which means that one will be overly controlling of one's environment and feelings. For example, a person fixated in the anal stage may be very neat, miserly, organized, and emotionally constricted. A person fixated in the phallic stage may show sexual deviations (such as a preoccupation with sex or an extreme lack of interest in sex) or problems with authority figures. In fact, the phallic stage includes the Oedipus Complex, which eventually leads to the development of the superego. Thus, according to Freud, a problem in the

phallic stage could have far-reaching consequences because a disturbance in the development of the superego could lead to fundamental difficulties in a person's ability to take part in society.

The specifics of Freud's psychosexual stage theory are not important for us here. What is important is that, because this theory was derived from widely known biological concepts and theories, and because it seemed to explain the development of neurotic disorders, it convinced many people that experiences during early childhood have an enormous influence on personality development. In fact, many psychoanalysts have believed that the general outline of adult personality is determined by the time of the fifth or sixth birthday. This is the source of the belief common in the United States that personality is "fixed" by five or six years of age. I hope you can see that this popular belief is questionable because it is based on a theory derived from incorrect biological ideas of the late-nineteenth century. Nevertheless, one could argue that the source of the ideas making up a theory are not important for the question of whether or not the theory is true. To determine the value of a theory, regardless of its source, we need to look at the relevant evidence—the observations that either support or fail to support the theory. Freud claimed that his theory was supported by the observations he made in his many case studies. But, as I have discussed in several chapters, case studies are not good evidence for a theory because they cannot rule out alternative explanations. Thus, case studies do not provide adequate evidence for any specific explanation. These criticisms bring us to the next topic: is Freud's psychoanalytic approach a scientifically valid one?

SQ 6-12: Discuss how biological ideas from the nineteenth century influenced the development of Freud's psychosexual stage theory. Briefly describe the five psychosexual stages and discuss how events experienced during the early stages were thought by Freud to affect personality development. In your answer, describe the role of fixation in this process and the kinds of experience thought by Freud to cause fixation. What is the source of the common belief that personality is fixed by five years of age?

Scientific Status of the Psychoanalytic Approach

There are several major problems with Freud's approach and with the evidence for that approach that have led many to question its scientific acceptability. In this section, I will talk about four major problems: psychoanalytic concepts tend to be vague; psychoanalytic claims are often unfalsifiable; psychoanalytic observations are often affected by suggestion; and psychoanalysts often use circular reasoning. Whenever such problems occur, they tend to make a claim or a theory unscientific. A fifth problem with the psychoanalytic approach is that, in trying to find support for some of its basic concepts, Freud seems to have committed fraud. That is, it seems that Freud

made up some of the evidence he used to support his claims. By the end of this discussion, it should become clear to you that Freudian psychoanalysis is not a scientific approach to understanding personality. By helping you to understand why this approach is not scientific, I hope to teach you how to identify other unscientific approaches you may hear or read about.

Vague Concepts. In broad outline, many of Freud's concepts and assumptions seem plausible. But when one looks at them more carefully, many problems emerge that lead one to question their scientific value. For example, when looked at superficially, the concepts of the id, ego, and superego seem clear and very plausible. That is, it seems appropriate to say that we have a biological part full of desires, a rational part that figures out how to get these desires satisfied, and a moral part that makes sure the desires are satisfied in a socially acceptable manner. But when examined more carefully, it becomes obvious that the concepts of the id, ego, and superego are so vague that it is difficult or impossible to derive testable predictions from them. What precisely are the id, ego, and superego? How is each structured? What are the processes that occur within each? There are no clear answers to these questions. Freud believed that all mental life (and, thus, personality) developed from the id; but the concept of the id is so unclear that even psychoanalysts are unable to characterize it. Macmillan (1997) summarized the results of various discussions among psychoanalysts during the 1950s and 1960s concerning the meaning of the id:

It seemed impossible to decide whether the id had any structure, to arrive at any consensus of its functions, to be certain whether all of it was unconscious in the descriptive sense, or to know what the relation between id and [the unconscious] was.... Since then no further attempt has been made to clarify the concept either by describing its functions more adequately or resolving the theoretical problems associated with it.... Until the functions are clarified, the concept can make only a pseudocontribution to Freud's personality theory.... (p. 534)

Similar problems appear when one tries to characterize the ego and the superego, as well as many other basic concepts within the Freudian approach. It should go without saying that, if the fundamental characteristics of the most important concepts within Freud's approach are not well described, the scientific status of this approach is questionable. In short, how can one study something when one cannot determine if it is actually being studied; and how could such a vague concept then be used in an explanation of specific behaviors and mental events? Because of such problems, many psychoanalysts today have discarded Freud's theorizing about the id, ego, and superego as well as several other of his basic concepts, including libido, fixation, and the Oedipus Complex.

Unfalsifiability. The **falsifiability criterion** of science asserts that, **if a claim is to be regarded as a scientific one, it must be stated in such a way that it can be shown to be false.** If there is no way to show that a claim is false, we are unable to infer from tests of the claim whether it is, or is not, likely to be true. Stanovich (1998) gave a good example of an unfalsifiable claim in his discussion of the work of Benjamin Rush. Rush was a physician from Philadelphia who, in 1793, treated many patients suffering from a yellow-fever epidemic in that city. Yellow fever is an often-fatal disease in which a viral infection causes symptoms of fever, jaundice, and vomiting. Rush treated his patients with “bloodletting”—an obsolete medical procedure in which a vein is opened and blood is allowed to flow out of the body. This is a very dangerous procedure that, today, we know has no medical benefits. But it was used often in Rush’s time. When the epidemic finally ended, Rush claimed that he had proved that bloodletting was a highly effective treatment for yellow fever. According to Stanovich, Rush reasoned in the following way:

[I]f the patient got better, this improvement was taken [by Rush] as proof that bloodletting worked. If the patient died, it merely meant that the patient had been too ill for any treatment to work! ... Rush fell into a fatal trap when assessing the outcome of his treatment. *His method of evaluating the evidence made it impossible to conclude that his treatment did not work.* If the recovery of the patient meant confirmation of his treatment..., then it only seems fair that the death of a patient should have meant disconfirmation. By interpreting the evidence as he did, [however,] Rush violated one of the most important rules regarding the construction and testing of theories in science: *He made it impossible to falsify his theory.* (pp. 22-23; italics added)

In other words, as long as some people got better after bloodletting (which is virtually guaranteed since many people eventually recover from yellow fever even with no treatment at all), there was no possible outcome that could have convinced Rush that he was wrong about the effectiveness of this treatment. Because his claim about the effectiveness of bloodletting could not be falsified, it was not a scientific claim. In general, **in order for a claim to be considered scientific, the researcher must specify in advance the observations that would cause him/her to reject the claim.**

Freud and his followers made many unfalsifiable claims. If evidence arose that might appear to falsify a psychoanalytic claim, psychoanalysts often would change the claim in such a way that the falsifying evidence no longer seemed important. For example, psychoanalytic theory

suggested that men who developed the personality characteristic of dependency had become that way because of fixation in the oral stage. During the oral stage (which occurs in the first year of life), the most important experiences were thought by psychoanalysts to involve the mother's breast. They believed that, if a person is weaned from the breast too early, the person is more likely to become overly dependent on others as an adult. Based on this claim (which has never been supported by adequate evidence, by the way), one study predicted that dependent men would be most attracted to large-breasted women. Torrey (1992) reported that, when "the results of the study showed exactly the opposite—[that] the dependent men preferred small-breasted women—it was said to be due to reaction formation among the men" (p. 223). You might remember from my discussion above that reaction formation occurs when the ego, which is at the conscious level, experiences a set of emotions and desires that are the opposite of what the person really wants at the unconscious level. In this case, the Freudian researchers were arguing that the preference for small-breasted women at the conscious level was a reaction formation that expressed their unconscious desire for large-breasted women. I hope you can see that this strategy is similar to the one that Benjamin Rush used: when the results didn't fit their prediction, the researchers changed the prediction so that the results still seemed to support their theory. This strategy makes the theory unfalsifiable. Of course, such theories still could be correct; but because we have no way of testing this possibility, we can never know. Such theories, therefore, are unscientific.

The Problem of Suggestion. Freud thought that his approach was scientific. For him, the most important tenet of science was empiricism—the drawing of conclusions from direct observations of the phenomena being studied. Freud presented evidence for his conclusions that were based on what he believed to be direct observations of the mind. When we look more carefully at this evidence, however, we discover a major problem: the evidence often consists of adult patients' memories of childhood experiences. The problem with this is that the childhood memories of his adult patients often were retrieved after Freud had told them what he thought had happened to them. If they denied that such events had occurred, Freud often would tell them that they had repressed the memory. At this point, he would push them to remember. As we saw in Chapter 4, we cannot trust memories obtained with such a technique because suggestion can cause the development of false memories. Freud, on the other hand, claimed that suggestion was not able to create false memories: he believed that memories of the past could not be changed by anything happening in the present. We now know that he was wrong. It is very likely, therefore, that Freud's therapeutic style caused the creation of false memories in many of his patients. Thus, these memories cannot be presented as evidence for his theories. To the extent that Freud used these memories as evidence for his theories, they are not supported scientifically.

Circular Reasoning. Often, Freud's evidence consisted of his "reconstructions" of what he thought probably had happened to patients during their pasts. That is, whenever patients were unable to recall incidents that might explain their symptoms, Freud often would develop plausible stories about what he believed had happened to them. These reconstructions were derived from Freud's theoretical ideas. The problem is that these reconstructions then were used as evidence to support the same theoretical ideas that had been used to create them. This is circular reasoning. In science, **circular reasoning** occurs when **one assumes the truth of a theory in order to interpret one's observations and then uses these interpretations as evidence for the truth of the theory.** Let's look at an example of circular reasoning in Freud's work. In his famous case of "Dora" (her actual name was Ida Bauer), Freud clearly showed circular reasoning. Dora, who was 18 years of age when she began treatment with Freud, had been sent by her father because of depression, suicidal ideas, constant fatigue, a "nervous cough," and various other mental and physical problems. She always had been very close to her father but emotionally distant from her mother. By the time of her first meeting with Freud, however, she was not getting along with either of her parents. It seems that Dora's problems began when she was 15 years old. At this age, she was sexually propositioned by a friend of the family, whom Freud referred to as "Mr. K," who was in his late 30s at the time. It seems that Mr. K also had made a sexual advance a year or two before (when Dora had been 13 or 14 years old) that consisted of suddenly grabbing Dora and kissing her. The situation was even more complicated than this, however. It seems that Dora's father had been having a long-term affair with Mr. K's wife (Mrs. K had been the father's nurse for several years)—an affair of which Dora was aware. Nevertheless, Dora had become very close to Mrs. K as well as to her children.

Although Dora's father stated that he did not believe her accusations against Mr. K, Dora believed that he was lying. She believed that he secretly hoped that Dora would submit to Mr. K's advances so that Mrs. K could be free of him. Instead of seeing all of this as a very difficult situation for a teenaged girl to be in—a situation that made her emotional problems seem very natural and even expected—Freud diagnosed Dora with hysteria and began to treat her. Freud used some speculative theoretical ideas (that is, ideas for which he had no good evidence) and derived an explanation for Dora's hysteria. Freud thought that Dora's anger at her father was unusually extreme—so extreme that he inferred that it must indicate a repressed unconscious desire. He believed that Dora actually was in love with her father and was jealous of his relation with Mrs. K. Furthermore, Freud believed that Dora also was in love with Mr. K and, therefore, Freud could not understand why Mr. K's advances had upset her so much. In fact, he believed that Dora should have been thrilled and sexually excited when Mr. K grabbed and kissed her. Freud thought that the incidents with Mr. K had caused Dora to exaggerate her unconscious love for her father.

By doing this, Freud reasoned, Dora had been able to defend against her feelings for Mr. K. Lastly, Freud also believed that Dora had unconscious homosexual desires for Mrs. K. In fact, he believed that this attraction was the fundamental problem causing all of Dora's other difficulties. Freud's interpretations became even more complicated at this point, and his inferences about what had probably happened to Dora, especially what he believed to be important early-childhood experiences, became even more speculative. We, however, do not need to worry about the rest of Freud's reconstruction. What I have reported here should give you an adequate idea of how Freud developed his interpretations.

Macmillan (1997) criticized Freud's reconstruction of Dora's unconscious desires by stating that it was based on several speculative assumptions. According to Macmillan, the "most important of Freud's assumptions is that Dora ought to have been sexually excited by Herr [Mr.] K.'s kiss. Her disgust [concerning the kiss] is Freud's essential evidence for a once strong but now repressed sexuality" (p. 256). It seems not to have occurred to Freud that a 13- to 14-year-old girl might reasonably be disgusted after being forced to kiss a married man who was her father's age. It probably seems understandable to you why Dora stopped coming to see Freud soon after her therapy had begun. Freud interpreted this to mean that she was resisting the correct explanation of her problems, not that he had offended her by trying to push her to accept a disturbingly incorrect explanation. In other words, Freud believed that Dora could not admit to herself that he was correct: this would have meant that she would have had to face the repressed desires that were causing her so much distress. **Freud exhibited circular reasoning by using the reconstruction as evidence for the truth of the speculative assumptions that had allowed him to develop the reconstruction in the first place.** The problems with such evidence should be obvious: it is not valid to derive the evidence for a claim from that claim itself!

Fraud. There now seems to be little doubt that Freud, at times, exaggerated and distorted the evidence for his claims, and even made some of it up. Borch-Jacobsen (2000) described the consensus among most historians interested in the origins of psychoanalysis:

One after another, historians of psychoanalysis have come forward to show us that things did not happen in the way Freud and his authorised biographers told us. No, Anna O.'s 'talking cure' never was the 'great therapeutic success' later vaunted by Freud.... Wrong again that Freud's patients ever spontaneously told him pseudo-memories of infantile sexual seduction: it was Freud himself who extorted these scenes of perversion, despite the patients' vehement protests. Freud had lied to us Suddenly, scholars started to notice that he disguised fragments of his self-analysis as 'objective' cases, that he concealed his

sources, that he conveniently antedated [set an earlier date for] some of his analyses [so that it would look like he had come up with an idea earlier than he had], that he sometimes attributed to his patients ‘free associations’ that he himself made up, that he inflated his therapeutic successes, that he slandered his opponents. (p. 1)

According to some critics, it seems likely that, even before Freud had collected much if any evidence for his ideas, he had been so certain that these ideas were correct that he published them along with distorted and sometimes imaginary evidence to support them. It even appears that Freud often was convinced by his own lies. In fact, he may not have realized that he was reporting fraudulent data. Nevertheless, it seems very likely that Freud did commit fraud. It should go without saying that, to the extent that this is true, it would make at least some portions of his approach unscientific.

Summary. Based on the above discussion, we must conclude that the psychoanalytic approach of Sigmund Freud is not supported by much scientific evidence: **he did not try to exclude obvious sources of error when collecting his data and he exhibited several errors of reasoning when trying to interpret these data.** Even more damaging is the fact that he probably committed fraud on several occasions. Finally, many claims and assumptions within his approach are unfalsifiable and, therefore, unscientific. Thus, instead of referring to psychoanalysis as a “scientific approach,” we might wish to call it a “pseudoscientific” one. In general, a **pseudoscientific theory is an explanation that claims to be supported by evidence collected according to scientifically adequate methods, but is not.** In other words, a pseudoscientific theory appears on the surface to be a scientific theory, but a closer examination shows that it suffers from serious weaknesses. **Of most importance in deciding that a theory is pseudoscientific is finding that it makes unfalsifiable claims;** but other reasons (such as the ones I talked about with regard to Freud’s theories) may also lead us to call such theories pseudoscientific. It is important to remember that, although Freud proposed several pseudoscientific theories, he still might have been correct in what he said. All we can say for sure is that he did not provide adequate evidence for his theories. Thus, when we call a theory or an approach pseudoscientific, we are saying only that the theory or approach that is being presented as scientific has not been tested with scientifically acceptable procedures. Because of this, we cannot tell if it is correct or incorrect. In fact, with regard to several of Freud’s ideas, there now exists some scientific research suggesting that a few of his ideas may have some merit after all. Furthermore, some recent followers of various psychodynamic approaches have appeared to be more interested in subjecting their claims to scientific testing. Thus, the indictment I have made

here of Freud and his followers should not necessarily be applied to all who are interested in psychodynamics.

SQ 6-13: Discuss the five major problems with the psychoanalytic approach (vague concepts, unfalsifiability, suggestion, circular reasoning, and fraud) that have led most psychologists to consider it to be unscientific. In your answer, describe the falsifiability criterion and its importance for deciding whether or not a claim is scientific. Define the term “pseudoscientific” and think of an example of a pseudoscientific theory that you have heard about (perhaps on television or in magazines).

Now, let's examine an approach that has taken great pains to use proper scientific procedures in developing its main concepts and claims—the trait approach.

The Trait Approach

The trait approach to personality first emerged in psychology during the 1930s. For many trait theorists, the major assumption of the **trait approach** is that **personality is primarily the result of the activation of traits**. I described earlier in this chapter what traits are and how they differ from motives and schemas. In fact, you probably already had a good idea of what a trait was even before you had read my description: most of you use the trait approach when predicting and explaining the behaviors of others. For example, when you describe a new acquaintance as “shy” or “outgoing,” you are using the trait approach. By describing the person in one of these two ways, you hope to predict what that person will do in various situations; and you also are assuming that his/her behavior is being caused by such traits. The trait approach has a very long history in Western cultures, even though it was not a major part of psychological theorizing until the 1930s. As we will see, many trait theorists assume that trait development is importantly influenced by biological factors; but many also believe that learning is important for the development of traits. Let's look at an early follower of the trait approach, Gordon Allport (1897-1967), so that we can develop a better understanding of how the trait-concept has been used to describe and explain personality development.

Allport was the first modern psychologist to promote the trait-concept. He disagreed with Freud's psychoanalytic approach because Allport did not believe that unconscious forces or childhood experiences determine adult personality. Perhaps some of his disagreement with Freud was inspired by a meeting he had with the famous psychoanalyst when Allport was a young man traveling through Vienna. He described this encounter with Freud:

[I]n my callow [inexperienced and immature] youth..., I wrote Freud a note, announcing that I was in Vienna and no doubt he would be glad to see me. I received a reply in his own handwriting inviting me to come to his office, at a certain time and place. I went there, to the famous red burlap room with pictures of dreams on the wall. He opened the door and invited me into the inner sanctum, and sat there silent. You may not believe this possible, but I was not prepared for silence. It occurred to me it was up to me to say something, so I fished around in my mind and I told him about an episode on the tram [trolley] car coming out. I had seen a little boy about four years old and the little boy obviously was developing a real dirt phobia. His mother was with him. She was a starched Hausfrau, terribly clean and purposive looking. And the little boy was saying: "I don't want to sit *there!* Don't let *him* sit near me, *he's* dirty." He kept this up all the time, and I thought it might interest Freud how early a phobia of dirt can set in. He listened, and fixed his therapeutic eye upon me and said "Was that little boy you?" Honestly, it wasn't, but I felt guilty. (quoted in Mayer & Sutton, 1996, pp. 108-109)

Freud was suggesting to Allport that the impression this incident had made upon him was related to an unconscious conflict—a conflict that probably involved Allport's experiences during the anal stage. Allport realized Freud's implication and, even years after the incident, stated that, "My single encounter with Freud was traumatic" (quoted in Schultz & Schultz, 1998, p. 232). Allport explained that he told Freud about the incident on the tram simply because he was nervous about meeting Freud and wanted to end the uncomfortable silence. In other words, Allport rejected Freud's claim that his behavior was unconsciously motivated: he believed that a conscious motivation was the best explanation for his behavior in Freud's office. As a mature psychologist, Allport promoted the idea that personality theorists should focus on conscious determinants of behavior rather than unconscious ones. Thus, in his approach to personality, Allport made two assumptions that differed from Freud's. (1) **We are rational creatures who usually are aware of our motives.** (2) **Our personalities are most importantly guided by what we are consciously aware of, especially by conscious goals we have for the future.** In addition to these assumptions, which are very similar to those made by many cognitive-learning theorists (as you will see later in this chapter), Allport believed that traits are the most important determinants of personality.

Allport distinguished three kinds of trait: cardinal, central, and secondary traits. These traits differ from one another with regard to how frequently they are activated across situations (that is, how central they are in the person's life). A **cardinal trait** is a **trait that affects virtually the**

entire personality almost all of the time. According to Phares and Chaplin (1997), a person with a cardinal trait “would exhibit obsessive, single-minded behavior consistent with that trait. Such a person would spend every waking hour seeking, for example, to become more attractive, make friends, keep his or her possessions organized, or make money, depending on the trait” (p. 418). Thus, when a person has a cardinal trait, almost all of that person’s behavior and mental events are caused by this trait. For example, if you had to assign a cardinal trait to the following person, what might it be?

Hank married seven times. He beat each of his wives, sometimes badly. Most of the marriages lasted no more than a few months. One wife...said “he’s got to be in control.” Another, who had had clumps of hair yanked from her head, called him “a Jekyll and Hyde.” Yet another said he was “vicious.” When she told him she wanted out, he took revenge by beating her parents. His first marriage ended when he beat his wife with a hammer.... He was 30, and his divorce from his fifth wife had not been finalized when he moved in with Jody. By the time they met, Hank had been arrested on 23 separate occasions.... A week earlier he had celebrated his birthday by sodomizing his 14-year-old daughter. When his daughter finally informed authorities of the 6 years of abuse, felony charges were filed against Hank for incest, unlawful sexual acts, sodomy, and oral copulation. Hank responded by changing his name. Using the stolen driver’s license of a state police officer, he obtained a new birth certificate and Social Security number, and he and Jody moved to another town. (Spitzer, et al., 1994, p. 108)

Jody eventually became his wife, and she and Hank began to engage in violent criminal activity together. Jody would help Hank lure teenaged girls and young women into their van, where he then would make them play the part of his daughter while he sexually assaulted them. Afterwards, Hank murdered his victims, by either strangling or shooting them while his wife drove the van with the radio blaring. Eventually, Hank and Jody were caught and he was sentenced to death for the murders. Hank’s behavior certainly seems single-minded and obsessive: it seems that every waking hour of Hank’s life was directed towards satisfying his own impulses by callously and viciously using others for that purpose. He is what we would call a **psychopath**—a person who **feels no empathy for others, acts on impulse, and suffers no remorse over actions that generally are regarded as immoral** (in Freudian terms, the person has a defective superego). In modern psychiatric terminology, Hank would be diagnosed as having “antisocial personality disorder.” I will talk about several personality disorders in the next chapter. We can think of most personality disorders as involving the influence of an abnormal cardinal trait. You might say that a psychopath has the cardinal trait of “impulsivity,” and that, with regard to others,

he (psychopaths most often are male) is impulsive in an insensitive, manipulative, and often violent manner.

According to Allport, most people cannot be described as having a cardinal trait. Instead, their personalities seem to be influenced by several traits working together. For example, if you had to describe your best friend, which trait terms would you use? Stop and try to do this before continuing. I bet that you came up with around five and perhaps as many as ten trait terms to describe your friend. Allport called these “central traits.” A **central trait** is a **trait that affects large parts of an individual’s personality most of the time**, but these effects are not as extensive as cardinal traits. Although the effects of a central trait on personality are not as all encompassing as those of a cardinal trait, they still tend to make the person’s behavior general and stable. For example, I would describe the late Martin Luther King as inspiring, determined, altruistic, assertive, highly intelligent, and peaceable. Because each of these traits had an important influence on his personality, you would not be able to describe his personality well by choosing only one or two. That is, at least several traits seem to be necessary for explaining Dr. King’s personality in a relatively complete way.

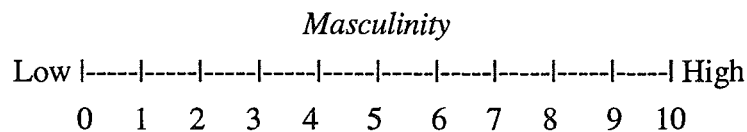
Allport also considered personality to be influenced by **secondary traits**, which he thought of as **behavioral tendencies that are activated in a limited range of situations**. For example, if someone pulls out in front of you when you are driving your car, and you believe that the person did this on purpose, you often will become angry. In fact, you may start to tailgate the person and yell at him/her at the next stoplight. Such aggressive behavior may be unusual for you. In this case, aggressiveness would be a secondary trait: only a small number of situations cause you to become aggressive. As with cardinal traits, most personality psychologists are not very interested in secondary traits. Instead, modern trait theorists focus almost exclusively on what Allport called central traits. For the rest of this chapter, therefore, whenever I use the term “trait,” I will be referring to what Gordon Allport called “central traits.”

SQ 6-14: What is the major assumption of the trait approach? Why did Gordon Allport disagree with Freud’s approach to personality development? What were the major assumptions made by Allport in his theorizing about personality? List, define, and distinguish the three types of traits that Allport studied. Which of these three is most studied by trait psychologists today?

Five-Factor Model

In trying to apply the trait approach, we first must answer an important question: how many traits are there? This is not an easy question to answer because traits have no physical

existence and, hence, they cannot be lined up and directly counted. Instead, they have to be inferred from a person's behavior. One way that personality psychologists have tried to determine the number of traits has been to study the traits that most people mention when they are describing themselves or others. When people are asked to do this, they tend to refer to the same general traits time and time again. For example, if you look back at the description you made of your best friend above, it probably will include traits describing his/her degree of likability, adventurousness, dependability, emotionality, and sociability. Most research shows that, when people are asked to describe their best friends (or anyone else), they tend to mention five major traits derived from the list in the previous sentence. Although these traits sometimes are referred to as the "Big 5," the formal designation is the **five-factor model** (abbreviated as FFM). The FFM states that five "factors" or "trait dimensions" are the most important ones for describing people. A **dimension** is a measure that exists on a continuum and, therefore, has two "poles" or extremes to it. In other words, a **trait dimension** describes a trait that a person could express to a small degree, a moderate degree, or a large degree. For example, "masculinity" may be thought of as a trait dimension because a person may be very masculine, very unmasculine, or somewhere in between. A measure of masculinity, therefore, might try to locate a person along a 10-point dimension of masculinity:



The five trait dimensions described in the FFM are fairly abstract ones. Thus, in the following, I list each trait dimension followed by a listing of more specific traits that describe people who are either high or low in their expression of that particular dimension:

(1) Openness to experience

High: imaginative, curious, creative, nontraditional, intelligent

Low: shallow, nonartistic, down-to-earth, narrow-minded, conventional

(2) Conscientiousness

High: organized, reliable, hard-working, ambitious, persevering, punctual

Low: careless, aimless, negligent, weak-willed, unreliable, lazy

(3) Extraversion/introversion

High: talkative, affectionate, optimistic, sociable, active, fun loving, assertive

Low: reserved, careful, quiet, sober, task-oriented, passive, independent

(4) Agreeableness

High: kind, soft hearted, empathic, tactful, helpful, forgiving, trusting

Low: hostile, uncooperative, manipulative, mistrustful, brusque, cynical

(5) Neuroticism

High: moody, insecure, depressed, anxious, guilty, tense, self-conscious

Low: calm, even-tempered, self-confident, self-satisfied, relaxed

The five factors are relatively easy to remember when you notice that combining the first letter of each factor into a single word spells OCEAN. (You might recall from Chapter 4 that I have just engaged in elaborative rehearsal, a way of encoding information that helps us to transfer it to long-term memory.) Hank (the psychopath in the case presented earlier) can be classified as high, moderate, or low with regard to each of the five trait dimensions. Think about how you might use the FFM to classify him and then write your answer in the space below:

With regard to the FFM, a psychopath may be defined as someone who is irresponsible (low C) as well as unempathic and self-centered (low A). They also are often focused on the external world and, hence, can be classified as extraverted (high E). In looking at the description of Hank, in particular, I placed him as moderate on openness to experience, low on conscientiousness, high on extraversion, low on agreeableness, and low on neuroticism. The judgement I have the most doubt about is openness to experience: there was not enough information to classify him with certainty.

Personality psychologists who accept the FFM believe that it can be applied universally across the human species: research shows that people across most cultures describe themselves and others in terms of these same five trait dimensions. This implies that most people around the world consider these same five trait dimensions to be important ways of categorizing behavior—both our own behavior as well as that of others. This is probably due to the fact that these five trait dimensions have important effects on our social interactions. Because we humans are extraordinarily social creatures, we pay very close attention to any behavior that affects social interactions. If you look back at the descriptions of the five factors, you probably will see that the traits describing each factor would have important effects on social interactions regardless of the culture in which one grows up.

SQ 6-15: How were the five trait dimensions of the five-factor model (FFM) discovered? List and define the five traits of the FFM. Why do some personality psychologists claim that the FFM describes something basic about human nature?

Biological Causes of Introversion/Extraversion

The trait dimension called extraversion/introversion has been studied more than any other. In general, introverts are focused primarily on internal mental events (thoughts and emotions) whereas extraverts are focused primarily on the outer world. Because of this difference in the focus of their attention, extraverts, when compared to introverts, tend to be more sociable, talkative, demonstrative, active, excitement seeking, and carefree. Or, looking at it the other way, introverts tend to be more reserved, self-controlled, shy, leisure seeking, and reliable. Hans Eysenck believed that there is a neural cause of these personality differences—a biological cause that involves differences in how easily a person is aroused by stimulation. To be specific, Eysenck suggested that activity in the reticular activating system (RAS)—which, as you learned in Chapters 1 and 2, is important for states of arousal such as waking and sleeping—differs between extraverts and introverts. As you may remember, when the RAS is stimulated by sensory information from the external world, it increases neural activity in the cerebral cortex. The cerebral cortex is important for our ability to reason, to plan actions, to use language, and to perceive the outside world. Eysenck claimed that the RAS of introverts is more sensitive to stimulation than the RAS of extroverts. In other words, it takes less stimulation to activate the RAS (and, thus, the cerebral cortex) of an introvert than an extravert. Because of this, the cerebral cortex of introverts is thought to have higher levels of activity, on average, than that of extraverts given the same level of external stimulation. Eysenck also claimed that we have an upper limit of arousal—a limit that, if surpassed, causes the person to feel uncomfortable. When this upper limit is surpassed, Eysenck suggested that the individual tries to decrease the amount of external stimulation by focusing on his/her internal mental life. He believed that the upper limit of introverts was reached more quickly than that of extraverts because of their increased sensitivity to stimulation from the outside world. Introverts, therefore, should be more likely to withdraw from the external world than extraverts. Extraverts, on the other hand, should be more likely than introverts to try to increase brain activity by seeking out external stimulation. In other words, extraverts are more likely than introverts to be bored by low levels of external stimulation.

Some research supports the claim that, compared to extraverts, introverts are more easily aroused by external stimulation. For example, one study looked at the amount of salivation by introverts and extraverts to a taste stimulus (a drop of lemon juice applied to the tongue). It was found that introverts salivated more in response to the stimulus than extraverts. The researchers

concluded that the taste aroused introverts more than extraverts, thereby causing a greater response to the stimulation. Another study found that introverts showed a greater emotional response to a loud sound (measured by the amount of electrical conductance in the skin caused by perspiration) than did extraverts. Direct measures of electrical activity in the RAS also showed higher levels in introverts than extraverts. Thus, some evidence suggests that there are biological differences in the arousability of the cortex due to a greater sensitivity of the RAS to external stimulation in introverts than extraverts. Extraverts, therefore, need more external stimulation than introverts to achieve the same level of cortical arousal. It is this difference that is thought to cause extraverts to become more easily bored with a low level of external stimulation and, thus, to seek out more stimulating situations. Because the presence of others causes increased arousal (you may remember this fact from the discussion of social facilitation in Chapter 5), extraverts tend to increase their arousal by seeking situations involving other people. Introverts, on the other hand, are more likely to get overly aroused by social situations and, thus, they tend to avoid them. The research inspired by Eysenck's theory suggests that what is exciting to an introvert is likely to be boring to an extravert; and that what is exciting to an extravert is likely to be terrifying to an introvert.

SQ 6-16: Discuss Hans Eysenck's theory of extraversion/introversion. In your answer, describe the roles of the reticular activating system, external stimulation, arousability, and the cerebral cortex. Discuss the evidence for this theory.

Heredity and Environment

Why would the brains of introverts differ from those of extraverts? One possible answer is that their brains developed differently because they had inherited different sets of **genes** (the **basic units of biological inheritance**). In fact, many trait theorists have emphasized the importance of biological inheritance for the development of traits. One piece of evidence in favor of this view is that close relatives often have striking similarities in their personalities. Of course, close relatives may have similar personalities not only because of their shared genes, but also because they have developed in similar environments. Thus, several methods for disentangling the independent effects of heredity and environment have been used in order to measure the effects of genes on personality development. One popular method involves the comparison of personality traits in identical twins versus fraternal twins. Identical twins are referred to as **monozygotic** (abbreviated as **MZ**) twins because they develop from a single "zygote" (a fertilized "egg" or ovum) that has split into two separate individuals at some point early in development. Because they develop from the same zygote, MZ twins share 100% of their genes. Fraternal twins are referred to as **dizygotic** (abbreviated as **DZ**) twins because they develop from two zygotes (that is, from two separate conceptions). DZ twins, therefore, share about 50% of their genes, which makes them no

more closely related than other brothers and sisters. If personality traits are associated with the genes one inherits, then the two members of an MZ twin pair should have more similar personalities than do the two members of a DZ twin pair, on average. In general, this is precisely what has been found for several traits. This suggests that differences in some personality traits are associated with differences in the genes one inherits.

But there is another possible explanation for the greater similarity of MZ twins compared to DZ twins with regard to a personality trait such as extraversion. Can you think of what it might be? The major problem with using MZ/DZ twin comparisons to infer that genes are important for the development of personality traits is that we still have not ruled out environmental explanations. That is, MZ twins may be more alike than DZ twins not because they share more genes but because they experience more similar environments than DZ twins do. How could this be? Think back to what you learned in the previous chapter. In Chapter 5, you learned that physical characteristics, such as the degree of physical attractiveness, influence how others react to a person. Since MZ twins tend to look more similar than DZ twins do, the greater similarity of their personalities might be due to experiencing more similar treatment by others as they grew up in the same household. Thus, we need to rule out this possible environmental effect. What is one way we could do this? We could study those twins who have been adopted and, therefore, raised in different households. The results of adoption studies show that, with regard to several traits, MZ twins are still more similar than are DZ twins when the members of each twin pair have been reared apart from birth. While this procedure does not rule out all possible environmental factors, it does offer better support for a genetic explanation of trait development. Differences in four of the five factors in the FFM—openness to experience, conscientiousness, extraversion/introversion, and neuroticism—seem to be most associated with differences in the genes inherited by individuals. Openness to experience is the one most closely associated with heredity, whereas agreeableness seems most closely associated with environmental experiences. You should remember, however, that the finding of a genetic influence on personality development does not mean that environmental influences are unimportant. As I have stated many times before, any phenomenon has many different causes. What we try to do in any given study is to remove the effects of other causes (other extraneous variables) so that we can investigate the possible influence of the factor in which we are interested. Thus, it is never correct to say that genes are more important than environmental experiences, or vice versa: they are both essential for the development of personality traits.

SQ 6-17: What are the two major reasons why close relatives tend to have similar personality traits? Define the terms monozygotic (MZ) and dizygotic (DZ). How does the comparison of MZ and DZ twins help us to say something about the effects of genes on personality development?

What is the best way to rule out environmental explanations for the greater similarity of MZ twins compared to DZ twins? What have such studies told us about the influence of genes on the development of the “Big-5” traits?

Person-Situation Controversy

Until the late 1960's, few trait theorists had examined whether or not the traits they were measuring with personality tests actually were having an important influence on behavior. Instead, they simply assumed that, when a person scored high on extraversion, he/she acted in an extraverted manner in most situations. In 1968, Walter Mischel, a cognitively oriented theorist, published a critique of the trait approach that claimed that behavior is highly variable from one situation to the next—too variable to be due to traits with stable and general effects on behavior. In other words, Mischel argued that **scores on personality tests measuring traits do not help us to predict how a person is going to act in a particular situation**. For example, I tend to score high on measures of introversion. Nevertheless, I am very talkative and sociable in particular situations, such as when I am interacting with students. In general, Mischel found that personality tests explain only about 10% of the differences in people's behaviors. He concluded that the basic assumption made by social psychologists—that **the situation is the most important cause of a person's behavior**—is correct. (I will talk more about the views of cognitive-learning theorists such as Mischel later in this chapter.)

After Mischel's critique was published, many personality psychologists investigated whether our behaviors and mental events are caused predominantly by personal factors (that is, traits) or by situational factors. They investigated this research problem by trying to determine if our behavior was consistent across situations—consistent enough to be caused by traits. The disagreement among psychologists over the solution to this problem became known as the **person-situation controversy**. With regard to this controversy, Pervin (1996) stated that:

the issue is both simple and complex. It is simple because we all recognize both stability and variability in behavior, our own as well as that of others. We assume that people have personalities and feel reasonably comfortable attributing traits to them; yet we also recognize that sometimes the same person is sociable and at other times unsociable, sometimes dominant and at other times submissive. The matter is complex because we do not have agreement about how stable or variable people are or, even more important, how to account for the stability and variability. Is there sufficient evidence of stability, or consistency, to warrant use of the trait concept? If so, how do we go about accounting for times when a person does not behave in ways consistent with the trait? (p. 53)

Pervin believed that, if the person-situation controversy was to be resolved, the opponents needed to find agreement concerning how much consistency was required across situations to conclude that traits have general effects on behavior.

There were, however, three problems that made it difficult to resolve the person-situation controversy. First, it was **not always clear what was meant by the phrase “consistency of behavior.”** Did it mean that a person’s behavior had to be identical in each situation? Or did it mean that behavior had only to show some kind of similarity across situations (a similarity in which the specific behaviors expressed still might differ)? The second option seemed to be what most people meant. No one (including trait psychologists) expected a person to act identically in different situations. Instead, if traits were important, then we should expect people to act in generally similar ways across situations. For example, when an extravert is at a funeral, he/she is going to act differently than at a party. Nevertheless, if traits are influencing behavior, an extravert should appear more outgoing and sociable in both situations than would an introvert. At the funeral, an extravert would be more likely to go up to the bereaved family to offer condolences and, perhaps, talk for a while about the deceased person. At the party, an extravert would be more likely to tell jokes or to walk up to strangers and begin conversing loudly with them. Thus, trait psychologists predicted that there would be stability in terms of general categories of behavior, not in terms of the precise behaviors expressed. The second problem with resolving the person-situation controversy was the fact that **traits probably have greater effects in some situations than in others.** To be specific, it was predicted that traits would have more of an effect when the situation was not regulated by a set of strict rules or by a stimulus that typically causes everyone to respond in the same way. For example, the behavior that one is permitted to express at a funeral is tightly regulated: one must wear formal clothes (preferably black), speak in a hushed voice, smile very little, and so on. On the other hand, there are few rules for how to behave at a party. Thus, a person’s traits should be expressed more freely at a party than at a funeral. As Phares and Chaplin (1997) stated:

If a snarling lion is suddenly let into your... class, nearly everybody is going to run. Likewise a red traffic light will cause nearly everyone to stop, and a ringing telephone will prompt most people to answer it. On the other hand, when situational stimuli are weak or ambiguous, behavior is more likely to be predicted accurately from personality information [that is, traits]. (p. 444)

The third problem was that **people seem to actively choose to be in situations that allow their traits to be expressed**. This can make it difficult to determine the relative importance of traits compared to situations. In other words, because people tend to choose situations that allow the free expression of their traits, it is impossible to tell how much the trait versus the situation is affecting their behavior. For example, an extravert is more likely to choose situations (such as a party) that require that one be sociable whereas an introvert is more likely to choose situations (such as a library) that require one to keep to oneself.

When personality psychologists tried to control for such difficulties in distinguishing the effects of traits from the effects of situations, they found that both traits and situations have important effects on behavior. In some situations (discussed in the previous chapter), trait differences will be relatively unimportant; in other situations (discussed in this chapter), trait differences will be relatively important. It seems that, when trait differences are important, they help us to predict a person's behavior over a long period of time and across a broad range of situations. Nevertheless, knowing that a person has a particular trait often will not allow us to predict a particular behavior in a particular situation: traits are not *that* consistent with regard to their effects. Instead, it makes most sense to think of traits and situations as interacting: both the traits one has and the situation one is in determine together one's behavior and mental events. For example, a person who is introverted may become anxious and quiet in a social situation containing a large number of strangers. On the other hand, this very same person may be relaxed and talkative in a social situation containing a large number of friends and family. Thus, you would not be able to predict how this person would act in a particular social situation just from knowing the trait alone or the situation alone.

Furthermore, a given trait will interact with other traits in a particular person, which will make the direct influence of any one trait on behavior much harder to recognize. In order to understand this point, let's compare two people who are both high on the trait of neuroticism—a trait characterized by negative emotions such as anxiety, moodiness, and depression. Let's say that the first person is high on agreeableness (characterized by kindness, empathy, and tactfulness) whereas the second person is low on agreeableness (characterized by hostility, self-centeredness, and mistrust of others). I think you can see that, in any particular situation, the expression of neuroticism will differ between the two people because of the differences they show in the trait of agreeableness: the first person's neuroticism probably will be much harder to detect than the second person's neuroticism. If one wants to predict how a person is going to react, therefore, one has to look at two kinds of interaction: one between a particular trait and a particular situation, the other between the particular trait and other traits in the same person. As you might guess, these

interactions often become very complicated. Nevertheless, we tend to be very good at making such estimates intuitively in our everyday lives. In trying to make these predictions explicit, personality psychologists have had to wrestle with the many complexities introduced by interactions.

SQ 6-18: Describe Walter Mischel's critique of the trait approach. In your answer, discuss why Mischel concluded that traits are not important, what he thought was the most important cause of behavior, and what the responses of trait psychologists were to Mischel's critique. What were the three problems that made it difficult to resolve the person-situation controversy and what was its final resolution? Why is it important to realize not only that traits interact with situations but also that traits interact with one another in the production of behavior?

The Scientific Status of the Trait Approach

One major problem with the trait approach is similar to one I mentioned with regard to the psychoanalytic approach: **some of its central concepts are very vague**. In fact, the concept of “trait” itself is vague. That is, it is not clear to what we are referring when we use the term trait. For example, some theorists, such as Gordon Allport, have included motives as parts of traits: he believed that some traits, such as aggressiveness, impel us to act in ways consistent with them. In Allport's view, a person with the trait of aggressiveness acts aggressively not only because certain situations activate the trait but also because he/she wants to be in situations in which the trait can be expressed. But if traits can be like motives, then is there any real distinction between the two? One thing that helps to make the problem of vagueness less of a difficulty with the trait-concept than with the terms used by psychoanalysts is that the trait-concept is often operationally defined: traits typically are defined as scores on personality tests. Because the concept of trait is so vague, however, another important question cannot be answered conclusively: how many traits are there? Although proponents of the five-factor model have tried to answer this question, other trait psychologists have proposed either fewer traits or more traits than the “Big Five.” Furthermore, the number of traits one finds depends strongly upon the type of data one uses to study them (for example, questionnaire data versus direct observations of behavior).

A second problem with the trait approach is also one mentioned in the earlier discussion about psychoanalysis: **circular reasoning**. In this case, the presence of a trait is inferred from behavior and, far too often, it is then used to explain that same behavior. Phares and Chaplin (1997) described this problem by giving an example:

The statement “Mary is friendly because she is friendly” is both trivial and unacceptable as a scientific prediction. Although the statement “Mary behaves in a friendly manner because

she has the trait of friendliness...” may sound less circular, it suffers from the same problem, particularly because the description of the behavior and the inference of the disposition generally rely on the same observations. (p. 441).

The problem is that, in this case, an inference was made from behavioral evidence about the existence of the trait of friendliness and, then, the existence of the trait was used to explain that same evidence. If we want to decide if a trait can be used to explain behavior, we need to find a way to measure the trait that is independent of the behavior we want to explain. For example, the work described above on arousability and its association with introversion/extraversion is an attempt to find such a measure. If Eysenck’s discovery of a connection between high arousability and introverted behaviors, on the one hand, and low arousability and extraverted behaviors, on the other hand, holds up, then an independent measure of introversion/extraversion—one based on physiological functioning—will have been attained. But few traits have been subjected to such an analysis. Thus, many personality psychologists look at traits as mere “descriptions” of observed behavior rather than as “explanations” of that behavior. In other words, they have argued that a trait, such as extraversion, is a label we give to certain behaviors. According to these theorists, we cannot say that a person engages in extraverted behaviors *because* he/she has the trait of extraversion.

SQ 6-19: Discuss the scientific status of the trait approach. In your answer, describe the problems of vague concepts and circular reasoning. How can we avoid these two problems, thereby giving the trait approach a firmer scientific standing?

Schemas: The Cognitive-Learning Approach

During the 1930s, a learning approach to personality development emerged that focused on how other people affect the behavior of individuals. Today, we may refer to this perspective as the **cognitive-learning approach**, the major assumption of which may be stated in the following way: **human thoughts, feelings, and behaviors are determined by what is learned from others and by the social context of particular situations.** We might think of the cognitive-learning approach as a combination of personality psychology and social psychology because it assumes that the idiosyncratic ways in which a person views a social situation cause that person to act, think, and feel in a manner that differs from other people. Modern cognitive-learning theorists have been most strongly influenced by two different approaches: behaviorism and cognitive psychology. From behaviorists, cognitive-learning theorists adopted the idea that personality is learned. From cognitive psychologists, cognitive-learning theorists adopted the idea

that people's behaviors, thoughts, and emotions are caused by the ways in which they process information coming from the outside world. Putting the influences of behaviorism and cognitive psychology together, cognitive-learning theorists claim that, **through learning, our experiences cause us to develop schemas** (schemas lead us to organize information and to interpret its meaning in particular ways) **and other cognitive structures that affect our thoughts, emotions, and behaviors**. In addition, they believe that much of the learning important for human personality development occurs within social situations. That is, cognitive-learning theorists believe that **personality is determined by what one has learned in interactions with others**. In other words, various experiences teach people what to expect, believe, etc., about various people and social situations. Before we can learn about the effects of schemas on personality, however, we first must discuss how experiences are important for the development of schemas.

SQ 6-20: What is the major assumption of the cognitive-learning approach? Discuss the two approaches that have been the major influences on the emergence of the cognitive-learning approach. Describe the importance of schemas for this approach and how schemas can explain individual differences in behaviors and mental events.

Observational Learning

In Chapter 3, I talked about the influence of classical and operant conditioning for learning behavioral responses to stimuli. Cognitive-learning theorists agree that both kinds of conditioning are important for the development of personality. Nevertheless, they emphasize the primary importance for personality development of a third kind of learning, called "observational learning." The term **observational learning** means just what it says—the response of an individual to an event changes as a result of observing another person experiencing that event. The sorts of responses learned with observational learning typically are the voluntary actions that can also be learned through operant conditioning. Observational learning differs from operant conditioning, however, in that we do not directly experience the reinforcement or punishment ourselves when we learn by observing another (the **person being observed** is referred to as the **model**). In order to understand what observational learning is, let's return to the example I used in Chapter 3 of turning in front of a speeding cement truck and nearly getting into an accident. I stated there that such an experience might cause you to develop a classically conditioned fear of cement trucks and an operantly conditioned avoidance of turning in front of cement trucks. But those who watched the cement truck almost hit you may also have learned something simply by observing what you did and its consequences. They may learn to go faster when a vehicle is approaching rapidly from the other direction; they may learn to wait until the

vehicle has passed; or they may learn not to turn at this particular intersection. That is, even though they were not directly classically conditioned or operantly conditioned, they still learned something by observing your experience. One very important thing to remember about observational learning is this: **in order to learn a behavior without being directly reinforced for it, the observer must be attending to, thinking about, and remembering what is happening to the model.** In other words, observational learning requires that we process and retain information about the experience. Thus, cognitive theories provide the best explanation of observational learning.

The concept of observational learning should be an intuitively obvious one for you since you have learned, over the course of your life, many new behaviors and ways of thinking by watching others. For example, the first time that you unlocked a door by yourself, it is very unlikely that you had to be told where the key should be inserted or how to turn it. Although you had never done it before, you had watched others unlock doors with keys thousands of times. Your everyday use of observational learning may even cause you to think of it as a very simple kind of learning. Nevertheless, there are at least four complicated steps involved in this kind of learning. Let's look at these four steps with respect to our example of unlocking a door for the first time. (1) *Attention*. First, you had to pay close attention to what models had done and then figure out what were the particular behaviors most important for unlocking a door. Directly facing the door is not important (one could turn sideways, for example); talking or being silent is not important; picking up a newspaper or getting the mail is not important; but putting the key in the keyhole is important. Attending to and distinguishing the few important behaviors from the much larger number of unimportant ones that often occur when a model is unlocking a door involves some very complicated mental processes. This is why relatively few animal species are able to learn through observational learning. For example, no matter how many times you show your dog, he probably will never learn through observation to open the refrigerator by pushing on it with his snout. However, if you reward him directly, step by step, for closer and closer approximations to this behavior, you eventually should be able to teach him to open the door through operant conditioning. Dogs, however, are able to learn simpler behaviors through observational learning (for example, how to go through a pet door). Although there is some controversy over this point, it seems safest to say that observational learning occurs only in a fairly small number of mammals (such as humans, chimpanzees, dogs, rats, orca whales, and mice) and a few species of birds (such as quail and pigeons). (2) *Memory*. Once you have attended to the important behaviors, you have to remember them so that they can guide your own behavior in the future. In most cases, it is likely that your memory for important behaviors involves **visual images** of the behaviors of models. In addition, you probably also often add **verbal descriptions** of important actions to

these visual memories (for example, “Dad placed the key into the hole on the knob and turned it”). Memories containing visual images and verbal descriptions probably make up much of what we have learned by observing others. (3) *Motivation*. At some point, you have to have the desire to use these memories to guide your actions. The development of this motivation involves all sorts of complex situational, social, and cultural influences that form the contexts for our actions. In the case of unlocking the door, perhaps you wanted to show one of your parents how “big” you were. (4) *Reproduction*. At some point, if you have the proper motivation, you will retrieve the memories of what you have observed and translate them into some sort of action. The first time that you unlocked a door, you probably fumbled a bit and did not show the smooth action of which you now are capable. This is because it is very difficult to take visual and verbal memories and translate them into movements. Very often, we have to practice before we are able to translate the memories adequately into smooth and precise movements of our bodies.

This discussion of the separate steps involved in observational learning should show you the complexity of the process. It should also suggest to you that you probably have learned much more about how to act in the world than you have shown: not until you have the proper motivation will you even attempt to use what you have observed. Thus, cognitive-learning theorists distinguish between the **acquisition** of a response (that is, its initial learning) and the **performance** of that response (that is, showing what you have learned). Acquisition requires that you have attended to and remembered the important actions (steps 1 and 2 in the previous paragraph) whereas performance requires that you have the proper motivation and have translated the memories into actions (steps 3 and 4). For example, many of you reading this have not yet had your own children. You have learned (acquired) a great deal about how to raise children by observing others, especially by observing the people who raised you. Nevertheless, you will not show (perform) most of these behaviors until you have your own children because having your own children will give you the proper motivation to translate your memories into actions. At this point, you may believe that you will perform only the positive behaviors you have observed in others and none of their negative behaviors. When you finally have children, however, you may be surprised (and perhaps even distressed) by how often you will perform, when you are properly motivated, negative behaviors that you first observed in others. For example, when you are tired after working all day, you may find yourself saying something cruel to a disobedient child—something that your parents had often said to you in similar circumstances—even though you had once promised yourself that you would never do this. Thus, we acquire both positive and negative behaviors simply by observing others. In the right situation, either may be expressed.

Let me give you an example of observational learning by looking at the work of Albert Bandura (1925-?), the theorist who has done the most to emphasize the importance of observational learning in humans. Bandura argued that we acquire both positive and negative behaviors by watching others, and that it can be very difficult later on to inhibit the negative behaviors. For example, Bandura and his colleagues studied the observational learning of aggressive behaviors in children. First, Bandura (1965) filmed adult models acting aggressively towards a “Bobo doll,” a plastic doll that stands several feet tall when inflated and that, when hit, falls down and then bounces right back up again. On the film, the model ordered the doll to move, stared at it for a moment in an aggressive manner, and then attacked it:

First, the model laid the Bobo doll on its side, sat on it, and punched it in the nose while remarking, “Pow, right in the nose, boom, boom.” The model then raised the doll and pummeled it on the head with a mallet. Each response was accompanied by the verbalization, “Sockeroo stay down.” Following the mallet aggression, the model kicked the doll about the room, and these responses were interspersed with the comment, “Fly away.” Finally, the model threw rubber balls at the Bobo doll, each stroke punctuated with “Bang.” This sequence of physically and verbally aggressive behavior was repeated twice. (pp. 590-591)

Next, Bandura showed these films to nursery school children to see if they would perform the same aggressive behaviors as the models when placed in a room with the doll. He found that, although most of the children had acquired the aggressive behaviors by watching the models, they did not always perform what they had learned. An important influence on whether or not they performed what they had learned was the consequence for the model of his aggressive behavior. That is, if another person in the film reinforced the model with praise and treats, the children later were very likely to perform the aggressive actions themselves. On the other hand, if another person punished the model with scolding and spanking, the children were not likely to perform the aggressive behaviors themselves. We can understand this influence if we think about the importance of motivation for performing an action: a child will be more motivated to perform an action (even if we think it is a negative one) if he/she observes that it has positive consequences.

Bandura’s work on the observational learning of aggressive behavior led to a series of studies by him and others on the effects of observing violence in television shows, movies, and video games. Many studies have shown that children who watch a great deal of television tend to behave more aggressively during childhood and to be convicted of more serious crimes during adulthood. Can we conclude from this that watching television causes violence? Why or why not?

Based on these studies, we cannot conclude that watching television causes violence because these studies are correlational. That is, we measured one variable—the amount of television watched—and found that it changed together with a second variable—the amount of aggressive behavior or serious criminality. What are possible explanations for this correlation? One possibility that occurs to me is that aggressive children might alienate other children and, thus, be forced to spend more time alone. Because watching television is an activity that one can do alone, we get a correlation between it and the amount of aggressive behavior. Furthermore, children who alienate others and, therefore, spend more time alone may be more likely to grow up to commit serious crimes. There are also other plausible reasons for the correlation between television viewing and aggressiveness that may have occurred to you. In order to make a cause-and-effect interpretation, experimental studies are needed that manipulate the variable of television viewing and determine whether or not this has effects on the amount of aggressive behavior shown (similar to Bandura's experiment with the Bobo doll described in the previous paragraph). This has been done and it has been found that watching violent television shows and movies leads to a short-term increase in aggressive behavior, on average. More recent research has shown that playing violent video games also causes aggressive behavior, on average. On the other hand, people who tend to have a personality low in the trait of aggressiveness tend not to be affected by depictions of violent behavior in the media or video games. Furthermore, there is still some controversy over whether or not the effects of watching violence will have long-term effects (that is, lasting from childhood to adulthood). Most researchers believe that it does have long-term effects, but this conclusion is not as firm as the one about the short-term effects of observing violent behavior.

SQ 6-21: What is observational learning and how does it differ from the other kinds of learning discussed in Chapter 3? Why do cognitive-learning theorists such as Albert Bandura emphasize the importance of observational learning? What are the four steps involved in observational learning? Why do cognitive-learning theorists distinguish between the acquisition of a response and its performance? Describe Bandura's Bobo-doll study of the observational learning of aggressive behavior. Why are we able to interpret this study in terms of cause and effect? What are the major findings from studies of children who grew up watching a great deal of television and movie violence? When is it most difficult to make definite causal interpretations of such studies? Which personality trait seems to interact with the effects of observational learning to produce differences in aggressive behavior?

Schemas and the Self

The experiences we have—what we learn through classical conditioning, operant conditioning, observational learning, and other types of learning—are essential for the

development of schemas (the beliefs, expectations, and other aspects of knowledge that we have about particular categories). Although many schemas are important for personality, perhaps the most important schemas are the self-schemas, otherwise known as the **self-concept**, which is defined as **the set of beliefs that a person has about him-/herself**. The self-concept is a very important set of schemas for personality because it is very stable (it tends to change very little over long periods of time) and it has very general effects (what you believe about yourself will tend to affect your thoughts, emotions, and behaviors in similar ways across many situations). For example, your self-esteem depends upon an evaluation of your self-concept, and self-esteem is thought by many to have important effects in virtually all situations. In general, your self-concept is important for how you organize your experiences. You organize new experiences into events that have to do with your self, on the one hand, and events that have to do with everything else, on the other. You usually pay more attention to events having to do with yourself and also remember them better. For example, if a teacher makes some comments critical of students who walk into class late, and it just so happened that you walked into class late that day, you probably will pay very close attention to these comments, think that the teacher is talking about you in particular, and remember these comments clearly for a long time. In general, **your self-concept, just as with any other set of schemas, affects what events you pay attention to, how you interpret them, and what you remember about them later on**. Because your self-concept is so central to who you are, it probably is the most important set of schemas you have for interpreting and responding to events in the world.

One very important effect of the self-concept on memory is referred to as the **self-reference effect**, which is **an increased memory for information that has been encoded by relating it to the self-concept**. In other words, it seems that we remember information better by thinking about it in terms of our own beliefs about ourselves. For example, by trying to remember the information you are learning in this chapter by linking it up with your self-concept, you will tend to remember it better for the test. When you read about the five-factor model, for instance, I'll bet that many of you wondered where you might score on tests of each of the trait dimensions. You might have thought: "I would score high on a test of extraversion and low on neuroticism." By doing this, you were encoding the information on extraversion/introversion and neuroticism in terms of your self-concept. According to research findings, this should help you to remember the information better for the test. Why does the self-reference effect work? It probably has something to do with the fact that the self-concept is the most elaborate and complex set of schemas that you have. You have spent a lot of time thinking about yourself and have interpreted most experiences in terms of their implications for yourself, which involves a great deal of elaborative rehearsal. Thus, there are now a large number of possible associations

between new information you are learning and your self-concept. In addition, because the schemas of the self-concept have been so well learned and are, thus, so easily activated, these associations will also be easily activated when you are asked to remember the information later on during the test. In other words, at least **some of the improvement in memory that makes up the self-reference effect involves elaborative rehearsal**, which (as you learned in Chapter 4) helps us to transfer new information into long-term memory and leads to a more stable long-term memory.

SQ 6-22: Why is the self-concept thought to be so important for understanding personality development? Describe the self-reference effect and discuss why it helps us to transfer new information to long-term memory.

Unconscious Aspects of the Self-Concept

Cognitive-learning psychologists claim that there are both conscious and unconscious aspects of the self-concept. In other words, one is not aware of every single belief making up one's self-concept because some parts are thought to be at the unconscious level. These unconscious parts of the self-concept cause us to react to the environment in ways that we cannot explain (and, in fact, that may even surprise us) because the reactions are caused by unconscious beliefs about ourselves that result in an automatic processing of information. For example, let's say that you signed up for a course that sounded extremely interesting to you. When the course finally began, you eagerly attended each class meeting, wrote a couple pages of notes in each meeting, read about ten pages from the textbook each night until you finished all the reading assignments, and then took the first test a few weeks after the course began. When you got the test back, you found that you received a "D." After this, you came to class only sporadically, doodled most of the time when you did attend class, and glanced through the chapter summaries the night before the next test. When asked why you gave up trying to do well in the course instead of figuring out what went wrong on the first test and then trying harder, you might have found that you couldn't think of a good answer. You just don't know why you gave up. The likely reason, according to cognitive-learning psychologists, is that you have an unconscious belief about yourself that was activated by the below-average grade on the test. Perhaps this belief is something like the following: "if I don't do well on something, then that means I don't have the ability to do well on that thing, and I should just give up." This unconscious belief within your self-concept causes you to respond automatically to situations in which you don't perform well. I will discuss such beliefs more in the next chapter. As you will see there, some unconscious (and conscious) beliefs about ourselves may cause us to develop abnormal behaviors, thoughts, and emotions—ones that can become so severe that we may be classified as having a mental disorder.

SQ 6-23: Discuss how unconscious aspects of the self-concept may cause us to automatically process information and act without knowing why we are doing so.

Self-Efficacy

One important aspect of the self-concept is what Bandura referred to as **self-efficacy**, which can be defined as **a person's belief that he/she is able to cope with the demands of a particular situation**. A person with high self-efficacy believes that he/she is competent to perform a set of actions that will have desirable consequences in a particular situation. On the other hand, a person with low self-efficacy believes that he/she is not competent to perform these actions. For example, a boy with high self-efficacy with regard to playing baseball believes that he is able to bat and field well enough that he will be successful when playing baseball with his friends. A boy low in self-efficacy for baseball believes that he is not able, for whatever reason, to play baseball successfully; perhaps he does not believe he has practiced enough or believes that he is too ill to exert himself. It should be obvious that people with low self-efficacy in a certain situation generally will be much less successful with regard to that situation compared to those with high self-efficacy: **people with low self-efficacy are less likely to try hard because they do not think that they can be successful**. Thus, people with low self-efficacy may quit before a task is completed, perform the task in a half-hearted manner, or put off starting the task until it is too late. For example, as a teacher, I have talked with many students who tell me that they don't "test well." What they are saying is that they have low self-efficacy with regard to tests. What I find is that such students often don't even try to study in a manner that would allow them to be successful because their belief that they don't test well prevents them from learning new study habits or from spending enough time studying. Pervin (1996) stated that

self-efficacy beliefs are important because they influence which activities we engage in, how much effort we expend in a situation, and how long we persist at a task, as well as our emotional reactions while anticipating a situation or being involved in it. Clearly, we think, feel, and behave differently in situations in which we feel confident of our ability than in situations in which we are insecure or feel incompetent. Thus, individuals will differ in their thoughts, motivation, emotions, and performance in situations according to differences in their self-efficacy beliefs. (pp. 257-258)

Many students who have low self-efficacy for taking tests tend to withdraw from courses that require more studying, to spend little time and effort studying, and to become very anxious as a test date approaches. Because of these problems, they tend to perform worse on tests, **not**

necessarily because they can't do well on tests, but because they don't *believe* they can do well on tests. Their belief that they "don't test well" becomes a self-fulfilling prophecy (which, as I stated in the previous chapter, is when one's expectations about future behavior actually elicit that behavior, either in oneself or in another). Those with high self-efficacy for taking tests, on the other hand, do not typically show such maladaptive thoughts, emotions, and behaviors; and, therefore, they tend to do better on tests.

We make judgements about self-efficacy with regard to specific tasks in specific situations. In order to become aware of those tasks and those situations for which you have low self-efficacy, you need to pay attention to your emotions. If you become very anxious when thinking about performing a task in a particular situation, your self-efficacy probably is low. If, on the other hand, you become energized (perhaps even exhilarated) when thinking about performing the task, your self-efficacy probably is high. Thus, you may find that you have high self-efficacy for your ability to learn a new computer program in a computer-skills course but have low self-efficacy for your ability to learn a new algebraic operation in your algebra course. You will feel and appear self-confident in situations for which you have high self-efficacy but feel and appear insecure in situations for which you have low self-efficacy. This shows that self-efficacy is not a trait (a disposition that has general effects across situations). Instead, **self-efficacy is a situationally specific set of thoughts and emotions.** Thus, it may not make much sense to talk about a person's self-confidence as a general trait: self-confidence typically varies from one situation to the next because of variations in the amount of self-efficacy. For Bandura, everyday problems for which people seek out therapy often are importantly influenced by low self-efficacy. Thus, he believed that therapists should pay attention to the self-efficacy beliefs of their clients and work on changing them when they are low. Low self-efficacy beliefs can be changed in various ways. A good way to change such beliefs is to force yourself to perform tasks that you believe you can't perform well. In this case, however, it often is important to get help from others (such as a therapist or a teacher) because, if you are not certain how to perform a task, you probably will continue to fail, which will result in continued problems with self-efficacy. If you tend to have low self-efficacy because you are overly critical of yourself, you might try to get others to give you a more objective evaluation of your performance. In other words, **getting support and help from others is usually very important for changing self-efficacy beliefs.**

SQ 6-24: Define the concept of self-efficacy. How does self-efficacy affect our ability to accomplish a goal? How can self-efficacy beliefs become self-fulfilling prophecies? Is self-efficacy like a trait in that it has general effects across many kinds of situation or is it more specific to

particular situations? How can you discover the situations for which you have low self-efficacy? What is the best way to increase your self-efficacy in such situations?

Situational Specificity

The section on self-efficacy showed that cognitive-learning psychologists differ from trait psychologists in one very important way: **cognitive-learning psychologists assume that personality will vary from one situation to the next whereas trait psychologists assume that personality will be consistent from one situation to the next.** In the case of self-efficacy, cognitive-learning researchers claim that self-confidence changes as people go from situations in which they have high self-efficacy to situations in which they have low self-efficacy whereas trait psychologists claim that self-confidence is a characteristic that has general effects. Probably both approaches are correct to some extent. With regard to the cognitive-learning approach, there is much evidence to suggest that the self-concept contains our beliefs about ourselves in each particular situation that we have experienced—beliefs that vary from one situation to the next. These beliefs cause us to think, feel, and act in more or less different ways in each situation. In other words, each person's self-concept seems to be made up of many "sub-selves," each of which may be referred to as a "working self-concept." **A working self-concept is a set of beliefs about one's self that is activated in a particular social situation.** For example, when I am teaching, I think of myself as competent, personable, outgoing, and helpful. On the other hand, when I am at a party, I think of myself as socially awkward, reserved, and distant. Because of past experiences in each social situation, a different set of beliefs about myself is activated. These beliefs then influence my behavior in each situation by causing me to act in a manner consistent with the beliefs. This consistency between my working self-concept in a situation and my behavior further strengthens the beliefs and causes them to be more easily activated the next time I am in that particular situation. You can probably see that, as one continually experiences a particular social situation, the beliefs of the relevant working self-concept become "solidified" and, therefore, very resistant to change. Your working self-concepts are most easily changed when you are younger or during your initial experiences of a situation. These first experiences, therefore, are very important for how you will view yourself in that situation later on.

Although different working self-concepts are activated in different situations, for most people there exists a core set of beliefs that probably are contained in all the various working self-concepts. This core gives you the sense that you are the same person regardless of the social situation you are in; and thus, just as trait psychologists suggest, you often tend to act in certain general ways in most situations. For example, some people have the belief that they are somewhat competent to handle just about any situation they are in. Thus, although their self-efficacy will vary

from one situation to the next, their general belief that they are competent will cause them to feel generally self-confident across most situations. Some people, on the other hand, tend to feel generally incompetent to handle most situations, although they may have high self-efficacy in certain situations. These people, therefore, are generally insecure across situations, although they may express confidence in a limited number of situations. Thus, we can conclude that both cognitive-learning theorists and trait theorists are correct in their views about the general effects of traits versus schemas.

SQ 6-25: What is the most important difference between trait psychologists and cognitive-learning psychologists? Who is correct with respect to this difference? Discuss how the “working self-concept” allows us to understand the issue of the situational specificity of personality. In your answer, describe which experiences are most important for the development of working self-concepts and how the notion of the working self-concept can help us to understand very general (pervasive) personality characteristics, such as the degree of self-confidence a person tends to feel in most situations.

The Scientific Status of the Cognitive-Learning Approach

The cognitive-learning approach emphasizes a dynamic and complex interaction of personal factors (schemas and other cognitive structures) with situational factors. In other words, the cognitive-learning approach assumes that personality is a continuously changing outcome of the interplay of a conscious and rational person with the world in which he/she lives. Because of its close connection with the cognitive approach, which is the dominant viewpoint in much of psychology at present, the cognitive-learning approach is very influential in personality psychology. The cognitive-learning approach also is popular because it emphasizes that personality can be changed (although most of those using this approach think that such change is difficult). According to cognitive-learning theorists, changing a person's interpretations of the immediate situation will lead to changes in personality. This can be accomplished by getting the person to think rationally about the beliefs making up his/her schemas (especially those making up the self-concept) as well as by helping the person to have different experiences that will lead directly to changes in schemas. Thus, the cognitive-learning approach is often used in therapy for various mental disorders thought to be caused by faulty interpretations of the immediate situation.

There is a great deal of scientific support for many of the claims made by cognitive-learning theorists. This is because of its association with behaviorism. As I have discussed in other places in this book, behaviorism began as an attempt to bring rigorous scientific thinking to bear on psychological topics and, thus, behaviorists have always emphasized the scientific testing of claims

(especially the need to make adequately controlled observations). The earliest cognitive-learning researchers (such as Albert Bandura) were behaviorists. Because of this identification with behaviorism, research within this approach has always focused on excluding alternative explanations by performing well-controlled experimental studies (such as the investigations of the observational learning of aggressive behavior discussed earlier in this section). Furthermore, unlike psychodynamic treatments, the therapeutic treatments developed by cognitive-learning clinicians and researchers have proved to be very successful for improving the symptoms of particular mental disorders such as major depression, anxiety disorders, and several personality disorders (I will talk more about some of these therapies in the next chapter).

Although the cognitive-learning approach has some important strengths that the other two approaches discussed in this chapter did not, it also has some important weaknesses. Again, as with the other two approaches, there is the problem of vague concepts. For example, the concept of “schema” is often very vague. How do we know when a person is using a schema? What beliefs are contained within any particular schema? How many schemas does a person have? How does a schema process information? Answering these questions can be difficult because it may not be clear what a particular researcher means by the term, nor are we always able to easily identify when a particular schema has been activated. There is a related question: how do the different concepts developed by various cognitive-learning theorists relate to one another? With regard to this question, cognitive-learning theorists have discussed and studied a large number of concepts. But it often seems that different groups of researchers use different terms to refer to the same (or at least very similar) ideas. In other words, the concepts proposed by a particular group of researchers often seem to overlap with those of other groups. Because these overlapping concepts often are given different names, it can be very difficult to know if different researchers are referring to similar ideas. Thus, although the cognitive-learning approach is much more scientific than the psychodynamic approach, and although the cognitive-learning approach has been shown to have more practical uses than the trait approach, there are some important limitations that those using the cognitive-learning approach will need to address in the future.

SQ 6-26: According to cognitive-learning theorists, what is the best way to achieve changes in personality? Why have cognitive-learning psychologists emphasized the importance of scientific methodology in the testing of claims about personality? Describe two weaknesses of the cognitive-learning approach.

In this chapter, we have examined some general approaches to studying personality. In the next chapter, we will examine how psychologists and others look at abnormal variations in

personality and some of the therapies they have developed to correct these abnormal variations. As you will learn, there have been many unscientific techniques developed to treat mental disorders, many of which have been derived from the psychodynamic approach to studying personality. Thus, I will continue in the next chapter my discussion of the differences between scientific and pseudoscientific approaches in psychology.

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Practice Test for Chapter 6

1. According to Freud, the conflicts that are MOST important for personality development typically occur
 - A: at the conscious level.
 - B: between the sexual and aggressive motives.
 - C: at the unconscious level.
 - D: between the id and the libido.
2. Which of the Big-5 traits seems to be LEAST affected by genetic influences?
 - A: conscientiousness
 - B: agreeableness
 - C: openness to experience
 - D: neuroticism
 - E: extraversion/introversion
3. According to Freud, unconscious conflicts GENERALLY are experienced consciously as
 - A: anxiety.
 - B: depression.
 - C: anger.
 - D: mania.
4. Primary-process thinking is ____ whereas secondary-process thinking is ____.
 - A: fantasy-oriented; oriented toward problem-solving
 - B: oriented toward problem-solving; fantasy-oriented
 - C: oriented towards satisfaction; oriented towards frustration
 - D: oriented towards frustration; oriented towards satisfaction
5. According to cognitive-learning theorists, people who immediately quit when they begin to perform poorly at a task MOST likely have
 - A: unconscious conflicts involving that task.
 - B: problems with the self-reference effect.
 - C: low self-efficacy for that task.
 - D: low levels of situational specificity.
6. In general, the person-situation controversy has been resolved by the finding that
 - A: traits are more important than situations.
 - B: situations are more important than traits.
 - C: neither traits nor situations are very important. Instead, schemas and motives are much more important influences on personality.
 - D: traits and situations interact in their effects on personality.
7. Because John has always been a good student, he believes that he will do very well in his psychology course. According to cognitive-learning theorists, John's belief that he is competent to adequately perform the work in psychology MOST reflects his strong
 - A: sense of self-efficacy.
 - B: defense mechanisms.
 - C: trait of self-confidence.
 - D: drive to overcome feelings of inferiority.

8. According to Freud, without the superego, ____ would not be possible.
A: sociability B: civilization C: frustration D: satisfaction
9. Which of the following types of evidence is BEST for concluding that genes are having an influence on personality development?
A: the study of identical twins raised apart
B: the study of identical twins raised together
C: the study of fraternal twins raised apart
D: the study of fraternal twins raised together
10. When our ego is unable to resolve directly an anxiety-inducing conflict, it usually reduces anxiety by
A: getting in touch with the preconscious.
B: using a defense mechanism.
C: eliminating desires.
D: giving in to unacceptable urges.
11. The id demands immediate gratification of its desires, something that Freud called the
A: pleasure principle. C: ego ideal.
B: reality principle. D: conscience.
12. According to Freud, defense mechanisms protect us from feeling anxiety by
A: making us unaware of our true desires.
B: allowing us to solve our problems rationally.
C: helping us to see the true causes of our behavior.
D: satisfying the true desires of others.
13. Unconsciously, I am angry at a student for talking in class; but, instead, I ask her why she is so angry at me. I am using the defense mechanism called
A: displacement. B: projection. C: reaction formation. D: denial.
14. Bandura's research on the development of aggressive behavior has shown that children are MOST likely to act aggressively when
A: aggressive behavior is associated with traumatic childhood experiences.
B: they have observed a model being rewarded for aggressive behavior.
C: aggressive behavior is associated with permissive cultural influences.
D: they have observed a model being punished for aggressive behavior.
15. Traits differ from motives in which of the following ways?
A: Motives can be hidden from others but traits are difficult to hide.
B: Traits endure over long periods of time but motives never do.
C: Motives cannot be unique whereas traits usually are unique.
D: Motives are expressed unconsciously whereas traits are expressed consciously.

16. According to Freud, the ____ attempts to get motives satisfied while taking account of limitations and constraints placed on the satisfaction of these motives.
A: superego. B: conscience. C: ego. D: id.
17. According to cognitive-learning theorists, what is the best way to change how people act, think, and feel in a situation?
A: Get them to take advantage of the self-reference effect.
B: Get them to interpret the situation differently by helping them to change the relevant schemas.
C: Help them to strengthen their rational defense mechanisms.
D: Increase the amount of primary-process thinking relative to secondary-process thinking.
18. Which of the following examples would MOST reflect the influence on your personality of a motive?
A: you are shy at a party
B: you are trying to find a good job because you want to have children
C: you believe that most people are caring
D: you feel able to do well on this test
19. I believe that I must always be prepared for class, that I must read every book ever published about psychology, that I must always be on time, that I must never get angry at students, that I must always be helpful, etc. Freud would say that my behavior is dominated by my
A: primary-process thinking. C: superego.
B: secondary-process thinking. D: ego.
20. I am normally very unaggressive; but if someone cuts me off in traffic, I usually will jump on the accelerator and smash into their car. According to Gordon Allport, such extreme aggressiveness in this particular situation reflects the influence of a
A: cardinal trait. B: secondary trait. C: self-concept. D: central trait.
21. The five-factor model is thought to reflect something fundamental to human nature because
A: genetic causes of most of the trait dimensions have been discovered.
B: most people around the world score about the same on measures of these trait dimensions.
C: none of these trait dimensions are influenced by social factors.
D: people around the world tend to describe themselves and others in terms of the five trait dimensions.
22. Which of the following is NOT one of the "Big-5" personality traits?
A: conscientiousness D: neuroticism
B: agreeableness E: openness to experience
C: excitability

23. According to Freud, the symptoms of neurotic disorders
- A: often represent symbolic expressions of intrapsychic conflicts.
 - B: are usually easily cured.
 - C: are due to conflicts between the ego ideal and the conscience.
 - D: rarely appear before a person has reached puberty.
24. I generally tend to be relaxed and calm. But, when I get in front of a class, especially when the students look bored, I begin to act like a hyperkinetic bunny rabbit: I run around, wave my hands a lot, and speak quickly. How would Walter Mischel explain my behavior?
- A: I have a trait of hyperactivity.
 - B: My sexual motive has been repressed and now is satisfied by performing more socially worthy behaviors, such as teaching.
 - C: I expect that, if I act this way in this situation, students will be more attentive.
 - D: My working self-concept probably has been damaged by early-childhood experiences.
25. The personality of someone with multiple personality disorder would NOT
- A: have personality dispositions.
 - C: exhibit characteristics.
 - B: be unique.
 - D: be integrated.
26. According to Freud, the fixations that occur during the early stages of personality development
- A: affect adult personality.
 - B: usually go away by themselves.
 - C: are eliminated by the defense mechanisms.
 - D: are less important than the fixations that first appear during adulthood.
27. What is MOST wrong with the following statement: "Gary avoids people because he is shy."
- A: This is an example of circular reasoning.
 - B: It implies that motives are more important than traits.
 - C: It is more correct to say that, "Gary is shy because he avoids people."
 - D: Gary probably only avoids people that he doesn't know very well.
28. Based on your understanding of the book's discussion, which of the following most likely would NOT be a neurosis?
- A: depressive disorders (those disorders characterized by extreme sadness)
 - B: anxiety disorders (those disorders in which anxiety is a major symptom)
 - C: phobic disorders (those disorders that involve fear of an event)
 - D: psychotic disorders (those disorders that involve hallucinations and delusions)
29. I do not like asparagus because I once saw someone throw up after he ate asparagus. My attitude about asparagus has been determined by
- A: operant conditioning.
 - C: observational learning.
 - B: self-efficacy.
 - D: unconscious conflicts.

30. When teaching a class, I think of myself as competent, personable, outgoing, and helpful. At parties, on the hand, I think of myself as socially awkward, reserved, and distant. According to cognitive-learning theorists, this difference in my behaviors in these two situations would be caused by
- A: the activation of a different working self-concept in each situation.
 - B: the self-fulfilling prophecy of the self-reference effect.
 - C: a general lack of self-confidence and self-efficacy.
 - D: the activation of a different set of motives in each situation.
31. In order to answer this test question, most people would have to use MOSTLY
- A: the pleasure principle.
 - B: ego defense mechanisms.
 - C: secondary process thinking.
 - D: the ego ideal.
32. According to Freud, during the phallic stage, all children experience
- A: a repression of sexual desires.
 - B: severely traumatic events.
 - C: the Oedipus Complex.
 - D: the first emergence of the unconscious mind.
33. The problem with astrology as a theoretical approach in personality psychology is that it does not satisfy which of the following scientific requirements?
- A: One cannot make observable predictions with an astrological approach.
 - B: Astrological approaches do not assume the doctrine of naturalism.
 - C: The bulk of the available evidence does not support an astrological approach.
 - D: The astrological approach is not used by people who have received degrees in scientific disciplines.
34. The field of social psychology differs from personality psychology in that social psychologists tend to focus on behaviors that
- A: show high consensus and low pervasiveness.
 - B: show low consensus and high pervasiveness.
 - C: are deviant and abnormal.
 - D: are conventional and normal.
35. According to Freud, personality develops PRIMARILY as a result of conflicts between the
- A: ego and superego.
 - B: id and superego.
 - C: id and ego.
 - D: ego and superego.

36. The theoretical approaches of personality psychology focus on ____ factors whereas the theoretical approaches of social psychology focus on ____ factors.

A: unstable; stable

C: external; internal

B: stable; unstable

D: internal; external

37. The president of the college said something that made me very angry but I did not express my anger. In fact, I was not consciously aware of it. Later, when a student forgot to bring a pencil to the exam, I became enraged and yelled at him in front of all the other students. I was using the defense mechanism called

A: projection.

B: reaction formation.

C: displacement.

D: denial.

38. According to the trait theorist, Hans Eysenck, personality is largely a function of

A: unconscious conflicts between traits and societal regulations.

B: biological factors such as neural activity.

C: learning and social environmental influences.

D: the beliefs about the world that people acquire during early childhood.

39. My friend is intelligent, gentle, open-minded, humorous, and reserved. According to Gordon Allport, I am describing my friend in terms of

A: central traits.

B: secondary traits.

C: his self-concept.

D: cardinal traits.

40. Cognitive-learning theorists believe that the self-concept

A: is not a major influence on a mature personality.

B: is not as important an influence on personality as is the social situation.

C: does not emerge until a person enters adulthood.

D: causes us to automatically process information and respond without thinking.

41. Over the years, other psychodynamic theorists have been most critical of Freud's emphasis on

A: the importance of the sexual motive for personality development.

B: the influence of childhood experiences on personality development.

C: the importance of the unconscious for personality development.

D: the influence of the defense mechanisms on personality development.

42. When a person's development stalls at a particular stage, Freud said that the person has developed a "fixation." For Freud, fixation is PREDOMINANTLY the result of

A: a conflict between the id and the superego.

B: parental neglect.

C: abnormal genes.

D: excessive satisfaction or frustration of desires.

43. According to cognitive-learning theorists, why might a student work very hard at her job but not very hard at her schoolwork?
- A: She expects to get reinforced for hard work on the job but not for hard work at school.
 - B: She is not always conscientious.
 - C: She has learned that hard work is never rewarded.
 - D: She has had traumatic childhood experiences.
44. It is sometimes stated that psychic claims cannot be tested scientifically because the presence of the skeptical people doing the testing eliminates psychic phenomena. Such a statement shows that parapsychology (the discipline that studies psychic phenomena) is a pseudoscience because
- A: its claims cannot meet the falsifiability criterion of science.
 - B: its practitioners have obtained pseudoscientific degrees.
 - C: research studies are not performed by parapsychologists.
 - D: parapsychologists do not develop theories explaining psychic phenomena.
45. I live just to party, party, party!! Freud would say that I am dominated by my
- A: ego.
 - B: id.
 - C: self.
 - D: ego defense mechanisms.
46. People describe Jeff as calm, introverted, and goofy. They are describing Jeff in terms of the personality disposition known as
- A: traits.
 - B: behaviors.
 - C: motives.
 - D: schemas.
47. Why did Freud believe that the best that a person could hope for was to be unhappy?
- A: Because the world is such a terrible place.
 - B: Because defense mechanisms make us unaware of our true conflicts.
 - C: Because the id and the superego are always in conflict.
 - D: Because we have strong biological motives.
48. Wanda is very quiet around people in authority but very loud around her friends and most other people. Which of the following theoretical approaches would be BEST able to explain this situational difference in Wanda's behavior?
- A: psychodynamic
 - B: trait
 - C: biological
 - D: cognitive-learning
49. According to Freud, when would the ego be expected to unconsciously distort reality?
- A: when reasonable action is possible but the person also has desires
 - B: when the id-superego conflict becomes so intense that the ego fears losing control
 - C: when the superego is relatively undeveloped
 - D: when the person has used up all of his/her libido in satisfying id impulses
50. Copycat crimes are ones in which people commit a crime that they have heard about. For example, a person may hijack an airplane after watching a movie about a hijacking. The existence of such crimes provides evidence for which of the following theoretical approaches?
- A: cognitive-learning
 - B: psychodynamic
 - C: trait
 - D: psychoanalytic

CHAPTER 7

MENTAL DISORDERS: SYMPTOMS, CAUSES, AND TREATMENTS

Philippe Pinel (1745-1826) was a French physician who, about 200 years ago, was in charge of two major mental hospitals in Paris. In 1801, he published a very influential book (translated into English in 1806) called *A Treatise on Insanity*. In that book, he described a disorder he called “mania,” a category containing symptoms that, in the present day, we would include within the several categories of mental disorders referred to as “psychoses” (a **psychosis** is any mental disturbance in which a person is having **difficulty interpreting reality because he/she is experiencing unusual perceptions and problems in thinking**). Pinel stated that the typical “maniac”:

is subject to a kind of uneasiness which he cannot describe nor account for ; experiences a degree of fear that sometimes amounts to terror, and feels either little disposition or absolute incapacity to sleep. Soon after, incoherence and incongruity of ideas are betrayed in his outward conduct, by unusual gestures and by extraordinary changes in the expression and movements of his countenance [face]. He generally holds his head erect, and fixes his eyes and attention upon the heavens. He speaks with a deep hollow voice ; walks with a quick and precipitate [hasty] step ; and stops suddenly, as if arrested by the most interesting and profound contemplations. Some maniacs are remarkable for great humour and merriment, which they express by fits of loud and immoderate laughter. There are others, as if nature delighted in contrast, whose taciturnity [uncommunicativeness] is perpetual, who express their afflictions by tears, or who sink without a tear under the distressing influence of solitary anxiety. The eyes, in some species of insanity, suddenly appearing red and sparkling, the cheeks flushed, with a vigorous and rapid action of the muscles of the countenance, accompanied by an exuberant loquacity [talkativeness], are certain presages [predictive signs] of an approaching paroxysm [sudden attack of symptoms] ; and point out the urgent necessity of strict confinement. I remember a maniac who suddenly spoke with great volubility, laughed immoderately, and then shed a torrent of tears. Experience had taught me the value of a speedy seclusion ; for his paroxysms were extremely violent, and he broke into a thousand pieces whatever fell in his way. (pp. 17-18)

I have presented a description of mental disorder about 200 years old for several reasons: to show you that the symptoms of our modern-day disorders have been recognized for some time; to

illustrate the importance of accurate descriptions of mental symptoms as a first step towards understanding them; and to show you one of the earliest of modern attempts to develop a useful classification system for mental disorders. Pinel recognized only a few categories of mental disorder in his classification system or “taxonomy” (a **taxonomy is a system of arranging categories into related groups based on some factor common to each**). He was very aware of the problems of such a meager taxonomy of mental disorders: such taxonomies tend to lump together people suffering from what we today would consider to be several different disorders that presumably have different causes and different treatments. Pinel wished to correct this problem by performing very careful observations of his patients in order to develop a more natural and detailed classification of mental disorders.

Pinel’s procedure of careful observation and description continues to the present day in the development of the modern taxonomy described in the *Diagnostic and Statistical Manual of Mental Disorders* (4th edition; abbreviated as *DSM-IV*) published in 1994 by the American Psychiatric Association. The present version of this manual has been developed by many psychiatrists and psychologists over the past few decades. A category of mental disorder is included when these clinicians recognize a need for it (“clinician” is the general name for anyone who works in a clinic or any other center dedicated to treating people with mental or physical disorders). Their collective experiences with people suffering from a given disorder are used to describe the essential symptoms of that disorder. They test the usefulness of these defining symptoms by observing additional patients, which may result in further modifications to the symptom list. In this way, almost 300 categories of mental disorder have been constructed for the present edition of the *DSM*. Let’s look at an example of a *DSM-IV* category. In the following table, I present the defining symptoms of specific phobia, a mental disorder that we first looked at in Chapter 3:

Table 7.1

The defining symptoms of the *DSM-IV* category of Specific Phobia

- A. Marked and persistent fear that is excessive or unreasonable, cued by the presence or anticipation of a specific object or situation (e.g., flying, heights, animals, receiving an injection, seeing blood).
- B. Exposure to the phobic stimulus almost invariably provokes an immediate anxiety response, which may take the form of a situationally bound or situationally predisposed Panic Attack. Note: In children, the anxiety may be expressed by crying, tantrums, freezing, or clinging.
- C. The person recognizes that the fear is excessive or unreasonable. Note: In children, this feature may be absent.

- D. The phobic situation(s) is avoided or else is endured with intense anxiety or distress.
 - E. The avoidance, anxious anticipation, or distress in the feared situation(s) interferes significantly with the person's normal routine, occupational (or academic) functioning, or social activities or relationships, or there is marked distress about having the phobia.
 - F. In individuals under age 18 years, the duration is at least 6 months.
 - G. The anxiety, Panic Attacks, or phobic avoidance associated with the specific object or situation are not better accounted for by another mental disorder.... (American Psychiatric Association, 1994; pp. 410-411)
-

As you can see, a category within *DSM-IV* includes the precise behaviors that must be observed in order to diagnose a person as having a particular mental disorder. In other words, the categories described in *DSM-IV* represent “operational definitions.” As I stated in Chapter 2, an **operational definition is defining a concept in terms of the specific procedures used to observe it**. The mental disorders of *DSM-IV* represent operational definitions because each category in the taxonomy specifies a set of observable behavioral responses that must occur before a person can be diagnosed with that mental disorder. By including the precise behaviors in an operational definition of a mental disorder, it is more likely that two clinicians observing the same person will reach the same diagnosis. This is known as **reliability**, a word that, in this case, means **the degree to which two or more observers agree on their descriptions of a phenomenon**. The modern version of the *DSM* has very good reliability compared to earlier versions and other taxonomies. In the past (before about 1980), the possibility that two clinicians observing the same patient would reach the same diagnosis often could be a matter of chance. On the other hand, the present *DSM* has a major limitation, as does any taxonomy of mental disorders: it is very difficult to define the term “mental disorder.” Let's discuss this problem next.

SQ 7-1: What is a psychosis? Describe what a taxonomy is and what an operational definition is. How does an operational definition of a mental disorder increase the reliability of its diagnosis?

The Concept of Mental Disorder

Peter Barham (1984) described Joseph, a 33-year old man with schizophrenia. Joseph was raised in a town in the north of England, where he had been a shy and solitary boy and young adult. He first developed severe symptoms of schizophrenia when he was 26 years of age. Joseph had the following to say about his problems: “If things get worse I won't be able to cope with my direction gear. I see myself heading for the life of a recluse, being valued at 7 and 1/2 pounds per

calendar month” (p. 101). When asked about his parents, who presumably still lived in his home town (identified simply as “F.”), Joseph claimed that no one lived in this town any longer:

- Joseph: It’s impossible to live there now. It’s just solid rock you know. You couldn’t live there. It’s just dust you know. You see, you can’t live anywhere you know, you’ve got to have the weather conditions to live in. I mean if you buy a house and find you can never go out of the house. If you buy a house on dry land like, you find that you’re never out of the house.
- Me [Barham]: Why?
- Joseph: Why, because if you go outside you get dust up your nose and down your throat.
- Me: In F.?
- Joseph: Why anywhere, don’t you. ([said] with some irritation)
- Me: So, we’re not just talking about F.?
- Joseph: No, even here. What they do is they get a pressure suit when you take seriously ill and you have to live on tablets. And when you take seriously ill they put you on a crash course in a pressure suit and you go crazy altogether, crackers altogether, for about three weeks. There’s one on M15s [the ward that contains the most seriously ill mental patients in Joseph’s hospital]. That’s psychiatry that. You see the whole world is, you see there’s so much dust and dirt and things like that, you can’t live. Most people live in communities under big domes. Now you don’t know the dome is there. They build a whole village, and then they build a dome over the top, and they paint the dome and you see aeroplanes flying about inside.
- Me: Inside the dome? And what is there outside the dome?
- Joseph: Certain death. There’s domes under the sea. (p. 115)

Although Barham was trying to make the point that Joseph’s speech does make some sense, and may even be profound when one takes the time to analyze it, Joseph’s thinking still is very idiosyncratic and, thus, not immediately understandable. After reading this conversation, I suspect that most of you would agree that Joseph is suffering from a mental disorder.

But what do you mean by the term “mental disorder”? At first, the answer probably seems obvious. It’s when a person is “crazy” or “does strange things.” The word “crazy” itself, however, requires definition; and we all do strange things now and again. What is it about Joseph that makes you want to say that he has a mental disorder? It seems obvious that his thought processes are

disturbed. In fact, he seems very irrational in his thinking. If we could look further into Joseph's case, we probably would find that he has much difficulty with expressing or feeling his emotions, and that he has heard things that others could not hear. His behaviors definitely are very peculiar, and he probably has particular difficulty with controlling his impulses. It is primarily the focus on disturbances in thinking, feeling emotions, expressing emotions, and controlling impulses that distinguishes mental disorders from the physical disorders studied and treated by physicians, although it is not always easy to make this distinction. We will define a **mental disorder** as **an internal dysfunction that causes the development of harmful symptoms involving behaviors, thoughts, impulses, and emotions.**

Let's look at another example from Philippe Pinel so that we can become a little clearer as to the meaning of this definition. In his 1801 book, Pinel described:

a madman who directed his fury towards himself as well as against other people. He had taken off his own hand with a chopping knife, previous to his admission into the hospital ; and, notwithstanding his close confinement, he made constant efforts to mangle his own thighs with his teeth. This unfortunate man put an end to his existence in one of his fits.
(pp. 21-22)

There is little doubt that this man's behavior is "irrational": it is not logical and it seems likely that the man is not thinking clearly. His emotions seem to be very extreme, and he appears unable to control his aggressive impulses. These disturbances in thinking, feeling, and resisting impulses are causing "harmful" behavioral symptoms—**symptoms that make it difficult or impossible for him to meet the demands of everyday existence.** It should be obvious to you that mutilating one's body or committing suicide are both harmful in this sense. But, because such consequences are relatively rare, we tend to be more concerned with other kinds of difficulty, especially problems in functioning occupationally (or academically for those in school) and interpersonally. In general, people with mental disorders express behavioral symptoms that are **harmful in the sense that they often lead to difficulties with performing their jobs and/or difficulties with developing and maintaining intimate relationships.** Another way to say this is that the symptoms of mental disorders make it difficult for people to "love and work."

In the case of Pinel's patient, it seems obvious that his harmful behavioral symptoms were caused by uncontrollable thoughts, impulses, and emotions. His harmful symptoms seem to have been caused by an "internal dysfunction"—a dysfunction of a mental process or processes—that

produced his irrational and highly emotional set of behaviors. The same seems to have been true of Joseph. His strange way of expressing himself apparently was due to some problem in the functioning of his mind, an internal dysfunction that led to his harmful symptoms. Before we can understand what is meant by the term “mental disorder,” therefore, we must develop a better understanding of the term “dysfunction.” A **dysfunction is an entity (a thing) that is not functioning as it was designed to function.** For example, your car engine sometimes develops dysfunctions that cause “symptoms” (such as clunking noises, problems with starting, problems with acceleration, etc.). It usually is relatively easy to tell when an engine has a dysfunction and where the dysfunction is in the engine. This is because any particular engine has a group of designers who have developed specifications for how that engine should be built and how it should run. A dysfunction would be any deviation from that design. In other words, when evaluating any particular car engine with regard to a possible dysfunction, there is a **type—an exemplar** of a properly functioning engine—to which we can refer. At an even higher level of analysis, we might describe a perfectly functioning engine—an engine that runs with optimal (and, thus, unobtainable) efficiency. With regard to such a perfectly functioning engine, all existing engines would be dysfunctional to a greater or lesser degree. Of course, in order to specify this ideal type, we must specify the particular qualities an engine *should* have; and thus, a set of standards for engines must first be accepted by the individuals performing the evaluation. Regardless of the level of analysis at which we are working, the concept of a “dysfunction” requires that there exist some “type” that we have designated by convention as normally or ideally functioning. **To the degree that an actual engine approximates that type, to that degree it is functioning normally.** Any deviation from that type is a dysfunction.

The determination of what constitutes a mental dysfunction, however, is not quite as straightforward as this because of two problems. (1) **We have no particular “design specifications” for the set of mental processes that make up a human mind.** (2) **There is no particular “thing” that we can call a mental process.** With regard to the first problem, if we have no “design specifications” for the human mind, how can we decide if a particular mental process is functioning properly? For example, in the chapter on memory, we talked about problems in the mental process of retrieval from long-term memory. Is your inability to remember what time you went to bed last night a symptom of a mental dysfunction involving memory retrieval? It might be, but it is very difficult to know for certain. What makes this a difficult question to answer is that we do not know precisely which steps are normally involved in the retrieval of a long-term memory—hence, we do not know precisely when the retrieval process is malfunctioning. With regard to the second problem, a mental process has no physical existence—it is simply a term we have created to help us in predicting and explaining our

experiences and behaviors. For example, there is no particular “thing” we can point to when we are talking about memory retrieval. The term “retrieval” is simply a shorthand way of referring to “what we believe is happening just before someone reports a memory.” Terms like “retrieval” are **mental constructs—creations of our own minds**—that help us to understand our worlds better and communicate with others about unobservable events. Mental constructs such as “memory retrieval” can be conceived of in many different ways. Thus, it becomes very difficult (if not impossible) to describe by convention how such a “nonexistent entity” *should* function.

The problem we have to solve then is this: how can we identify the presence of an internal mental dysfunction—something that has no physical existence and no known design specifications? The makers of the *DSM-IV* answered this question by reasoning in the following way:

- (1) our mental processes are expressed in behavior;
- (2) our behavior adjusts (adapts) us to the environment;
- (3) behavior that does not adjust us well (that is, behavior that is maladaptive) may reflect the workings of dysfunctional mental processes.

In reasoning in this way, we might conclude that any behavior that is *severely maladaptive* is a “symptom” of a mental dysfunction. In fact, this argument was taken from the field of medicine. In medical practice, the maladaptive workings of the body (such as severe coughing or high temperature) are thought usually to indicate the effects of a physical dysfunction. In the same manner, the maladaptive workings of the mind (such as the inability to resist an unacceptable impulse or a very strong and long-lasting emotion) may indicate the effects of a mental dysfunction. This possibility is embodied in a set of ideas referred to as the **medical model** of mental disorder. The medical model states that **a particular set of overt symptoms is caused by a particular internal problem in functioning**. For example, just as the overt symptoms of the flu (stomach cramps, stuffy nose, coughing, fever, etc.) are signs of a virus disrupting bodily functioning, the overt symptoms of a mental disorder (for instance, hallucinations, bizarre behavior, extreme emotions, etc.) may be signs that there is something disrupting mental functioning. In other words, the *DSM-IV* is based on the assumption that mental disorders are “diseases” caused by mental dysfunctions.

SQ 7-2: Define the term “mental disorder” and outline the argument made in the DSM-IV for judging whether or not a person has a mental disorder. Describe the main characteristics of abnormal behavior and list the two characteristics that are most important for the diagnosis of

mental disorder. Why is it so difficult to discover the internal dysfunctions thought to cause mental disorders? Describe the medical model of mental disorder used in the DSM-IV and describe what is meant by the term “harmful symptoms.”

Of course, just as an engine may not function properly if there is some abnormal external event—such as the engine being unable to start because the surrounding air does not have enough oxygen—abnormal external events also may cause particular instances of maladaptive behavior. The fact that an external problem is causing the maladaptive behavior means that there is no mental disorder. Let me explain this idea by looking first at the concept of a physical disorder. The presence of a crumb in your throat may cause a violent attack of coughing. In this case, however, there is no physical disorder: the coughing is a normal reaction to a foreign object in your throat. In fact, the coughing is necessary if the crumb is to be dislodged. Thus, coughing is, in this case, an adaptive response to an external irritant, not the symptom of an internal bodily dysfunction. In a similar way, the sudden death of a family member usually results in apparently maladaptive behavior in survivors (such as not eating, sleeping, or taking care of one’s daily responsibilities). In this case, however, there is no mental disorder because the behaviors are normal reactions to an unusual environmental event. In fact, a case might be made that the behaviors are actually adaptive: perhaps they allow for a period in which the person can get some distance from other life concerns, thereby allowing time for him/her to adjust to the permanent absence of the loved one. Even if these behaviors are not adaptive, however, we still would not attribute the behavior to an internal cause: most people react in this way to the death of a family member (high consensus) and the person probably does not respond this way in other situations (low pervasiveness). Because of the high consensus and low pervasiveness, attribution theory suggests that we need to focus on an external cause of the maladaptive behavior—the death of the family member. In other words, we would conclude that the survivors were responding normally to an external event. On the other hand, what if one of these family members was still deeply depressed five years after the death of the person? Would we still claim that he/she was responding normally to an external event? In this case, it is likely that most people would no longer be severely depressed (low consensus); and we probably would find that this person becomes easily depressed in many other kinds of situation (high pervasiveness). Thus, most of us would conclude that something is wrong internally with this individual: he/she is suffering from a mental dysfunction.

This analysis touches upon what is perhaps the most important question about defining a mental dysfunction: how can we determine if a particular set of behaviors is maladaptive? In order to do this, we must have in mind some set of standard behaviors that are best for adapting us to a particular environmental event. Thus, the question of which standards we might use to evaluate

behavior is of primary importance for our ultimate goal of identifying mental disorders. Is there a set of behaviors that we all can agree are the most adaptive ones in a particular situation? In some situations, most of us probably could come to some agreement. For example, if we were in the middle of a very smoky house fire, covering one's face with wet cloth, getting on the floor, and crawling to an exit would be most adaptive. We all would agree that any person in such a situation who stood up and breathed in deeply while fumbling for the remote control so that he could watch a little television would be engaging in a set of highly maladaptive behaviors. In other situations, however, there would be disagreement about which behaviors were most adaptive. In fact, in particular situations, behavior that seems adaptive to one person might seem maladaptive to another. For example, when you are approaching an intersection and the stoplight changes from green to yellow, is it most adaptive to speed up (in order to make it through the light) or to slow down (so that you can stop when the light turns red)? One person might argue that it is most adaptive to speed up because you will get to your destination faster. Another person might argue that it is most adaptive to slow down because another car might hit you if the light turns red before you enter the intersection. Thus, in at least some situations, people would argue about which behaviors are most adaptive, whereas in other situations, most people would be able to reach an agreement. Perhaps, therefore, we can define mental disorders by considering only those situations in which we can get the most agreement.

But, even if we can come up with a set of situations for which there is overwhelming agreement on the most adaptive behavioral responses, how do we deal with the person who is aware that his/her behavior is in conflict with these standards, knows how to change his/her behavior in order to comply with the standards, and yet still chooses not to do so? For example, most people would agree that men should not wear women's clothing, put on make-up, and spend the evening dancing with friends. Such behavior can be maladaptive if it causes others to avoid or persecute the man. Obviously, conforming to standards of appropriate gender-related behavior is important in most societies. Yet, the man going against these standards typically is very aware of them, knows how to conform to them, and still chooses not to do so. How do we evaluate his behavior? The problem of values is central here: is a person who chooses not to conform suffering from a dysfunction? Perhaps one way out of this is to think of the problem as being not so much "adjusting to standards" but, instead, "accomplishing one's goals." That is, if a man's goal is to "shake people up" by dying his hair purple and putting on a slinky dress (that is, if he desires to upset people by going against social norms), and he accomplishes this goal by performing these actions, one might say that his mind is functioning normally because he can successfully carry out this plan of action. But then, how would we deal with the case of a pedophile—a person who desires strongly to have sex with prepubescent children and may even seek them out for sexual

relations? Pedophiles typically are very aware of accepted standards concerning appropriate ages for sexual partners (and may even agree with them), know how to meet these standards, but still do not do so. In addition, they are accomplishing their goal of having sex with children. In this case, it is the set of goals themselves (and the associated impulses that pedophiles have trouble resisting) that are considered to be signs of a mental dysfunction. In other words, the pedophile's main problem is his inability or unwillingness to adjust his thoughts and desires to social standards concerning the age groups with which it is acceptable to have sexual relations.

In general, when trying to identify maladaptive behaviors that are symptoms of a mental disorder, it seems that we must consider the issue of "social norms." **Social norms** are defined as **the standards of a particular social group for judging the appropriateness of behaviors, thoughts, and emotions in particular situations**. Social norms involve not only what is considered to be the best way to adapt ourselves to a particular situation but also what are the most appropriate goals to have in that situation. If a person fails to adjust his/her behaviors, thoughts, or emotions to social norms widely believed to be very important, then others are likely to infer that the person is suffering from a mental dysfunction. For example, homosexual behavior in the United States was considered to be a symptom of a mental disorder until 1973. Such behavior was considered, at that time, to be a transgression of a very important social norm (of course, some people argue that it still is). During the early 1970s, on the other hand, very long hair on males was not considered to be a symptom of a mental disorder even though it was considered to be a transgression of a social norm, and often invited derision from others. Failing to conform to this latter social norm was seen to be less of a problem, however, and therefore was much less likely to be seen as a sign of a mental disorder. Putting all of this together, **a mental dysfunction is inferred to exist in a person when that person is unable or unwilling to conform to important social norms regulating behaviors, emotions, and thinking**. Of particular importance are those social norms that state that people must be able to hold a job and must be able to form intimate relationships with others. The major problem with this way of thinking about mental disorders, of course, is that we may "pathologize" (which means, "to characterize as ill") a person who is merely an extreme nonconformist. This is a problem for which there are no easy answers because we cannot check up on our diagnosis by observing directly a dysfunction of a mental process. An awareness of this problem and a great deal of humility about the state of our knowledge is the best we can do if we are to avoid calling mentally disordered those people who are merely nonconforming.

SQ 7-3: Discuss how we judge that a set of behaviors is "maladaptive." In your answer, discuss the relevance of social norms for judging the adaptiveness of behavior. Discuss the problems with

judging the presence of a mental disorder by looking for maladaptive behaviors and deviations from social norms.

Causes of Mental Disorders

Although I have stated that mental disorders are defined as mental dysfunctions—and, hence, that they are internally caused—the distinction between proximate and ultimate causes that I outlined in the first chapter suggests that the reality is much more complex than this. The causes of any mental disorder range from very proximate ones, which are internal to the individual, to very ultimate ones, which usually are events in the external world that occurred sometime in the distant past. The most proximate cause of a mental disorder is always a biological one: something changes in the nervous system that directly causes the **symptoms** (which may be defined as **the mental, behavioral, and/or physical signs of a disorder**). Why do I say this? Throughout this book, I have presented evidence in favor of the brain/mind theory—the claim that all mental events and behaviors are caused by biological events in the nervous system. In other words, I have been arguing that it is not quite accurate to distinguish between the body and the mind (the physical and the mental, the biological and the psychological). Instead, this distinction is the product of an outmoded mind-body dualism. Thus, according to the brain/mind theory, any problem involving mental or behavioral disturbances must be due most proximately to disturbances in the nervous system. Nevertheless, although neural factors are the most proximate cause of mental disorders, many psychologists focus on less proximate (more ultimate) causes, especially when trying to develop treatments for mental disorders. These less proximate causes can be biological, environmental, or mental ones. Thus, some psychologists focus on childhood experiences, others focus on negative thoughts of the person with the disorder, and still others focus on cultural factors that seem to make one set of symptoms more likely than another set. For example, a proximate cause of insomnia (a difficulty in falling or staying asleep) might be the firing of a group of neurons in the brain stem, whereas an ultimate cause of this disorder might be growing up in a culture that teaches that sleep is a waste of time. In such a culture, those who sleep “too much” are thought of as being lazy, a belief that could lead some people to develop insomnia because they are anxious about being called lazy. Thus, ultimate causes external to the individual are essential for the development of the internal dysfunction most proximately causing a particular mental disorder. **It is the particular type(s) of causal factor focused on by particular researchers that distinguishes the different theoretical approaches to mental disorders.** We talked about some important theoretical approaches in the field of personality psychology in the last chapter. You may remember that each approach focused on a different type of psychological cause for personality: some focused on motives, others focused on traits, and still others focused on schemas. These psychological causes themselves were thought to have other causes (usually

biological or environmental ones). This shows that there are many different causes one might study when trying to explain the development of a particular mental disorder.

In the rest of this chapter, I am going to discuss what we know about a few different categories of mental disorder. At this point in your study of psychology, it would not be beneficial to cover a wide range of mental disorders. Instead, learning some details about a smaller number of disorders will help you to develop a better understanding of how we diagnose, explain, and treat mental disorders at the present time. As you read about these disorders, and perhaps begin to think about problems you might have had in your own life, recall the definition of mental disorder that I provided earlier—"an internal dysfunction that causes the development of harmful symptoms involving behaviors, thoughts, impulses, and emotions." Mental disorders lead to severe consequences in meeting the demands of everyday existence. Thus, if you have ever suffered from an hallucination or from problems with a depressed mood, this does not mean that you had a mental disorder. Instead, we diagnose the presence of a mental disorder only when the disturbances in thoughts, emotions, impulses, and behavior are causing serious problems in a person's ability to adapt to the everyday demands of life. If at any time during your reading of this chapter you become concerned because you fear that you or someone you know may have the mental disorder being discussed, you should seek out expert opinion. You probably will find that there was little to worry about. In those few cases where there is a real problem, you probably will find that effective treatments exist for reducing or eliminating the symptoms.

SQ 7-4: What is the most proximate cause of mental disorders? List some important ultimate causes of mental disorders. What distinguishes the different theoretical approaches used by those who research the causes of mental disorders?

Schizophrenia

Of all the psychotic disorders, schizophrenia is probably the most severe because it causes extreme disturbances in everyday functioning. The disorder also causes a great deal of emotional distress to the person who has developed it as well as to his/her family and friends. Much of this distress is caused by the fact that schizophrenia tends to be a chronic (long-lasting) disorder that often develops just as the person is becoming an adult. It is estimated that about two million Americans have schizophrenia right now; and that about 1.5% of Americans (almost four million of those alive today) will suffer from schizophrenia at some point during their lives. In general, schizophrenia typically develops sometime during late adolescence or young adulthood (usually between 15 and 25 years of age). On average, males tend to develop the disorder somewhat earlier

than females: almost all male schizophrenics develop the disorder before 30 years of age, whereas about 40% of female schizophrenics develop it after this age. I first will describe some of the major symptoms of schizophrenia and then I will discuss some proposed explanations for its development.

Symptoms of Schizophrenia

It is very hard for those of us who have never had schizophrenia to understand the experiences of people with the disorder. In order to help you get a better “feel” for what it is like to have schizophrenia, I will illustrate the major symptoms of the disorder by quoting the descriptions of those who have experienced them firsthand. It is helpful to distinguish between two major groups of schizophrenic symptoms—positive and negative symptoms. A **positive symptom** is a **distortion or exaggeration of a mental or behavioral function**. For example, a person who sees something that is not really there is experiencing a distortion in the function of perception. A **negative symptom** is a **reduction or absence of a mental or behavioral function**. For example, a person who states that he feels no pleasure in his/her life is experiencing a reduction of emotionality. Most people with schizophrenia suffer from some combination of positive and negative symptoms. In the following sections, I will sketch out the major positive and negative symptoms of schizophrenia. As you read about these symptoms, there are two important points to keep in mind: (a) there is no symptom that is observed in all individuals diagnosed with schizophrenia, and (b) most individuals expressing a particular symptom show it to only a mild or moderate degree.

Positive Symptoms. There are several positive symptoms of schizophrenia: hallucinations, formal thought disorder, and delusions. A **hallucination** can be defined as a **perception in the absence of sensation**. In other words, a person experiences a sight, sound, smell, taste, or touch, but the relevant sensory receptors are not being stimulated. The most common hallucination in schizophrenia involves hearing sounds, a problem known as **auditory hallucinations**. Most people with schizophrenia experience auditory hallucinations at some point. Even people who are born deaf may experience auditory hallucinations if they develop schizophrenia later in life. These hallucinations often involve voices, but they also can involve other kinds of sound. When voices are heard, there are some differences in how they might be experienced by different people. Some will hear voices most of the time, whereas others will hear them only occasionally. The voices usually say embarrassing or unpleasant things; but some people experience pleasant, helpful, or caring voices. The voices may be people the schizophrenic person knows or they may be strangers. One person described the hallucinated voices in this way:

For about almost seven years—except during sleep—I have never had a single moment in which I did not hear voices. They accompany me to every place and at all times; they continue to sound even when I am in conversation with other people, they persist undeterred even when I concentrate on other things, for instance read a book or a newspaper, play the piano, etc.; only when I am talking aloud to other people or to myself are they of course drowned by the stronger sound of the spoken word and therefore inaudible to me. But the well-known phrases recommence at once, sometimes in the middle of a sentence, which tells me that the conversation had continued during the interval, that is to say that those nervous stimuli or vibrations responsible for the weaker sounds of the voices continue even while I talk aloud (Torrey, 1995; p. 60)

Although auditory hallucinations are suffered by most schizophrenics, few have a problem as severe as this person does.

Hallucinations involving the other senses—vision, touch, smell, and taste—also may occur, but they are much less common than auditory hallucinations. Of these less common hallucinations, visual and tactile hallucinations are the most frequent. With regard to tactile hallucinations, one woman described by Torrey (1995) stated that she could feel insects crawling under the skin on her face. As for visual hallucinations, another patient reported the following:

At an early stage the appearance of colored flashes of light was common. These took the form either of distant streaks or near-by round glowing patches about a foot in diameter. Another type, which took place five or six times, was the appearance of words or symbols on blank surfaces. Closely connected with this was the occasional substitution of hallucinatory matter for the actual printed matter in books which I have been reading. On these occasions, the passage which I have been seeing has dissolved while I have been looking at it and another and sometimes wholly different passage has appeared in its place. (p. 61)

On another occasion, this person hallucinated on a wall “the pictures of the heads of young women as though projected from a projection machine” (p. 61). Such hallucinations also can occur in people suffering from disorders other than schizophrenia; and they sometimes occur in people who have no mental disorder at all (as, for example, in “visions” associated with religious experiences).

Many people, when they first begin to develop schizophrenia, have unusual perceptions in which actual physical stimuli are perceived in a distorted way (and, hence, they are not

hallucinations). For example, one person with schizophrenia stated that sounds became louder: “It’s as if someone had turned up the volume.... I notice it most with background noises—you know what I mean, noises that are always around but you don’t notice them. Now they seem to be just as loud and sometimes louder than the main noises that are going on.... It’s a bit alarming when there’s so much going on that you can’t help listening to” (Torrey, 1995; p. 31). In fact, these altered sensations sometimes seem to pour into the person’s mind so that it is difficult for the person to pay attention to anything in particular, a phenomenon that has been referred to as **stimulus flooding**:

Everything seems to grip my attention although I am not particularly interested in anything. I am speaking to you just now, but I can hear noises going on next door and in the corridor. I find it difficult to shut these out, and it makes it more difficult for me to concentrate on what I am saying to you. Often the silliest little things that are going on seem to interest me. That’s not even true: they don’t interest me, but I find myself attending to them and wasting a lot of time this way. (Torrey, 1995; p. 33)

Stimulus flooding may cause the person to look confused to others: “An outsider may see only someone ‘out of touch with reality.’ In fact we are experiencing so many realities that it is often confusing and sometimes totally overwhelming” (p. 34). Such alterations in sensations often develop into hallucinations eventually.

Formal thought disorder is a **disorganization of the process of thinking**. In other words, the person is having difficulty putting his/her sensations, emotions, and thoughts together into a coherent experience of the world. People with schizophrenia often have cognitive deficits that involve three areas: (a) **memory formation and retrieval**, (b) the ability to **focus their attention voluntarily**, and (c) the ability to **organize and analyze information** in order to problem-solve. Because of these difficulties with information processing, schizophrenic people have difficulty making sense of their environments. In fact, many experience the world in fragments, as if it were made up of a large number of isolated events with little connection to each other. One patient put it this way:

Everything is in bits. You put the picture up bit by bit into your head. It’s like a photograph that’s torn in bits and put together again. If you move it’s frightening. The picture you had in your head is still there but broken up. If I move there’s a new picture that I have to put together again. (Torrey, 1995; p. 41)

In some cases, the phenomenon of stimulus flooding causes this problem: the person cannot follow a train of thought because new sensations keep flooding into his/her mind. But almost all schizophrenics, even when they are not experiencing stimulus flooding, have difficulty making sense of the world because they cannot think coherently. Even relatively simple activities such as watching a movie or reading a magazine can be impossible for a person with schizophrenia:

I tried sitting in my apartment and reading: the words looked perfectly familiar, like old friends whose faces I remembered perfectly well but whose names I couldn't recall; I read one paragraph ten times, could make no sense of it whatever, and shut the book. I tried listening to the radio, but the sounds went through my head like a buzz saw. I walked carefully through traffic to a movie theater and sat through a movie which seemed to consist of a lot of people wandering around slowly and talking a great deal about something or other. I decided, finally, to spend my days sitting in the park watching the birds on the lake. (p. 42)

Many schizophrenics will not even watch television because they cannot understand what is happening in the story. If they do watch television, they usually prefer very simple programs such as cartoons meant for young children.

Because of their formal thought disorder, people with schizophrenia have a great deal of difficulty responding to the world in appropriate ways. For example, what they say often sounds confused and disorganized, and it can become quite bizarre. The most common form of disorganized speech is called **loose associations**, a problem that involves going from topic to topic, with each topic being only marginally related to the topics before and after it. The following quote from the Russian ballet dancer, Vaslav Nijinsky (1890-1950), who developed severe schizophrenia, illustrates this symptom well:

I am not artificial. I am life. The theatre is not life. I know the customs of the theatre. The theatre becomes a habit. Life does not. I do not like the theatre with a square stage. I like a round stage. I will build a theatre which will have a round shape, like an eye. I like to look closely in the mirror and I see only one eye in my forehead. (Torrey, 1995; p. 45)

If you read the passage carefully, you will see that each sentence is related to the one before and after it, but only in a very superficial way. By the end of the passage, he is talking about something very different from the idea that started the passage. Sometimes, associations are so loose that the responses of schizophrenics to questions asked of them may seem completely irrelevant. For

example, when asked to explain the proverb, “people who live in glass houses shouldn’t throw stones,” one person answered by saying, “Don’t hit until you go—coming or going.” Another responded, “Some people are up in the air and some in society and some up in the air.” A third patient simply said, “Caution” (p. 46). The most extreme type of disorganized speech is sometimes referred to as “word salad.” It is a symptom in which the person strings together completely unrelated words, such as the patient who turned towards his psychiatrist and asked in a very solemn voice, “Bloodworm Baltimore frenchfry?”

The problems in thinking experienced by most schizophrenics make it relatively easy for them to develop unusual beliefs—delusions—that seem to them to explain their strange experiences. A **delusion** is a **firmly held belief, not common in one’s culture, for which there is little, no, or even contradictory evidence**. Many delusions are a consequence of the attempt to explain hallucinations or other unusual sensations experienced by schizophrenics. In the following example, you should be able to see how both the normal and abnormal experiences of a schizophrenic patient are explained with his delusional thinking:

I got up at seven A.M., dressed and drove to the hospital. I felt my breathing trouble might be due to an old heart lesion.... I decided that I was in heart failure and that people felt I wasn’t strong enough to accept this, so they weren’t telling me. I thought about all the things that had happened recently that could be interpreted in that light. I looked up heart failure in a textbook and found that the section had been removed, so I concluded someone had removed it to protect me. I remembered other comments. A friend had talked about a “walkie-talkie,” and the thought occurred to me that I might be getting medicine without my knowledge, perhaps by radio. I remembered someone talking about a one-way plane ticket; to me that meant a trip to Houston and a heart operation. I remembered an unusual smell in the lab and thought that might be due to the medicine they were giving me in secret. I began to think I might have a machine inside me which secreted medicine into my bloodstream.... At this point, I panicked and tried to run away, but the attendant in the parking lot seemed to be making a sign to motion me back.... A custodian’s eyes attracted my attention; they were especially large and piercing. He looked very powerful. He had to be “in on it,” maybe he was giving medicine in some way. (Torrey, 1995; p. 53)

As you learned in Chapter 5 when I talked about attribution theory, all humans try to understand their experiences by inferring causes for the events occurring around them. We use consensus, pervasiveness, and consistency information to make attributions that are either internal or external, general or specific, and stable or unstable. People with schizophrenia are no different. They realize

that their experiences (especially their hallucinations) are not shared by most people (low consensus), that they are having these experiences in most situations (high pervasiveness), and that they are having these experiences in each situation on many occasions (high consistency). According to what we learned in Chapter 5, they should infer that the cause of their experiences is internal to them. But surprisingly, they often do not infer this (we say that they have little “insight” into their problems). It seems very likely that their formal thought disorder makes it difficult for them to make the expected attributions. In other words, their formal thought disorder, more than anything else, gives rise to their delusions. This seems to be the case with the man I just quoted. Because of his formal thought disorder, his external attributions for what we know to be internally generated hallucinations seemed perfectly obvious to him.

Schizophrenics may mistrust anyone who tries to convince them that their attributions are wrong. In fact, the most common delusion in schizophrenia involves the belief that others are trying to harm you, which is known as a **delusion of persecution**. Most delusions of persecution involve a powerful agency—such as the FBI or the CIA—that the person believes is trying to destroy his/her life. For example, there was the case of a German mass murderer by the name of Ernst Wagner. On two nights in September of 1913, Wagner murdered thirteen people (including his wife and four children) and wounded twelve more. This case received widespread attention at the time and was commented on by several German psychiatrists. It is unlikely that Wagner had schizophrenia, but he definitely had delusions of persecution that led him to commit the murders. The delusions began to form in 1901, twelve years before the murders:

On the way home from the local inn, his sexual appetite aroused by drink, he committed several acts of indecency with animals. How often this happened, or with what kind of animals, we still do not know.... The acts were witnessed by no one. Immediately afterwards, his despair was enormous; so was his anxiety lest he should be found out, and his shame that by his bestial practices he had sinned against all mankind. He wandered about in restless torment and the very next day, ...he believed, in a state of tense expectation, that other people knew of his disgraceful behavior by looking at him. Before long, he noticed that people were making remarks about him and were pointing at him behind his back. If two or three people were standing together, he felt that they were laughing and jeering at him. (Gaupp, 1914; quoted in Maher & Spitzer, 1993; pp 102-103)

He began to think about committing suicide, and he carried a loaded gun in his pocket so that he could kill himself immediately if the police came for him (at his wedding, for example, he secretly carried two loaded guns). After he had children, he decided that he could not kill himself and leave

them fatherless. He decided, therefore, that if he were to commit suicide, he also needed to kill his family—a decision strengthened by his belief that his children had inherited his sexual problems. Because he believed that the men in his town were talking about him, he decided to kill them as well. It took him several more years, however, before he actually performed the killings. After the murders, Wagner was captured and spent the rest of his life in an asylum.

Negative Symptoms. There is a moderately long list of negative symptoms of schizophrenia but I will describe briefly only four of the more common ones: avolition, alogia, asociality, and blunted affect. **Avolition is an inability to accomplish most goals** (such as those involving work or school) **because of a lack of motivation**. In everyday language, we say that the person doesn't seem to care about anything. **Alogia is a relative lack of meaningful speech**. The alogic person either speaks very little or, when a normal amount of words is spoken, he/she communicates very little information (for example, the person may describe in great detail how he/she made a piece of toast that morning). Alogia seems to indicate that the person has very few meaningful thoughts. Thus, it may be a variation of formal thought disorder. **Asociality is a withdrawal from social interactions**. The asocial person spends much time alone, and often seems not to desire close contact with others. Asociality may also reflect a focusing on unusual internal experiences (such as hallucinations and delusions) that consumes much of the person's time. **Blunted affect** (which also sometimes is called "flattened affect") is **a reduction in the amount of emotional expression**. A person with blunted affect may express emotions, but only to a very minor degree. Most of the time, the person has a blank look that gives his/her face a mask-like appearance. People with blunted affect usually state that they are feeling emotions, but that they are unable to express them. When severe, negative symptoms give others the impression that the schizophrenic person is not quite "there"—that the person is merely a shell of his/her former self.

Changes in Symptoms. There are many changes that occur in the symptoms of people with schizophrenia after the onset of the disorder. Of most importance is the fact that, as the person gets older, schizophrenic symptoms often decrease substantially. By the time a schizophrenic person gets into his/her 50s and 60s, the positive symptoms of schizophrenia may be almost nonexistent, although negative symptoms may still be expressed to some extent. Any positive symptoms that are left, such as auditory hallucinations, often are ignored by the person so that he/she is able to function much better than when younger. There are many exceptions to this pattern, however.

SQ 7-5: What percentage of Americans will suffer from schizophrenia at some point in their lives? When do schizophrenic symptoms typically develop? Distinguish between positive and negative

symptoms of schizophrenia and describe the symptoms mentioned in the book. Distinguish between hallucinations and delusions. What is the most common hallucination in schizophrenia? What is the most common delusion in schizophrenia? What change(s) in symptoms tend(s) to occur as a schizophrenic person gets older?

Explanations of Schizophrenia

In trying to find causes of schizophrenia, there are several facts that may help us to narrow down the possibilities. First, **it seems that schizophrenia was a very rare disorder until the nineteenth century**. Some evidence suggests that, during the 1800s, the frequency of schizophrenia increased dramatically—an increase that continued into the twentieth century. Second, **the frequency of schizophrenia varies among different parts of the United States and among different ethnic groups**. For example, there are higher rates of schizophrenia in urban areas compared to rural areas; and rates of schizophrenia seem to be particularly low among people of Mexican descent. Third, **the frequency of schizophrenia varies among different countries**. The average rate of schizophrenia in the U.S. is high relative to that of many other countries (especially to the rates observed in nonindustrialized countries). The frequency of schizophrenia is lowest in Ghana, Botswana, Papua New Guinea, and Taiwan; and it is highest in Dominica, Ireland, Finland, and Sweden. Fourth, **the frequency of schizophrenia varies over time**. For example, in Ireland, schizophrenia is highest in those people born before 1940. On the other hand, in the U.S., it seems that schizophrenia has been increasing in recent decades. What does this all mean? Although it is not obvious how these facts may be related, it seems likely that, if we could relate them, we might be able to discover the major cause or causes of schizophrenia. In this section, I will discuss some theories that have been developed to explain facts such as these. I have separated them into those focused primarily on proximate causes and those focused primarily on ultimate causes.

SQ 7-6: Describe the differences observed in rates of schizophrenia in different geographical areas, different time periods, and in different ethnic groups.

Proximate Causes. Theories that look at proximate causes of schizophrenia are concerned with either (a) **neurotransmitters and other biochemicals** in the body, or (b) **brain structures and activity**, both of which are seen as direct causes of the symptoms of schizophrenia. Let's talk first about biochemical theories of schizophrenia. The best support for these theories involves the effects of various drugs on the symptoms of schizophrenia. For example, the following drugs all can produce schizophrenia-like symptoms in at least some people: amphetamines, PCP, anabolic steroids, antidepressants, Antabuse, Motrin, Ritalin, Afrin, Actifed,

and LSD. You may be surprised to see some commonly used medications on this list. There actually are many other commonly used drugs that can produce symptoms similar to those of schizophrenia in at least a small number of people. These drugs are thought to interact with the particular biochemistry of certain individuals to produce the symptoms. This suggests that schizophrenia itself, in at least some people, may be caused by an unusual biochemistry of the body. Other drugs reduce the symptoms of schizophrenia in those who have the disorder. These drugs are called **antipsychotics**. They can improve the positive and negative symptoms of schizophrenia to such an extent that sometimes the person may seem normal to observers (nevertheless, they do not cure the underlying problems thought to cause schizophrenia). These drugs affect various neurotransmitters in the brain. As you may recall from Chapter 2, neurotransmitters are biochemicals, released from axons, which travel across the synaptic gap and bind to the dendrites of other neurons, thereby changing the electrical potentials (voltages) of these other neurons. In this way, neurotransmitters allow the neurons making up the nervous system to communicate with one another.

One neurotransmitter affected by many antipsychotics is **dopamine**. You may recall from Chapter 2 that dopamine is a neurotransmitter involved in the activity of the “pleasure centers” in the limbic system as well as areas important for voluntary movements of the body. Because dopamine is released from neurons throughout much of the brain, it also is important for many other mental processes. It seems that most antipsychotics block dopamine receptors on the dendrites of neurons. When this occurs, dopamine is unable to bind and, thus, it cannot change the electrical potentials of these neurons. These drugs, therefore, reduce the activity of dopamine receptors, which is correlated with a decrease in the symptoms of schizophrenia. This finding has led to the **dopamine theory of schizophrenia**, which states that **excess activity of dopamine causes schizophrenia**. Other evidence supporting the dopamine theory involves drugs that increase the activity of dopamine, such as amphetamine. Based on the dopamine theory, what do you predict should happen when a person takes too much amphetamine over a long period of time? As predicted, it has been found that amphetamine and other drugs that increase dopamine activity cause schizophrenia-like symptoms in normal people. They also make the symptoms of schizophrenia more severe in those who already have the disorder. Nevertheless, there are two major problems with the dopamine theory of schizophrenia. The first problem is that, although dopamine receptors are blocked almost immediately by many antipsychotic drugs, the symptoms of schizophrenia typically do not improve for at least one to two weeks. This suggests that the blocking of dopamine receptors is only the initial step in a long chain of related events that occur over several weeks. It is unknown what these events might be and precisely which changes are most important for reducing schizophrenic symptoms. The second problem with the dopamine

theory is that not all schizophrenics are helped by the antipsychotic drugs affecting dopamine activity. In fact, about 30% of people receiving these antipsychotic drugs are not helped by them at all. A large number of these people, however, are helped by newer drugs, referred to as “atypical antipsychotics,” that seem to affect the neurotransmitter serotonin. This has led some theorists to distinguish between a dopamine-dependent schizophrenia and a serotonin-dependent schizophrenia. Later in this chapter, I will discuss attempts to subtype schizophrenia into different disorders with different causes.

We now know that schizophrenia most often is related to problems in the brain that are correlated with problems in neurotransmitter activity. One important question that researchers would like answered is which areas of the brain are involved in the development of schizophrenia? Some of the earliest studies looking for possible brain dysfunctions involved the use of autopsies and X-rays. These techniques, however, often gave results that were difficult to interpret. With regard to autopsies, many abnormalities develop in the brain immediately after death, which makes it difficult to attribute any observed abnormality to schizophrenia. With regard to X-rays, because they give very crude pictures of the brain, they are virtually useless for identifying small amounts of damage in limited areas. Since the 1980s, however, several new techniques have been developed that allow us to get very clear pictures of brain structures in living subjects as well as to measure the activity of various brain structures. These newer techniques have identified several brain abnormalities in schizophrenic people. **The most easily observed abnormality is enlarged ventricles.** The cerebral ventricles are part of a system of cavities and canals in the central nervous system (the brain and spinal cord) through which cerebrospinal fluid flows. In many schizophrenics, there is some enlargement of the lateral and third ventricles in the brain. Although this is the most easily observed abnormality among schizophrenics, it also is found in those suffering from other brain problems (such as Alzheimer’s disorder, tumors, and strokes). Thus, it probably does not directly cause schizophrenia.

A second abnormality that is probably more important for causing schizophrenic symptoms is **the atrophy of structures within the limbic system**, especially the hippocampus and the amygdala. The word “atrophy” means a “wasting away or failing to develop.” This implies that structures within the limbic system either developed fully and then began to waste away at some point, or never developed fully in the first place. You may recall from the discussion in Chapter 2 that the hippocampus is involved in the formation of memories and the amygdala is involved in the regulation of emotions. Furthermore, other areas in the limbic system regulate biological drives (such as those involving sex and hunger). The limbic system as a whole is associated with many more functions than these, however. This is evident in the fact that most sensory information

passes through the limbic system and that the limbic system is connected directly with all other areas of the brain. In other words, the limbic system is a sort of “central receiving and distribution area” within the brain. Problems in the limbic system, therefore, should give rise to problems in emotional expression, perception, memory, motivation, and many other essential functions. As you already know, disturbances of all these functions are observed in most people with schizophrenia. Because of the limbic system’s central importance for many mental functions and because of the damage that has been found in the limbic systems of many schizophrenics, **schizophrenia researchers believe that the limbic system is the most important brain area for understanding the causes of schizophrenia.**

Although damage to particular brain structures has been found in many schizophrenics, most researchers believe that schizophrenics also may have very subtle problems in their brains—problems that are not easily seen in pictures. In these cases, we need to look at disturbances in brain activity itself. There exist several techniques that allow us to observe directly the activity of different regions in the brain, such as the EEG (which, as you learned in Chapters 1 and 2, is a rough measure of electrical activity in a large group of neurons). In recent years, some very sophisticated techniques have also been developed that provide us with more detailed information than can be obtained with the EEG. By using such techniques, it has been discovered that many schizophrenic people show **decreased activity in the frontal lobes**. As you may recall from Chapter 2, the frontal lobes are involved in a large number of important functions, especially those involved in solving problems, planning actions, and producing language. Schizophrenics often have difficulties with all of these abilities. **Abnormal activity also has been found in the limbic system**, a finding that is consistent with the structural problems mentioned above. For example, the EEG shows abnormal activity in the limbic systems of most schizophrenic people. The fact that the limbic system shows abnormal EEG activity in many schizophrenics suggests that the development of schizophrenia involves disturbances of neuronal communication within this area of the brain. As I stated above, because most of the sensory information from the outside world passes through the limbic system and because the limbic system has direct connections to all other areas of the brain, disturbances in its electrical activity should have widespread effects on cognitive, emotional, and motivational functions. Taken together, then, the evidence of structural damage and disturbances of brain activity suggest strongly that **schizophrenia is a disorder most proximately caused by widespread abnormalities in the brain, especially in the limbic system.**

It is important to remember, however, that there is no particular brain abnormality that is observed in all schizophrenic people. In fact, there are some schizophrenics who show no

detectable brain abnormalities at all (this does not mean that they don't have any, it means only that we can't detect them). In addition, people with other brain disorders, and even some people without any observable disorder, show similar brain abnormalities. In other words, no brain abnormality has been observed which is specific to schizophrenia or which occurs in all cases of schizophrenia. The best inference to make from these findings is that **there are likely to be several different brain dysfunctions important for causing schizophrenic symptoms, with no one cause being either necessary or sufficient.** This conclusion has led many researchers to think of schizophrenia as being, in reality, several different disorders, each with its own set of causes. That is, just as we can subtype a medical disorder (such as cancer) into several different kinds (for example, lung cancer, skin cancer, and pancreatic cancer), we should eventually be able to subtype schizophrenia into several different disorders, each with a different set of causes and symptoms.

One widely used subtyping scheme involves distinguishing among paranoid, catatonic, and disorganized (hebephrenic) schizophrenia. **Paranoid schizophrenia** is defined as a subtype of schizophrenia in which the person is preoccupied with delusions (especially delusions of persecution) or is experiencing frequent auditory hallucinations. Paranoid schizophrenics are more likely than other schizophrenics to be angry, anxious, argumentative, and violent. Some evidence suggests that paranoid schizophrenics have a later age-of-onset of the disorder and are more likely to recover than other schizophrenics. **Catatonic schizophrenia** is defined as a subtype of schizophrenia in which the person shows various problems in movements and voluntary behavior. For example, catatonic schizophrenics may assume an unusual posture and maintain it for hours, or they may engage in excited behavior that seems to have no goal. This subtype has decreased since the introduction of antipsychotic drugs, a finding that suggests that these drugs may be especially effective in its treatment. **Disorganized schizophrenia** (formerly known as hebephrenic schizophrenia) is defined as a subtype of schizophrenia in which the person shows formal thought disorder as well as strange or childlike behaviors. Disorganized schizophrenics are more likely to have a chronic (long-lasting) disorder and to have severe problems in interpersonal relations compared to other schizophrenics. Although this way of subtyping schizophrenia has a long history, it has at least two problems. (1) **Many people cannot be assigned to any particular subtype because they show symptoms of more than one.** (2) **Many people change from one subtype to another as they age.** Because of such problems, researchers are constantly trying to develop better subtyping schemes. At present, however, no alternative has proved to be any better (or worse) than the one just discussed. Thus, the search for different subtypes of schizophrenia continues. As we find out more about the causes of schizophrenia, we hope to develop better ways of subtyping the disorder.

SQ 7-7: Discuss the major proximate explanations of schizophrenia. In your answer, describe the neurotransmitters and brain areas involved in schizophrenia, and outline the evidence supporting these explanations. What are two difficulties with the dopamine theory of schizophrenia? What is the major problem with identifying brain dysfunctions causing schizophrenia? Describe the major subtypes of schizophrenia. Why have researchers been so interested in subtyping schizophrenia? Why has it proved so difficult to subtype schizophrenia?

Ultimate Causes. Some evidence now suggests that the brain abnormalities of schizophrenic people develop very early in their lives. In fact, it is widely believed that most of these abnormalities form when their brains first develop before birth. If this is true, it means that there are important ultimate causes that must be having effects sometime between conception and birth in many people who develop schizophrenia. Most theories that propose such ultimate causes of schizophrenia are concerned with either (a) **genetics** or (b) **environmental factors** that affect brain development. Genetic studies have often shown that genes are important for the development of schizophrenia. Some of the best evidence involves the comparison of monozygotic (MZ) twins and dizygotic (DZ) twins. As you may remember from the last chapter, MZ twins share 100% of their genes whereas DZ twins share, on average, about 50% of their genes. If a characteristic is caused by genes, then the two members of MZ twin pairs should be more alike than the two members of DZ twin pairs, on average. This has been found to be true for schizophrenia. On average, in about 30% of the cases, when one member of an MZ twin pair has schizophrenia, the other one also has the disorder. With DZ twin pairs, on the other hand, both members have it only about 10% of the time. And finally, in the general population (which is made up mostly of unrelated individuals), about 1% of the population develops schizophrenia at some point during their lives. These results show that, the greater the number of genes that you share with a schizophrenic, the more likely it is that you will develop schizophrenia. In fact, it does not seem to matter whether you are brought up in the same family or not. That is, the social environment in which a person is raised does not seem to affect his/her chances of developing schizophrenia. Nevertheless, it seems likely that something in the environment must be important for the development of schizophrenia. I say this because, even in the case of MZ twins (who are genetically identical), there is only a 30% chance of developing schizophrenia when a co-twin has the disorder. This means that having the genes associated with schizophrenia is not enough: one must also experience an abnormal environmental factor if one is to develop the disorder. Furthermore, this must be an environmental factor that one member of a twin pair may experience while the other may not. Thus, **the results of genetic studies suggest that unique environmental factors, in combination with genetic factors, cause schizophrenia.**

But what might some important environmental factors be? As I stated in the previous paragraph, the social environment in which a person is raised does not seem to matter. In fact, there is evidence that the brain dysfunctions that eventually cause schizophrenia are often present from before birth (although they don't produce symptoms until adolescence or young adulthood). If this is true, then it seems likely that, whatever the important environmental factors are, they typically must be having their effects before birth (or at least during or soon after birth). One possibility that has attracted much attention involves viral infections that affect the brains of developing fetuses (a fetus is a developing individual from about the third month of pregnancy until birth). According to Torrey (1995):

Viruses are known to attack very specific areas of the brain while leaving other areas untouched.... Viruses may also alter the function of brain cells without altering their structure; cell enzymes, for example, may be permanently disrupted by a viral infection yet the cell itself will continue to live and show no evident damage. This means that viruses could conceivably cause schizophrenia and leave no trace of their damage visible under a microscope. (pp. 158-59)

Some viruses may not have noticeable effects until years after the person is infected. Thus, an infected fetus may not show symptoms of the infection until fifteen to twenty-five years after birth. This might explain why schizophrenia is not seen until late adolescence or early adulthood in many people. We also know that people with certain genes are more vulnerable to particular viral infections than others. This could explain why genes are associated with schizophrenia. But is there any evidence for the claim that viral infections cause schizophrenia? Yes, there is, but it is not very good at this point. Some viral infections seem to mimic the symptoms of schizophrenia and some (but not all) studies have shown that pregnant women who develop flu symptoms are more likely to give birth to children who eventually develop schizophrenia, especially when the mother is in the second trimester of her pregnancy. Furthermore, one investigation (Torrey, et al., 1994) has found that some schizophrenics have antibodies to particular viruses previously unknown in humans. Lastly, people who develop schizophrenia are most often born during the winter, which is a time of more frequent viral infections.

Other possible environmental causes also have been proposed, such as toxins (for example, environmental pollutants) and obstetrical complications (for example, anoxia, which is a lack of oxygen during childbirth). But again, there is no good evidence for the claim that any one environmental factor is of particular importance for the development of schizophrenia. Torrey,

Bowler, Taylor, and Gottesman (1994) concluded that the best explanation of schizophrenia may be a developmental one in which any one or more of several factors may cause schizophrenia if they act very early in development. That is, they propose that no particular factor may be more important than any other:

Once the original insult takes place at a critical stage of brain development [usually during the fetal stage, but perhaps soon after birth in some individuals], the damage is done. In most cases, however, its effects are not immediately noticeable, except perhaps for nonspecific signs such as lack of coordination or behavioral problems in childhood. In the majority of cases, the effects of the early brain damage must await the maturation of the brain, at which point the developmental damage becomes noticeable as the signs and symptoms of schizophrenia. [For example, there] are now rat models that show you can cause lesions in the hippocampus of a rat's brain during early development, but the effects of the lesions will not show up behaviorally until the rat matures. (p. 203)

Thus, the most popular explanation for schizophrenia seems to be the following: people who eventually will develop schizophrenia often are born with the brain damage that causes the disorder, but they show few or no mental or behavioral difficulties for many years. Any one of a large number of environmental factors in conjunction with a large number of abnormal genes probably cause this early damage to the brain. Thus, we probably never will find one cause of schizophrenia and our attempts to subtype the disease probably will become very complicated in the future.

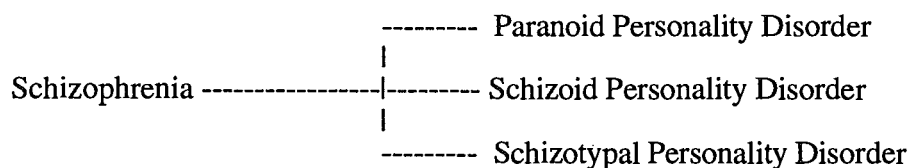
SQ 7-8: Discuss the two major ultimate causes of schizophrenia, genetics and environmental factors, and mention the evidence in favor of each.

Schizophrenia and Personality Disorders

Sometimes a person will exhibit unusual thinking, emotions, and/or behavior, but not so severely that he/she would be diagnosed with schizophrenia. That is, it appears that there may be milder forms of schizophrenia in which the person, although not psychotic, acts, thinks, and feels in peculiar ways. These people usually are diagnosed with having one of the personality disorders. As I discussed in the last chapter, personality is the collection of mental events and behaviors that (a) makes an individual different from others over long periods of his/her life, and (b) tends to occur over a wide range of situations. Traits, motives, and schemas are the basic causes of personality. **A personality disorder is a severe disturbance in personality due to the development of abnormal traits, motives, and/or schemas.** Because an individual's

personality is what others respond to, a personality disorder often makes it very difficult for that individual to function well in society, and it may cause the person to feel a great deal of distress. Because an individual's adult personality, at least in its broad outline, is formed typically by adolescence, a personality disorder often appears by that time. The disorder then typically continues for the rest of that person's life (although, with some of the personality disorders, there may be an improvement as the person ages). Because the mental dysfunction in people with a personality disorder involves core personality factors—factors that are fundamental to their identities—they usually do not feel that their difficulties with others are due to anything that they are doing wrong. In fact, people with personality disorders typically blame others for the problems that their own behaviors are causing. If this is hard for you to understand, just think about how difficult it is for you to admit that you did something wrong in a negative interaction with another. Typically, in such cases, your behavior often seems to you to be natural and correct, so that you often blame the other person for what happened. The same is true for people with a personality disorder, except that they generally have a much harder time than most people seeing their own roles in negative interactions.

Although people with personality disorders are usually not psychotic, some of the personality disorders are thought to be milder versions of psychotic disorders. With regard to schizophrenia, three personality disorders are thought to be related to it:



Paranoid personality disorder is a mental disorder characterized by the **stable and general belief that others are trying to harm, exploit, or deceive one**, even when there is no evidence that others are trying to do so. Spitzer, et al. (1994) described the case of an 85-year-old man diagnosed with paranoid personality disorder:

He has been caring for his bedridden wife, but has been reluctantly persuaded to seek help because her condition has deteriorated, and his strength and energy have decreased with age.... He has never been treated for mental illness.... He had a moderately successful career as a lawyer and businessman. He has been married for 60 years, and his wife is the only person for whom he has ever expressed tender feelings, and is probably the only person he has ever trusted. He has always been extremely careful about revealing anything

of himself to others, assuming that they are out to take something away from him. He refuses obviously sincere offers of help from acquaintances because he suspects their motives. He never reveals his identity to a caller without first questioning him as to the nature of his business. Throughout his life there have been numerous occasions on which he has displayed exaggerated suspiciousness.... He spends many hours monitoring his stock market investments, and has changed brokers several times when he suspected that minor errors on monthly statements were evidence of the brokers' attempt to cover up fraudulent deals. (pp. 211-212)

Although it may sound to you as if this man is suffering from paranoid schizophrenia, he cannot be diagnosed with this disorder because he is not psychotic. The quickest way to tell if someone is psychotic is to determine if he/she is experiencing hallucinations or delusions. This man seems to have had no hallucinations; and, although he has "beliefs of persecution," they are not delusional in intensity. A delusion is a firmly held belief that is not common in one's culture and for which there is little or no evidence. In the case of this man, you could get him to question most if not all of his beliefs if you considered each belief one at a time. That is, they are not held as firmly as they typically would be if they were delusional. The man's beliefs of persecution also are not bizarre: any one of his beliefs could be true in particular instances. His problem is that he believes that virtually everyone is trying to harm or exploit him in some way and, hence, he has never formed a close relationship with anyone but his wife.

So that you may get a better idea for the difference between paranoid personality disorder and paranoid schizophrenia, let's look at the case of a 44-year-old paranoid schizophrenic who was:

brought to the emergency room by the police for striking an elderly woman in his apartment building. His chief complaint is, "That damn bitch. She and the rest of them deserved more than that for what they put me through." ...The patient has been continuously ill since age 22. During his first year of law school, he gradually became more and more convinced that his classmates were making fun of him. He noticed that they would snort and sneeze whenever he entered the classroom. When a girl he was dating broke off the relationship with him, he believed that she had been "replaced" by a look-alike. He called the police and asked for their help to solve the "kidnapping." ... [He believes] that his apartment is the center of a large communication system that involves all three major television networks, his neighbors, and apparently hundreds of "actors" in his neighborhood. There are secret cameras in his apartment that carefully monitor all his activities. When he is watching TV,

many of his minor actions (e.g., going to the bathroom) are soon directly commented on by the announcer. Whenever he goes outside, the “actors” have all been warned to keep him under surveillance. (Spitzer, et al., 1994; pp. 101-102)

This man’s problems are definitely much more severe than are those of the elderly gentleman with paranoid personality disorder. The most important differences from the previous case study involve the intensity of the schizophrenic man’s paranoid beliefs and the severity of the behaviors that result from them. These beliefs are held so firmly that he will engage in bizarre behaviors designed to end the “persecution.” His beliefs also are bizarre: they are so far outside anything that is possible that they sound “crazy” to us. The schizophrenic man’s perceptions of his environment also suggest a severe thought disorder, something that was not evident in the case of the man with the personality disorder. In fact, the man with paranoid personality disorder was a successful lawyer and businessman, something that would not have been possible if he had had severe thought disorder. Lastly, the schizophrenic man’s behaviors, thoughts, and emotions changed during adulthood—these were not a part of his personality that had existed since adolescence, which is the time that most personality disorders become apparent. I hope that you can see how difficult it is to diagnose mental disorders accurately: there are many subtle distinctions a clinician must make between very similar behaviors when attempting to diagnose a mental disorder. In general, however, the distinction between a personality disorder and schizophrenia is that the personality disorder usually appears by adolescence and it does not involve a psychosis.

Schizoid personality disorder is a mental disorder characterized by **the apparent lack of a desire for social relationships**. People with this disorder seem to get no satisfaction from their interactions with others, and seem indifferent to either praise or criticism. Because of this, they spend most of their time alone. As you might expect, they usually have no close friends and no one in whom to confide their thoughts and feelings (except for perhaps a family member). People with schizoid personality disorder also have other problems. Most importantly, they seem to find little that is pleasurable in life; and they usually express very few emotions (especially anger) even though they may feel various emotions (especially painful ones when they interact with others). The following case of a 50-year-old retired policeman illustrates most of these symptoms. He sought out clinical help for depression caused by the death of his dog:

The patient lives alone and has for many years had virtually no conversational contacts with other human beings beyond a “Hello” or “How are you?” He prefers to be by himself, finds talk a waste of time, and feels awkward when other people try to initiate a relationship.... He is employed as a security guard, but is known by fellow workers as a

“cold fish” and a “loner.” They no longer even notice or tease him, especially since he never seemed to notice or care about their teasing anyway.... The patient floats through life without relationships except for that with his dog, which he dearly loved. At Christmas he would buy the dog elaborate gifts and in return would receive a wrapped bottle of scotch that he bought for himself as a gift from the dog. He believes that dogs are more sensitive and loving than people, and he can in return express toward them a tenderness and emotion not possible in his relationships with people. The loss of his pets are the only events in his life that have caused him sadness. He experienced the death[s] of his parents without emotion, and feels no regret whatever at being completely out of contact with the rest of his family. He considers himself different from other people and regards emotionality in others with bewilderment. (Spitzer, et al., 1981; p. 209)

This man seems not to care about having contacts with people, and seems unable to comprehend their motivations or emotions. Of course, this makes it impossible for him to have intimate relationships with others. Nevertheless, he must desire some sort of relationship because he feels very strongly about interacting with dogs. It is a fact that dogs exhibit none of the motivational and emotional complexities of humans. It may be this that makes it possible for the man to relate to dogs in ways that are meaningful to him: he also has little motivational or emotional complexity. People with schizoid personality disorder are not psychotic and, therefore, we would not diagnose them with schizophrenia. Nevertheless, people with schizoid personality disorder have some important similarities to people with schizophrenia. (1) They tend to be socially withdrawn and isolated, (2) to show few emotions, and (3) to receive little pleasure from experiences that most people would find pleasurable (such as eating or having sex). In general, people with schizoid personality disorder show some of the negative symptoms of schizophrenia, especially asociality and blunted affect. Because of this, some researchers have suggested that it also is a mild form of schizophrenia. In fact, when under a great deal of stress, people with schizoid personality disorder may become psychotic for a brief period of time (minutes to hours). Because their psychotic episodes last only a short time, however, we would not diagnose them as having schizophrenia.

Schizotypal personality disorder is a mental disorder characterized by **disturbances in thinking and perceiving as well as by severe discomfort in social situations**. People with this disorder show all sorts of odd and unconventional behaviors, and they express many peculiar thoughts. For example, they may be preoccupied with supernatural and paranormal phenomena to a degree that is beyond what is normal in their culture, such as believing that they can control the thoughts, emotions, and behaviors of others. They may have illusory experiences associated with these preoccupations, such as the experience of seeing their recently

deceased dog out of the “corner of their eye.” When speaking to others, their thoughts may appear disorganized, with some loose associations. The following case of a 32-year-old woman illustrates well many of these symptoms. She was unmarried, unemployed, and complained of feeling “spacey”:

For many hours each day she feels as if she were watching herself move through life, and the world around her seems unreal. She feels especially strange when she looks into a mirror. For many years she has felt able to read people’s minds by a “kind of clairvoyance I don’t understand.” ... She is preoccupied by the thought that she has some special mission in life, but is not sure what it is.... She is very self-conscious in public, often feels that people are paying special attention to her, and sometimes thinks that strangers cross the street to avoid her. She is lonely and isolated and spends much of each day lost in fantasies or watching TV soap operas. She speaks in a vague, abstract, digressive manner, generally just missing the point, but she is never incoherent. She seems shy, suspicious, and afraid she will be criticized. She has no...hallucinations or delusions.... [and] has never had treatment for emotional problems. She has had occasional jobs, but drifts away from them because of lack of interest. (Spitzer, et al., 1981; pp. 95-96)

This person seems very peculiar. In fact, you might be tempted to say that she has schizophrenia. But look more carefully at the description. She has no symptoms that are severe enough to be called delusions, hallucinations, or formal thought disorder, but she does have problems that seem to be mild forms of these psychotic symptoms. People with this disorder often are unkempt in their appearance and usually have poor social skills (for example, they may avoid eye contact and have difficulty chatting informally with others). Much of this has to do with the fact that they feel very uncomfortable in social situations. In fact, they are somewhat similar to those with schizoid personality disorder in that they often seem not to desire close relationships. They also are similar to those with paranoid personality disorder in that they often are suspicious of others and may believe that others are trying to harm them. Schizotypal personality disorder shows, in very mild form, both the positive and negative symptoms of schizophrenia. As with the other personality disorders, these people are not psychotic, although at times, they may become psychotic for a brief period of time, especially when under a great deal of stress.

All three personality disorders show, in mild form, at least a few of the symptoms of schizophrenia. Thus, many researchers have wondered if these disorders have causes similar to those of schizophrenia. Some evidence supports this possibility. All three personality disorders are more likely to develop in the family members of people with schizophrenia (this is especially true

with paranoid and schizotypal personality disorders). In fact, in the case of schizotypal personality disorder, low doses of antipsychotic medications (those used to treat schizophrenia) are effective treatments; and a small number of people with schizotypal personality disorder eventually develop schizophrenia. In the case of paranoid and schizoid personality disorders, however, antipsychotics are not helpful, and these people are no more likely to develop schizophrenia than is anyone else. Thus, schizotypal personality disorder seems to be the personality disorder most closely related to schizophrenia, paranoid personality disorder is perhaps next, and schizoid personality disorder is probably only minimally related to schizophrenia. But there are still disagreements over this conclusion and it is hoped that future research will help us to understand better the relation of these personality disorders to schizophrenia.

SQ 7-9: Define what is meant by the term “personality disorder.” Describe the symptoms of the three personality disorders thought to be related to schizophrenia. What is the evidence supporting the relationship of these three disorders to schizophrenia?

Mood Disorders

Everyone feels emotions every moment of their lives. These emotions involve two levels: (1) the fleeting emotions that are our responses to thoughts or to events in the environment; (2) the more stable emotions that seem to “color our worlds” over longer periods of time. Both levels occur all the time for each of us. For example, one person I know seems to be mildly depressed almost all of the time in most situations. In fact, he has been mildly depressed for as long as I have known him. When something good happens, he seems to feel genuinely happy for a little while. Nevertheless, even during such times (brief as they are), he never seems to be extremely happy: his happiness is superimposed on a general emotion of sadness. We use the term “mood” to refer to the second level of emotion. In other words, a **mood** is defined as a **general and stable emotional state**. The category of mood disorders is made up of disturbances in mood that cause serious problems in everyday functioning.

In this section, I will discuss the two most severe mood disorders—major depression and bipolar disorder. These two disorders together cause the most problems for people suffering from disturbances of mood. For example, as many as 15% of those suffering from major depression or bipolar disorder commit suicide each year in the United States. It is difficult to get accurate estimates of this, however, because not everyone suffering from a mood disorder is seen by a clinician, and many people commit suicide in ways that are difficult to detect as suicides (for example, they may crash their cars). Even given such difficulties with measuring the social and

personal costs of mood disorders, it seems obvious that these two disorders together account for untold amounts of human suffering.

Symptoms of Major Depression

We all become depressed at times. In fact, even closely related primates, such as baboons and chimpanzees exhibit behaviors that look like depression to human observers. Not all of us, however, will develop a “major depression” during our lives. In this context, the word “major” simply means “severe,” and it is used to distinguish this mental disorder from the more mild depressions that we all experience from time to time. Let’s look at some of the more important symptoms of major depression. (1) *Feelings of sadness or despair*. Almost all people with major depression complain that they feel very sad and despairing. Some people, however, may be able to hide these feelings so well that others are not aware of them. (2) *Anhedonia*. The word **anhedonia** means **the inability to feel pleasure**. Many people with major depression complain that they are unable to feel pleasurable feelings, even when engaged in activities that they normally would find pleasurable. Because of this, depressives often lose interest in most activities. This symptom differs from sadness: people who are sad may still be able to find pleasure in some events (such as talking with friends or riding their horse). Very often, anhedonia is accompanied by a decrease in sexual desire, which may become so severe that sex is seen as an annoying chore rather than a pleasurable activity. (3) *Fatigue*. Many people with major depression lack energy and complain of always feeling very tired, even after they have slept normally. Fatigue often leads to difficulties with concentration that cause problems at school or work. (4) *Sleep changes*. Most people with major depression have difficulties with sleeping. Typically, depressives suffer from insomnia (sleeping too little): they often wake up during the night or several hours before their normal waking time in the morning. A much smaller number of depressives, on the other hand, show hypersomnia (sleeping too much). In fact, these people may sleep as much as sixteen hours per day. (5) *Appetite changes*. Many people with major depression have disturbances in their appetite. The most common problem is a lack of appetite (a problem referred to as “anorexia”). A small number of depressives, however, exhibit increases in appetite. These people often desire foods high in carbohydrates. (6) *Bodily complaints*. Many people with major depression report painful symptoms such as aching in the neck, back pain, muscle cramps, or headaches. They also may experience physical problems such as nausea, vomiting, indigestion, or constipation. (7) *Psychomotor changes*. The word “psychomotor” refers to thoughts (“psycho-”) and movements (“-motor”). In other words, people with major depression often experience changes in the speed of thought processes and bodily movements. Most often, they experience **psychomotor agitation**, which is **an increase in the speed of thinking and moving**. Psychomotor agitation can occur even when the person feels very fatigued. The agitation generally is associated with

overwhelming feelings of anxiety. A much smaller number experience **psychomotor retardation**, which is a **decrease in the speed of thinking and moving**. Psychomotor retardation also seems to be independent of feelings of fatigue. It probably is due to a decrease of activity in key areas of the brain. (8) *Feelings of shame and guilt*. In general, **shame is a feeling of self-disapproval involving the belief that one is a defective person**, whereas **guilt is a feeling of self-disapproval involving the breaking of a rule or the failure to meet an obligation**. Shame often leads to low self-esteem, whereas guilt may lead to attempts to correct the problem that the person believes he/she has caused. Shame may cause people to develop a hopeless attitude about their ability to solve problems, whereas guilt may lead people to punish themselves. Suicidal thinking often results from feelings of shame and guilt.

Let's look at a case of major depression that was first described by Emil Kraepelin (1856-1926) around the turn of the twentieth century (Kraepelin was a German neurologist who developed a taxonomy of mental disorders that was a precursor to the modern *DSM*). Kraepelin described a 59-year-old farmer who showed many of the symptoms of major depression:

The patient looks much older than he really is.... His expression is dejected. The corners of his mouth are rather drawn down, and his eyebrows drawn together.... On being questioned about his illness, he breaks into lamentations, saying that he did not tell the whole truth on his admission, but concealed the fact that he had fallen into sin in his youth and practiced uncleanness with himself; everything he did was wrong: "I am so apprehensive, so wretched; I cannot lie still for anxiety. O God, if I had only not transgressed so grievously!" He has been ill for over a year.... It began with stomachache and head troubles, and he could not work any longer. "There was no impulse left." ...His appetite is bad, and he has no stools. He cannot sleep.... He fastened his neckerchief to strangle himself, but he was not really in earnest. Three sisters and a brother were ill too.... The illness began gradually 7 or 8 months before his admission, without any assignable cause. Loss of appetite appeared first, and then ideas of sin. (quoted in Spitzer, et al., 1994; p. 494)

By going through the characteristics discussed above, we can see that this case clearly describes most of the main symptoms of major depression. (1) He is expressing strong feelings of sadness and despair. (2) He seems to find no pleasure in anything. (3) No mention, however, is made of fatigue. (4) He is suffering from insomnia. (5) He has little appetite. (6) He has many bodily complaints, including aches, pains, and gastrointestinal difficulties. (7) He seems very agitated. (8)

He has strong feelings of guilt and shame. His suicide attempt also is consistent with the diagnosis.

If a person receives no treatment, an episode of major depression usually lasts between six and twelve months. At the end of that time, people typically return to their normal mood state. Major-depressive episodes are common in the United States: about 8% of men and 15% of women will suffer from a major-depressive episode at some point during their lives. About half of these people will have more than one episode. Within any six-month period, about 10 million Americans suffer from a major-depressive episode. Major depression is so common that some people have referred to it as the “common cold” of mental disorders. In fact, it would not be an exaggeration to say that we live in an “age of depression” since the disorder has been increasing in frequency since at least the 1940s.

SQ 7-10: Distinguish between moods and temporary emotional states. Describe the symptoms of major depression. How do the two genders differ in rates of major depression? What percentage of people who have experienced one major depressive episode will suffer from at least one more? How have rates of depression changed in the last 50-60 years? Why is depression referred to as the “common cold” of mental disorders?

Explanations of Major Depression

Major depression not only is becoming more frequent, it now also appears at earlier ages than it did in the past. Today, a person is more likely to have his/her first major depressive episode before the age of nineteen whereas, in the past, major depression was much more likely to first develop during adulthood. No one knows why these changes in frequency and age-of-onset have occurred. As I stated above, it is also the case that women are about twice as likely as are men to develop major depression. Furthermore, the depressive episodes of women tend to be more severe, last longer, and more likely to return compared to the depressive episodes of men. Again, no one knows why. With respect to culture and ethnic groups, differences in symptoms have been found. For example, anhedonia and feelings of worthlessness are more common among people from northern Europe whereas bodily complaints are more common among Asians. Ethnic groups within the United States vary with regard to the frequency of depression. For example, there seem to be high rates of this disorder among Native Americans and people from Southeast Asia. Any attempt to explain the development of major depression will need to take account of findings such as these.

Research on major depression has identified several possible explanations of the disorder. As I did earlier with schizophrenia, I have divided these explanations into proximate and ultimate ones.

Proximate Causes. There are two major proximate causes on which most research has focused: **abnormal neurotransmitter activity** and **maladaptive schemas**. Let's look at abnormal neurotransmitter activity first. Researchers have focused on the activity of two neurotransmitters—serotonin and norepinephrine. They believe that a decrease in the activity of one or both of these neurotransmitters is important for the development of major depression. The evidence for this claim is based mostly on the effects of antidepressant drugs. These drugs, which reduce the symptoms of depression, cause increases in the activity of serotonin and norepinephrine (some drugs affect one of these neurotransmitters more than the other). If it is true that increases in the activity of serotonin and norepinephrine improve depressive symptoms, then what do you think should happen if we lower the activity of these two neurotransmitters? In this case, a person should develop depressive symptoms. In fact, this prediction has been confirmed. Drugs (such as reserpine) that decrease the activity of one or both neurotransmitters have been found to cause depression in many people. Thus, there is now good evidence in favor of the theory that lowered activity of norepinephrine and serotonin are important for the development of depression. Nevertheless, there are some problems with this theory. The most important problem is that, although many antidepressants increase the activity of norepinephrine and serotonin when they are first taken, this increased activity lasts only a few days. After this time, neurotransmitter activity again decreases to low levels but the drugs still have antidepressant effects. Thus, the complete explanation of the effectiveness of antidepressant medications is much more complex than the simple theories we have at present.

Researchers also have examined the effects of maladaptive schemas on depression. Basically, this involves the idea that negative thinking causes depression. Cognitively oriented clinicians believe that some people are more prone to becoming depressed because they have a stable set of schemas that, when activated by negative events, cause them to engage in negative thinking. You probably recall from earlier chapters that a schema is a set of beliefs that is developed from one's experiences with a class of environmental events (such as beliefs about fast-food restaurants or professors). In the case of those schemas thought to underlie depression, depressed people often have negative beliefs about themselves (for example, they may believe that they are boring or stupid) and their worlds (for example, they may believe that most people are selfish and uncaring). As you learned in earlier chapters, when a person experiences an environmental event related to a schema, the schema becomes activated and influences how that

person processes information about the event and what he/she remembers about it later. For example, when you are at the grocery store and the cashier looks at you and says, “paper or plastic,” you immediately understand that she is asking you if you would like your groceries packed in paper bags or plastic bags. Your schema about grocery stores consists of beliefs developed from prior experiences—beliefs that, among other things, concern the sequence of events that typically occur in the checkout line. On the other hand, if your psychology instructor, while handing out tests, asks you the same question (“paper or plastic?”), you undoubtedly will become very confused. You might infer that he is giving you a choice between paper and plastic tests, but you will be uncertain because it is not a part of your “handing-out-tests schema.” Thus, in order to adjust yourself well to the demands of the outside world, you need to have schemas that allow you to organize your experiences well and to respond to them in adaptive ways. The schemas thought to underlie depression do not allow people to do this in many important situations in their lives (hence, we refer to them as “maladaptive” schemas). For example, many students I have talked with have the following schema about the course material: “if I don’t understand something immediately, then I never will understand it.” It should be obvious that having such a schema is likely to make them very upset when they are in any learning situation that involves complex material. Such students are more likely to become depressed by school and to withdraw from difficult courses. Thus, this is a maladaptive schema that could have a large impact on their lives and lead to future problems with depression.

Cognitive theorists believe that people who become easily depressed have had many negative experiences during their lives (especially during childhood) that have caused them to develop maladaptive schemas about themselves and the world around them. These maladaptive schemas, when activated by negative events (such as failures), cause them to become depressed. The maladaptive schemas underlying depression give rise to the **cognitive triad**, which is a set of **negative thoughts about one’s self, one’s experiences with the world, and one’s future**. Aaron Beck and his colleagues, who have done the most work on developing a cognitive theory of depression, describe the cognitive triad in the following way:

The first component of the triad revolves around the patient’s negative view of himself. He sees himself as defective, inadequate, diseased, or deprived. He tends to attribute his unpleasant experiences to a psychological, moral, or physical defect in himself. In his view, the patient believes that *because* of his presumed defects he is undesirable and worthless.... The second component of the cognitive triad consists of the depressed person’s tendency to interpret his ongoing experiences in a negative way. He sees the world as making exorbitant [excessive] demands on him and/or presenting insuperable

[insurmountable] obstacles to reaching his life goals. [In other words, the person thinks to himself, “why is the world always against me?”].... The third component of the cognitive triad consists of a negative view of the future. As the depressed person makes long-range projections, he anticipates that his current difficulties or suffering will continue indefinitely. He expects unremitting hardship, frustration, and deprivation. When he considers undertaking a specific task in the immediate future, he expects to fail. (Beck, Rush, Shaw, & Emery, 1979, p. 11)

It is not surprising that a person with these negative thoughts would become anxious and depressed. Because of the cognitive triad, this person will immediately feel bad about himself when something bad happens and will tend to become hopeless about his future. If the cognitive triad causes depression, it would make sense to get people to change the maladaptive schemas that give rise to their negative thoughts. Beck and his colleagues recommend trying to get people to question their maladaptive schemas by getting them to look at relevant evidence. In other words, cognitive therapists try to get their clients to engage in the sort of scientific reasoning I have been talking about throughout this book. Scientific reasoning is used to examine clients' maladaptive schemas by first looking at the cognitive triad—their negative beliefs about themselves, their worlds, and their futures. The following is an example of a cognitive therapist (T) questioning the evidence for a dieting patient's (P) negative beliefs about himself—beliefs that the patient concludes dooms him to failure with regard to his dieting:

Patient: I don't have any self-control at all.

Therapist: On what basis do you say that?

P: Somebody offered me candy and I couldn't refuse it.

T: Were you eating candy every day?

P: No, I ate it just this once.

T: Did you do anything constructive during the past week to adhere to your diet?

P: Well, I didn't give in to the temptation to buy candy every time I saw it at the store.... Also, I did not eat any candy except that one time when it was offered to me and I felt I couldn't refuse.

T: If you counted up the number of times you controlled yourself versus the number of times you gave in, what ratio would you get?

P: About 100 to 1.

T: So if you controlled yourself 100 times and did not control yourself just once, would that be a sign that you are weak through and through?

P: I guess not—not *through* and *through* (smiles). (Beck, et al., p. 68)

As the patient's hesitant answer to the last question suggests, it is very difficult to change negative views about one's self. This is because your beliefs about yourself are deeply ingrained: you have been developing them since you were a very young child. But much research on cognitive therapy has shown that it is very effective for the relief of depressive symptoms. Furthermore, it often helps to prevent future episodes of depression. This last finding suggests that, if people can change their maladaptive schemas so that they can begin to view themselves, their futures, and their world in more positive ways, then negative events will be less likely to cause them to become depressed.

Attribution theory is closely related to the cognitive theory I have just described. As you learned in Chapter 5, an **attribution** is a **cause that one infers about an event**. When something happens to you, you begin automatically to think of what might have caused it. The attribution that you make is affected by several things, especially by various biases to which we all are prone. You have already learned about the self-serving bias—the tendency to infer that a negative event was caused by external factors (the situation) and that a positive event was caused by internal factors (personality). For example, if you do not do well on a test, you probably will explain this by blaming the teacher who wrote the test or some other factor external to you. But if you do well on a test, you probably will explain this by saying that you are smart or a hard worker. Some people, on the other hand, have the opposite bias, which sometimes has been called the **self-effacing bias**. This can be defined as **the tendency to attribute the cause of a negative event to internal factors (personality) and the cause of a positive event to external factors (the situation)**. People who exhibit the self-effacing bias would attribute a poor test score to some personal factor (they might say that they were stupid or lazy) and a good test score to a situational factor (they might conclude that the test was easy). The first part of this bias—the attribution of negative events (failures) to internal, personal factors—is the part that has interested attribution theorists. In general, they have found that people who become easily depressed when negative events occur **tend to make internal, stable, and general attributions about these negative events**. This has been called the **depressive attributional style**. It is related to Beck's cognitive theory of depression because it is thought to be caused by a set of maladaptive schemas. If you explain a poor test grade by concluding that you're "stupid," you have made an internal, stable and general attribution. Concluding that you are stupid obviously involves an internal attribution. In addition, stupidity is something that should last a long time (it is stable) and should affect your performance in many situations (it is general). If instead of making this attribution, you had blamed your poor test grade on the person next to you who kept tapping his pencil during the test (thereby making it difficult to concentrate), you would have been much less likely to become depressed by your test grade. In this case, you would have

made an external, unstable, and specific attribution. It is external because pencil tapping by another is something that happens in the environment. It is unstable because, on the next test date, you will make sure that you do not sit next to the “pencil-tapper” (thus, the cause will not endure over time). It is specific because pencil tapping occurred only in that one testing situation: the tapper is not going to follow you around and tap his pencil in each situation in which you are being tested. If you typically make external, unstable, and specific attributions for failures, you will be much less likely to become severely depressed by failures.

We can tie together the two proximate explanations I have discussed—abnormal neurotransmitter activity and negative thinking—by relating them to the concept of stress. When we use the word **stress** in psychology, we are referring to **a state (biological and psychological) of negative arousal that is caused by events with which a person is having difficulty coping**. Thus, stress is a person’s response to a situation in which demands are being placed upon him/her. It should be obvious to you that stressful events are an important proximate cause of depression. But it seems that stress causes depression by causing biological changes in our bodies as well as psychological changes in our minds. The biological changes associated with stress seem to involve, in part, the changes in neurotransmitter activity that I discussed above. In addition to this, however, stressful events seem to cause psychological changes involving how we think about our lives. For example, when a stressful event has occurred, it may be hard for us to stop thinking about the event, and we may even begin to imagine other stressful events that might possibly occur to us in the future. That is, stressful events can result in negative thinking in those predisposed to such thinking because of maladaptive schemas. Thus, stress may be a proximate explanation of depression: stress may lead to the development of depression through its effects on the bodies and minds of individuals.

SQ 7-11: Which two neurotransmitters are thought to be most important for the development of depression? Describe the cognitive triad and discuss how it is believed to cause depression. With regard to attribution theory, which pattern of attributions is thought to be most important for the development of depression? Define “depressive attributional style” and the “self-effacing bias.” How is stress thought to be related to depression?

Ultimate Causes. There is little doubt that current environmental events are important proximate causes of depression: people are much more likely to become depressed after experiencing stressful events. The problem is that only some people become depressed after such events whereas other people suffer little or no mood disturbance. Thus, there must be more ultimate causes of the increased sensitivity some people seem to have to stressful events. The three

possibilities most often mentioned are **genetics, childhood experiences, and sociocultural factors**.

With regard to genetics, it seems that the genes one inherits are important causal factors in at least some cases of major depression. On average, people are more likely to develop major depression if close relatives have developed the disorder. Some of this increased chance is probably due to the fact that close relatives share environments; but there also is good evidence to support the claim that shared genes are important. As we have discussed before, a person shares exactly 50% of his/her genes with a biological mother and 50% with a biological father. In addition, this person shares about 50% of his/her genes, on average, with biological brothers and sisters (siblings). When people who eventually develop major depression are placed in adoptive families soon after birth, it has been found that their biological relatives also tend to have a slightly increased chance of developing major depression. Since the adopted individuals did not share a social environment with their biological relatives, this increased chance is best explained as being due to shared genes associated with depression. How might genes cause depression? Genes are important for the production of biochemicals in the body—biochemicals such as neurotransmitters in the brain. Thus, it seems likely that, in at least some people, the inheritance of abnormal genes results in the development of abnormal neurotransmitters or abnormal brain structures that predispose them to develop major depression after even relatively minor negative events. Nevertheless, most research suggests that, in general, the relationship of genes to the development of major depression is relatively weak. Environmental factors, such as childhood experiences, are probably more important.

With regard to childhood experiences, it is widely believed that such experiences are important for causing people to develop oversensitivity to the negative effects of present environmental events. For example, the maladaptive schemas that lead to the cognitive triad are thought to be caused by negative experiences people have had during earlier periods of life, especially their experiences with parents during childhood. Getting good evidence for this, however, is very difficult because, in studying these events, we must rely upon the often-inaccurate memories of adults regarding what happened to them many years before. For example, if you ask a currently depressed person about his/her childhood experiences, what kinds of experiences is he/she most likely to remember? You learned the answer to this question in Chapter 4. According to the discussion of the mood-congruence effect in that chapter, a depressed person is most likely to remember negative events. Once his/her mood improves, however, the person is more likely to remember positive events. Such problems in remembering accurately are not removed by asking relatives. They may incorrectly remember a large number of negative

experiences in the depressed person's childhood simply because they are trying to find an explanation for his/her current depression. Parents, on the other hand, may either knowingly or unknowingly underestimate the number of negative events in their depressed child's life because of feelings of guilt and responsibility for their child's present difficulties. Thus, asking currently depressed people or their relatives to describe events from the depressed person's childhood is not the best way to investigate the possible importance of childhood experiences for the development of depression.

A better method is to look for evidence that cannot possibly be affected by problems in remembering. For example, some studies have looked at the possible influence on adult depression of a parent's death during childhood. Memory problems are not likely to affect the results of such a study because a parent's death is likely to be well remembered and, in any event, death certificates document these experiences. Some researchers have found that adults who are presently depressed were more likely, when they were very young, to have experienced the death of a parent. But this correlation is a weak one. Furthermore, the variable of parental death is **confounded** with other variables. The term "confounded" refers to **the inability to separate the independent effects of two or more causal variables** (I referred to this earlier as the "extraneous-variable problem"). For example, if we wanted to study the effects of increases in age on changes in IQ scores, the extraneous variable of disease might cause problems in interpreting the results: older people are not only older, they also tend to have more diseases that could affect IQ scores. It is very difficult to determine, simply by making observations, which factor is more important (or even whether both are important) for changes in IQ. Thus, to the extent that two variables are confounded in this way, a researcher is unable to construct a clear causal theory. In the case of childhood causes of adult depression, the variable of parental death is confounded with other possible causal variables, such as lower socioeconomic status (SES): people born into a lower SES are more likely to experience the death of a parent. Thus, it is possible that the current depression of such people is due to their experiences growing up poor rather than by the early loss of a parent. In general, the major difficulty with studying possible ultimate causes such as childhood experiences is that they cannot be subjected easily (or ethically) to controlled research—the sort of research in which we are able to rule out alternative explanations. Approaches that rely upon ultimate explanations (such as psychoanalysis) tend to rely upon less scientifically valid methods (such as case studies). Thus, you should always be careful not to accept uncritically any ultimate explanation of a phenomenon: **because of the problem of confounded (extraneous) variables, it can be very difficult to establish any particular ultimate explanation with certainty.**

With regard to sociocultural explanations of depression, there is evidence that influences within particular social groups and the wider culture are important causes of depression in many people. For example, I mentioned above that the poverty associated with a person's socioeconomic status is a possible cause of depression. The problem with concluding that poverty directly causes depression is the same as that for any other ultimate explanation: there are many other factors confounded with it. For example, it could be that poorer nutrition and the resulting diseases that tend to occur in people with lower SES might be the actual causes of depression. Racism is another factor on which attention has been focused. Racism may be an indirect or a direct cause of depression. Indirectly, racism results in fewer opportunities for members of oppressed races. For example, because of racism, a person often has a reduced chance of obtaining a good education or making the sort of contacts necessary to get a good job. Racism also may be a direct cause in that it often leads to negative and even traumatic experiences that are known to be important for the development of depression. In the United States, both of these kinds of influence probably have been important for higher rates of depression in African Americans and Native Americans. What is even more disturbing about this is that racial groups subjected to prejudice and discrimination are less likely to receive adequate treatment for several reasons. (1) They are less likely to trust mental-health or medical workers. (2) They tend to live in areas in which adequate treatment is unavailable. (3) They tend to be underdiagnosed because of cultural differences between them and the clinicians who are treating them (that is, it often is more difficult for clinicians to accurately interpret the behaviors of clients from other cultures). One result of this state of affairs is that suicide—a common consequence of mood disorders—is very high for young African-American men living in poor urban areas and for Native Americans. Nevertheless, the highest suicide rates overall are for white men over 50 years of age, which suggests that suicide (just like everything else studied by psychologists) is not explainable by any one theory.

SQ 7-12: Describe the major ultimate causes of depression—genetics, childhood experiences, and sociocultural factors. Define what is meant by the term “confounded variables.” How does confounding make it difficult to discover the causes of a phenomenon?

Symptoms of Bipolar Disorder

The word “bipolar” means “two extremes.” That is, people with bipolar disorder experience two extremes of mood disturbance: they alternate between episodes of depression and mania. As far as anyone can tell, depressive episodes in bipolar disorder are similar to depressive episodes in major depression. Depressive episodes in major depression and in bipolar disorder have the same symptoms and they last for about the same period of time (about six to twelve months). The other extreme is referred to as **mania**, a mood disturbance in which a person

becomes very energetic, experiences very high self-esteem, often appears to be very happy, is easily angered, sleeps very little, talks a great deal, and becomes focused on experiencing as much pleasure as possible. An untreated manic episode can last anywhere from a week to several months. Before a person develops a full-blown manic episode, they may first suffer through one or more episodes of **hypomania**, a less-extreme mood disturbance that might be best characterized as feeling “high,” as if you had just taken a drug that made you feel energetic and happy. Eventually, however, hypomania often transforms into mania, a much more severe mood disturbance in which the person looks “crazy” to others. Although the description of a manic episode may sound almost fun to you, the following description by a person with bipolar disorder should show you that mania often is terrifying:

I have felt infinitely worse...when manic than when in the midst of my worst depression. In fact, the most awful I have ever felt in my entire life...was the first time I was manic. I had been high [that is, hypomanic] many times before, but they had never been frightening experiences—ecstatic at best, confusing at worst. In fact, I had learned to accommodate quite well to them. I developed mechanisms of self-control to keep down the peals of otherwise inappropriate laughter, and rigid limits on my irritability. I learned to avoid situations that might otherwise trip or jangle hypersensitive wiring, and I learned to pretend I was paying attention or following a logical point when my mind was off chasing rabbits in a thousand directions. My work and professional life flowed. But nowhere did this, or my upbringing, or my intellect, or my character, prepare me for insanity.... My thoughts were so fast that I couldn't remember the beginning of a sentence halfway through. Fragments of ideas, images, sentences raced around and around in my mind like the tigers in Little Black Sambo. Finally, like those tigers, they became meaningless melted pools. Nothing once familiar to me was familiar. I wanted desperately to slow down but could not. Nothing helped—not running around a parking lot for hours on end or swimming for miles. My energy level was untouched by anything I did. Sex became too intense for pleasure, and during it I would feel my mind encased by black lines of light that were terrifying to me. The delusions centered on the slow painful deaths of all the green plants in the world—vine by vine, stem by stem, leaf by leaf they died, and I could do nothing to save them. Their screams were cacophonous. Increasingly, all of my images were black and decaying. (Goodwin and Jamison, 1990; p. 27)

I take it for granted that none of this sounds very enjoyable to you. People in the midst of a manic episode typically are very confused, irrational, and scared. Furthermore, they are likely to engage in actions that will have dramatic and generally negative effects on their lives. For example, they

may spend large sums of money in just a few days, begin sexual relationships that destroy their relationships with others, consume large amounts of drugs, or drive dangerously at high rates of speed.

People experiencing a manic episode are often psychotic: they have lost contact with reality and suffer hallucinations, delusions, and thought disorder. In fact, people in the midst of a severe manic episode often look very similar to schizophrenic people. For example, Bert Yancey, a professional golfer, described a manic episode he experienced in the 1970s:

I was a messiah. I was going to the Orient to bring an end to the evil of Communism and bring the religions of the Orient into line with Christianity. I was saying, "All right, all the whites over here, all the blacks over there, we're going to have us a Chinese fire drill," or something like that.... And people were laughing, right? ...That's a natural high. That's manic-depressive illness. You're uninhibited. You do things that have a great deal of meaning to you, but they don't have any meaning to other people.... So in comes the Security and takes me into the quiet room. And down there I was spitting on a light bulb, thinking if I watched the saliva burn, the different colors and shapes, I could find the key to the cure for cancer. (quoted in Goodwin & Jamison, 1990; p. 27)

It's very difficult to find differences between the hallucinations, delusions, and irrational thinking of bipolar disorder and schizophrenia. The main difference between the psychotic symptoms of the two disorders is that those of bipolar disorder occur only during the manic episode. Once the manic episode is over, the psychotic symptoms end and people with the disorder typically go back to their normal ways of thinking, feeling, and behaving. Of course, after a manic episode, they often have much damage to repair (especially to relationships, occupational security, and finances). Those around them, unless they are educated about the disorder, often hold people with bipolar disorder responsible for this damage. It is hard to imagine that people can become temporarily psychotic and then be normal again. Even when friends, family members, and coworkers are educated about the disorder, it still is very difficult to interact or live with people who suffer from frequent episodes. Thus, there are high rates of divorce and job loss among people with this disorder.

Once a person develops bipolar disorder, he/she typically will suffer from it for many years (often for the rest of his/her life). Furthermore, there tends to be frequent relapses and, as the disorder progresses, shorter and shorter time periods between episodes of mania and depression. Because of the difficulties caused by frequent manic and depressive episodes, many people with

untreated bipolar disorder attempt to kill themselves, and a significant proportion (about 15%) eventually commit suicide.

Explanations of Bipolar Disorder

There is not much known about the proximate and ultimate causes of bipolar disorder. All recent theories, however, have focused on biological causes of this disorder. Although psychological theories have been proposed, there has never been good evidence that psychological factors (such as those involved in stress responses) are important for causing the initial development of bipolar disorder.

Proximate Causes. Research on the neural causes of bipolar disorder has focused on neurotransmitters and biological processes occurring in and around the neuron. One early theory of bipolar disorder claimed that manic episodes were due to increases in norepinephrine activity and that depressive episodes were due to decreases in the activity of this neurotransmitter. Most research on this theory, however, has suggested that it is incorrect, or at least incomplete. One important reason for the rejection of the norepinephrine theory of bipolar disorder is that the drug lithium carbonate, which is the primary treatment for bipolar disorder, prevents both manic and depressive episodes in the majority of people who take it. It is very unlikely that lithium is leveling out moods by first raising norepinephrine activity when the person is depressed and then lowering it when the person is manic. Instead, lithium must be regulating the activity of neurons directly, thereby preventing them from exhibiting the biological irregularities that are thought to underlie the two extremes of mood that characterize bipolar disorder. The manner in which lithium does this, however, is not understood.

Once a person begins taking lithium, he/she typically will need to continue taking the drug for years, often for the rest of his/her life. However, people with bipolar disorder often stop taking the drug when it begins to have an effect, either because they are experiencing severe side effects or because they enjoy their manic states. The problem with stopping in this way, however, is that these people often develop more severe cases of the disorder than do those who continue on lithium without interruption. A person who stops taking lithium is almost certain to develop future episodes; and the more episodes of mood disturbance a person with bipolar disorder has, the more severe and frequent his/her future episodes become. Furthermore, it is more likely that lithium will not have as strong of an effect on their symptoms when they start taking it again. Thus, when a person first develops bipolar disorder, it is very important to get that person immediately on lithium (or one of the other anti-manic drugs now on the market) and to make sure that he/she does not stop taking the drug.

Ultimate Causes. The genes that a person inherits seem to be an important influence on the development of bipolar disorder. Research on twins has found that MZ twins are more similar with regard to the symptoms of bipolar disorder than are DZ twins. When one member of an MZ-twin pair is diagnosed with the disorder, the other member of the pair develops bipolar disorder in about 70% of the cases. On the other hand, both members of DZ-twin pairs pair are diagnosed with bipolar disorder in only about 15% of the cases. In general, other members of the immediate families of people with bipolar disorder are diagnosed with a mood disorder anywhere from ten to twenty-five percent of the time. What is peculiar, however, is that most of these family members are diagnosed with major depression, not bipolar disorder. This finding suggests that the genes associated with bipolar disorder may predispose people to develop mood disorders, in general, and that some other influence determines which mood disorder this will be.

SQ 7-13: Distinguish between mania and hypomania. Distinguish bipolar disorder from major depression. Describe what are thought to be the major proximate and ultimate causes of bipolar disorder.

Schizoaffective Disorder

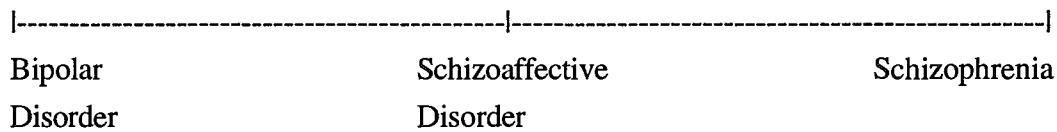
Some researchers believe that schizophrenia and the mood disorders may be related. In fact, people showing the first signs of schizophrenia often experience significant mood disturbances that look similar to the symptoms of bipolar disorder. One patient described his emotional state during the onset of schizophrenia in the following way:

In affective [emotional] aspects, a pervasive feeling of well-being dominated the complex. I felt as though all my worries were gone and all my problems solved. I had the assurance that all my needs would be satisfied. Connected with this euphoric state, I experienced a gentle sensation of warmth over my whole body, particularly on my back, and a sensation of my body having lost its weight and gently floating. (Torrey, 1995; p. 66)

The euphoric mood sometimes experienced during the onset of schizophrenia typically disappears; but even after this point, most schizophrenics show mood disturbances in the form of depression. Furthermore, people with bipolar disorder often show delusional and disorganized thinking—symptoms that are more characteristic of schizophrenia. In rare instances, people will show unmistakable symptoms of schizophrenia that, within a couple years, change into the symptoms of bipolar disorder. With other people, the opposite progression of symptoms (from

bipolar to schizophrenia) occasionally occurs. Furthermore, in the families of some schizophrenics, close relatives are more likely to suffer from a mood disorder. This finding suggests that, at least in these families, the two mental disorders share genetic influences.

Torrey, Bowler, Taylor, and Gottesman (1994) stated that there exists “a complete continuum of symptom complexes between the schizophrenia and bipolar ends of the clinical spectrum. Those individuals in the center of the spectrum are diagnosed with schizoaffective disorder” (p. 172). This continuum is illustrated in the following:



Schizoaffective disorder is a mental disorder in which an individual suffers from **symptoms of both schizophrenia and a mood disturbance** (either a manic or a depressive episode, or some mixture of these two) **for a long period of time**. In order for a person to be diagnosed with schizoaffective disorder, the schizophrenic symptoms must appear by themselves for at least two weeks. Because of this last requirement, most people with schizoaffective disorder are closer to the schizophrenia end of the continuum than to the bipolar end; but there do exist cases that show a greater similarity to bipolar disorder. Because mood disturbances are so common during schizophrenia, it can be very difficult to know when a person is suffering from schizophrenia or schizoaffective disorder. If the mood disturbance occurs along with schizophrenic symptoms for a long period of time, the person often will be diagnosed with schizoaffective disorder; but if the mood disturbance is only temporary, the person typically will be diagnosed with schizophrenia. Furthermore, people with bipolar disorder who are in the midst of a manic episode often show psychotic symptoms similar to schizoaffective disorder. With bipolar disorder, however, the psychotic symptoms disappear when the mood disturbance ends whereas, in schizoaffective disorder, the psychotic symptoms usually continue after the mood disturbance ends. The most important point for you to remember from this discussion is that **schizophrenia and the several mood disorders are probably not as distinct as is commonly believed: they may share some biological (especially hereditary) influences**.

SQ 7-14: Discuss the reasons why some researchers believe that schizophrenia and the mood disorders are related. In your answer, describe what sometimes happens during the early stages of schizophrenia and the mood disorders, and describe the symptoms of schizoaffective disorder.

Sleep Disorders

In Chapter 1, I presented a detailed discussion of sleeping and dreaming. Now, I would like to continue that discussion by describing briefly some of the mental disorders that involve sleeping and dreaming. There are two major kinds of sleep disorder. The first are the **dyssomnias**, which are **disturbances in the patterning or timing of sleep** (for example, having trouble falling to sleep at night or sleeping too much). The second are the **parasomnias**, which are **disturbances in the mental or behavioral events associated with sleep** (for example, suffering from frequent nightmares or sleep terrors).

Dyssomnias—Disturbances in the Patterning or Timing of Sleep

Insomnia. When a person has insomnia, he/she has one or more of three problems: **difficulty falling asleep, difficulty staying asleep, or difficulty feeling rested after sleep.** The sleep disturbance must be either upsetting to the person or cause problems for him/her during the day (for example, an inability to study due to fatigue). People with insomnia worry about their difficulties with sleeping to such an extent that they often begin to suffer from severe anxiety at bedtime, which only makes the problem worse. In fact, they may have no trouble falling asleep at other times (for example, during a lecture). Many of these people say that they were “light sleepers” before their insomnia began, which suggests that, for at least some of them, there may be a basic problem in the transition to deeper stages of sleep. It seems that women and older people are more likely to suffer from insomnia. Insomnia also often occurs in people who have suffered at some point from depression or anxiety problems.

Hypersomnia. People with **hypersomnia sleep too much** instead of too little. The disorder typically begins during late adolescence or young adulthood and usually lasts for years. For most hypersomniacs, there are no disturbances in the timing and length of sleep stages during the night (although during daytime naps, they generally show no REM periods). They typically have a long nighttime period of sleep from which they have great difficulty awakening. In fact, upon awakening, they may seem confused, clumsy, and belligerent (a problem that is referred to as “sleep drunk”). In addition to their nighttime sleep, these people sleep a great deal during the day. Even with all this sleep, people with hypersomnia complain of being very tired, and will fall asleep easily if put in a boring or monotonous situation. Some people simply need a large amount of sleep. We would not diagnose these people with hypersomnia. To be diagnosed with hypersomnia, a person must often complain of being very tired during the day, even after he/she has had a large amount of sleep (more than, say twelve hours).

Narcolepsy. A person with **narcolepsy suffers daily from sudden episodes of intense sleepiness followed by a short period of sleep**—an event referred to as a “sleep attack.” Sleep attacks usually last between 10 and 20 minutes. When untreated, people with narcolepsy typically suffer anywhere from two to six sleep attacks per day. The disorder is very rare. Once a person develops it, however, narcolepsy usually lasts for years. Although narcolepsy may seem similar to hypersomnia, a narcoleptic sleep attack usually makes the person feel rested. In addition to sleep attacks, narcoleptics often suffer from a sudden but brief loss of muscle tone in various parts of the body (typically while feeling an intense emotion). This loss of muscle tone can, in extreme cases, cause them to fall to the ground. Some narcoleptics also experience characteristics of REM sleep—muscle paralysis and dream-like hallucinations—as they fall asleep or wake up. The hallucinations are usually visual or auditory, and can incorporate actual objects in the room (such as seeing a hallucinated person standing next to an actual piece of furniture). While experiencing “sleep paralysis,” people with narcolepsy feel alert and awake but cannot speak or move for a short period of time. (People without a sleep disorder also can experience sleep paralysis.) When the hallucinations and paralysis occur together, narcoleptics may become terrified because they cannot react to what they are perceiving. Close relatives of people with narcolepsy are more likely to suffer from it or from other disorders characterized by abnormal sleepiness, which suggests that there may be some inherited biological factor associated with the disorder.

Breathing-related Sleep Disorder. This is a group of sleep problems **that cause people to have difficulty with breathing while asleep**. There are several kinds of breathing difficulties that might occur, including not breathing for several seconds, decreased rates of breathing, or an increased shallowness of breathing. Because breathing difficulties cause people to wake up partially, a person with this disorder is unable to get a good night’s sleep. The breathing difficulties, therefore, often lead to complaints of sleepiness during the day. **Obstructive sleep apnea** is the most common breathing-related sleep disorder. It occurs when **something obstructs the upper parts of our respiratory pathways** (generally fat deposits in older or overweight individuals). Because of the obstruction, the person snores very loudly during sleep. In fact, the snoring of someone with this disorder is often so loud that it can be heard at quite a distance from the person’s bedroom:

A few years ago a woman was actually arrested and subsequently charged with disturbing the peace because her neighbors complained that her snoring was so loud. A patient of mine told me that when he was in the army he would go to bed inside his barracks, and in the morning he would wake up to find himself outside on the parade grounds, where other

soldiers had carried him, bed and all. The wife of another patient told me that her next-door neighbor had pounded on her door one day and demanded to know what kind of animal she was keeping in her house. [The animal was her sleeping husband.]. . . . Recently several students petitioned me to do something about a student who slept in the dormitory room next to them. His loud snoring greatly disturbed their sleep and even caused the wall to rattle, they said. (Dement, 1999, p. 169)

A person with obstructive sleep apnea often stops breathing altogether as the pathway closes up, usually for about 20-30 seconds, but sometimes for over one minute or more. The person begins to wake up and may make loud snorting noises, gasps, moans, or violent movements of the whole body as he/she begins breathing again. People suffering from this disorder typically do not wake up fully, so they often are unaware of the problem. They usually come for help because of their partner's concern or because of excessive sleepiness. Sleep apnea not only causes a decrease in the amount of slow-wave sleep obtained each night (due to the frequent awakenings), it also leads to a long-term decrease in oxygen supply that may cause physical or mental problems (for example, high blood pressure or decreased intelligence). In fact, sleep apnea can cause death due to cardiovascular disease. This disorder is most commonly seen in middle-aged and overweight males as well as in children who have enlarged tonsils. Because some apnea probably is normal as people age, we need to be careful when diagnosing this disorder (for example, we can't diagnose someone with it simply because he/she snores). Obstructive sleep apnea is relatively common: as much as 10% of the adult population suffers from it. It usually develops gradually, but is a long-term problem once it develops fully.

Parasomnias—Disturbances in the Mental/Behavioral Events Associated with Sleep

Nightmare Disorder. A person with **nightmare disorder** has **frequent occurrences of frightening dreams that cause him/her to awaken fully**. To be diagnosed with nightmare disorder, a person must be either upset about his/her frequent nightmares or having problems with daytime functioning (usually because of lack of sufficient sleep). Many adults who experience frequent nightmares are not bothered by them and, therefore, they would not be diagnosed with nightmare disorder. In addition, because children, on average, have relatively frequent nightmares, a child should not be diagnosed with nightmare disorder unless he/she is strongly bothered by nightmares that occur several times a week (for example, the child refuses to go to bed because he/she is afraid of having nightmares). Children typically develop nightmare disorder only after experiencing very distressing events. Nevertheless, even those children who suffer from a high frequency of nightmares typically outgrow the problem within a few years.

Sleep-Terror Disorder. When suffering from **sleep-terror disorder**, a person **frequently awakens screaming or crying from deep sleep**. Because sleep terrors occur during stages of sleep in which there is no muscle paralysis, there typically is a great deal of movement and yelling. After partially awakening, the person typically returns immediately to sleep and, by the next morning, often remembers nothing about the event. In adults, sleep-terror disorder is more likely to develop in people who are having problems with anxiety and depression (especially when caused by stressful situations), are using alcohol or other sedating drugs, or have been deprived of normal amounts of sleep. The disorder typically begins between 20 and 30 years of age, and it often is a chronic problem (although its severity may fluctuate over time). In children, there is no association of sleep-terror disorder with other psychological problems. Sleep terrors are more common in children; but most children exhibiting frequent sleep terrors probably would not get a diagnosis of sleep-terror disorder because they often are not overly distressed by their sleep terrors and are not having significant trouble with daytime functioning. Of the few diagnosable childhood cases, the sleep terrors usually begin between 4 and 12 years of age, and typically disappear during adolescence.

Sleepwalking Disorder. A person suffering from **sleepwalking disorder** experiences **problems in functioning or is very upset because he/she engages in frequent episodes of sleepwalking**. As I discussed in Chapter 1, sleepwalking occurs during deep sleep, which makes it very difficult to awaken the person. In severe cases, the person may leave his/her house and even eat and talk while asleep. In rare instances, the person may become violent. An episode of sleepwalking typically lasts less than 30 minutes. The person may return to sleep (sometimes in a new location) and typically does not remember anything about the episode the next morning. Most people who sleepwalk frequently would not be diagnosed as having a mental disorder: the consequences for everyday functioning of sleepwalking must be severe before a diagnosis of sleepwalking disorder would be considered.

SQ 7-15: Distinguish between the dyssomnias and the parasomnias. Describe the symptoms of insomnia, hypersomnia, narcolepsy, obstructive sleep apnea, nightmare disorder, sleep-terror disorder, and sleepwalking disorder.

You may have noticed that, except for sleep apnea, I did not discuss possible causes of these disorders. The reason for this is that we have virtually no well supported explanations of normal sleep. Because of this, it often is difficult to present even plausible explanations for the disorders of sleep. This is an important problem because, without adequate knowledge about the causes of sleep disorders, it is difficult or impossible to develop effective treatments. The category

of sleep disorders, however, is not the only one for which this situation is true. In fact, we have very little knowledge about the causes of most mental disorders. Because of this, there often is frequent controversy over how to explain particular mental disorders and how best to treat them. This controversy can get very intense at times, as we will see in the next section.

Dissociative Disorders

Perhaps you have had the following experience. You are driving down a highway while thinking deeply about something. You begin to get lost in thought. You become so deeply absorbed in your train of thought that apparently you lose awareness of your driving. All of a sudden, you “snap out of it,” look around, and realize you are several miles farther down the road. You don’t remember anything from the last several miles except your thoughts. You look in the rearview mirror to make certain that you caused no accidents and ran over nobody. I suspect that some of you reading this are smiling right now because you remember something like this happening to you. This experience is referred to as “highway hypnosis” because the person seems to be in what people commonly call a hypnotic “trance.” What might cause such an experience? In trying to answer this question, let’s return to something I discussed in Chapter 4. You might remember that I distinguished there between controlled and automatic processes. Controlled processes are those mental processes that involve attention and mental effort. You use controlled processes for tasks that are demanding or relatively novel (new) for you, such as studying from a college textbook. You have to be very aware of what you are reading so that you can elaboratively rehearse the material in the textbook. Automatic processes, on the other hand, are those mental processes that involve no attention or effort. You use automatic processes for well-learned habits such as reading a children’s book to a preschooler at bedtime. Over the years, you have become so good at reading that simple books present no difficulties for you. You may even be able to think about something else while reading the book out loud, and perhaps even express the appropriate emotions while paying little or no attention to the actual words. But even with more difficult books (such as this one), you have probably often had the experience of reading a paragraph and then realizing that you had paid no attention to it. Once it has been well learned, reading occurs automatically, just like driving down the highway. Thus, we can explain highway hypnosis by supposing that driving is so habitual for you that you tend to use automatic processes to perform it. This allows you to shift your attention to other things. Although this sounds like a plausible explanation, we can’t yet say that it is true. Are there any other plausible ways to explain the experience of highway hypnosis?

Some theorists explain experiences such as highway hypnosis by supposing that we are able to split our consciousness into two (or more) separate streams, each of which has little or no contact with the other. This is called **dissociation**, which may be defined as **a division of the conscious level into two or more parts**—a main part containing the majority of memories and perceptions, and one or more “mental fragments” containing a limited number of memories and perceptions. In essence, dissociation results in two or more “consciousnesses,” each of which is capable of responding to the outside world independently of the other. At different times, it is believed, each conscious part can take control of bodily movements. According to these theorists, when a dissociated part does this, it becomes aware of and can interact with the outside world. When one part is in control, the other part may be aware only of its own thought processes and emotions. This “hidden” part cannot interact with the outside world until it takes control of the body. In this way, we can plausibly explain highway hypnosis as being caused by a dissociation of consciousness: the main part of the conscious mind is thinking about something else while a separate fragment of consciousness is perceiving the outside world and controlling bodily movements. Eventually the main part of consciousness takes control of the body and again becomes aware of the external world. However, because the conscious fragment that had been driving was not in contact with the main part of consciousness, the main part has no memory for the events that occurred during those few miles. Dissociation, therefore, is thought by some theorists to be a relatively normal occurrence in everyday life, perhaps especially in children. These theorists argue that, when dissociation does occur in everyday life, it causes only minor disruptions of memory and perception. Within a few seconds, the memory fragment often is reunited with the main part of consciousness, and the person can now remember what happened.

In addition to its normal use in everyday life, dissociation theorists claim that dissociation can be used as a defense mechanism. As you may recall from the last chapter, a **defense mechanism is a mental process that protects the ego from feeling anxiety by making it unaware of distressing desires, perceptions, and memories**. According to dissociation theorists, when a person is very upset about an external event, a fragment may split off from the rest of consciousness—a fragment that contains the perceptions and memories of the distressing event. By dissociating in this way, the main part of consciousness is unaware of the event for as long as the conscious fragment remains separated from it (therefore, the main part of consciousness feels no anxiety). While dissociating in this manner, it is claimed that the person looks dazed and distant, somewhat like a “zombie,” because the only part of consciousness interacting with the external world is a mental fragment that has no sense of identity and few or no memories. Such a mental fragment is unable to express the range of thoughts and emotions that might give it a semblance of complexity. It is nothing more than an isolated bit of consciousness.

In a sense, the fragment *is* a zombie that engages in a minimal amount of interaction with the external world, mostly responding automatically to whatever is occurring around it. At some point after the distressing event is over, the main part of consciousness takes control of the body again; but the conscious fragment containing the memory of the event may remain separated from the main part, which results in amnesia for the event. The amnesia continues for as long as the fragment remains unintegrated with the rest of consciousness.

The category of **dissociative disorders** is defined as **a set of mental disorders resulting from the habitual or extreme use of dissociation as a defense mechanism**. In other words, a dissociative disorder is thought to develop when a person either (a) continually uses dissociation to forget all sorts of events (even those that are only mildly upsetting) or (b) uses dissociation to such a degree that memories of important events are blocked off completely from the main part of consciousness. Those who use the concept of dissociation believe that these disorders are always caused by the **occurrence of highly distressing events**. Such pathological (disease-related) dissociation may occur only rarely in a person's life or the person may become "sensitized" to even mildly upsetting events so that he/she uses dissociation in a habitual way. The primary factor affecting this process is claimed to be the age of the person when he/she first experiences an emotionally traumatic event: the younger the person, the more likely it is that he/she will use dissociation habitually to deal with all sorts of stresses, even mild ones. In order to understand this better, let's look at two dissociative disorders of particular theoretical importance: dissociative amnesia and dissociative identity disorder. In discussing these two disorders, I will introduce a second possible explanation for the development of the dissociative disorders—one involving the effects of suggestion.

Dissociative Amnesia

The disorder known as **dissociative amnesia** is defined as **the forgetting of episodic memories and other personal information that is greater than can be explained by everyday loss of memory**. In Chapter 4, I stated that an episodic memory is a memory for a particular event in which you remember having participated. For example, your memory for how you felt during the last test in this course is an episodic memory. The complete set of episodic memories makes up your autobiographical memory. In addition to episodic memories, you also may forget personal information such as your name, how old you are, and what town you live in. The most common kind of dissociative amnesia involves the loss of memories for a specific period of time—typically a period of time that lasts for a few hours to a few days. In case studies of people with dissociative amnesia, the "missing time" often involves the occurrence of an emotionally upsetting event, such as a car accident, a rape, or a natural

disaster. To be diagnosed with dissociative amnesia, forgetting cannot be due to a disturbance of brain activity caused by a drug, a blow to the head, an epileptic seizure, or some other physiological or neurological cause. In other words, the amnesia must be the direct result of the defense mechanism of dissociation.

The following case of an 18-year-old male illustrates many of the characteristics of this disorder. He was brought to a hospital emergency room because of exhaustion and because he had the appearance of someone who had just experienced prolonged exposure to the sun. However, he could not explain why he looked this way, nor could he explain what had happened to him for the several days preceding his admittance to the hospital. Furthermore, there was no evidence of a head injury or any other major physical problem that could explain his amnesia:

He identifies the current date incorrectly, giving it as September 27 instead of October 1.... He recalls sailing with friends, apparently about September 25, on a weekend cruise off the Florida coast, when bad weather was encountered. He is unable to recall any subsequent events and does not know what became of his companions. He has to be reminded several times that he is in a hospital, as he expresses uncertainty as to his whereabouts. Each time he is told, he seems surprised.... [However, after sleeping for six hours, he] is able to remember that he was a student at a southern college, maintained a B average, had a small group of close friends, and had a good relationship with his family.... Because of the patient's apparently sound physical condition, a sodium amytal interview is performed. During this interview he relates that neither he nor his companions were particularly experienced sailors capable of coping with the ferocity of the storm they encountered. Although he had taken the precaution of securing himself to the boat with a life jacket and tie line, his companions had failed to do this and had been washed overboard in the heavy seas.... He never saw either of his sailing companions again. (Spitzer, et al., 1994; p. 130)

This person suffered from amnesia that developed after a particular distressing experience. Because there were no physical problems, such as head injury or drug use, that could explain the forgetting of such a significant event, he was given the diagnosis of dissociative amnesia. Thus, his doctors believed that the memories of his experiences during the storm were split off from the rest of his consciousness. His dazed and confused state upon being brought to the hospital was further evidence for the diagnosis: he seemed to be still in a dissociative state. One interpretation of this case is that, after being allowed to sleep and given sodium amytal (a drug that causes relaxation), he was able to reintegrate the split-off fragment with the rest of his consciousness. This allowed him to remember the distressing set of events that occurred during the storm. In general,

dissociative amnesia lasts for only a few days or weeks at most. It is often the case that, even without therapeutic help, a person with the disorder eventually will remember what happened during the forgotten period of time.

There are several problems with this interpretation, however. First, no one really knows what is going on in the minds of people exhibiting the symptoms of dissociative amnesia. Can they really not remember? Perhaps in some cases, the event is remembered, but they simply do not want to talk about it. Second, it is concluded that dissociation is causing amnesia when a physical cause cannot be found. But it might be that there is a physical cause that is not detected because it is so subtle. As we saw earlier in this chapter, even neurological disorders as severe as schizophrenia may show no detectable physical causes in some people. In the case of “dissociative” amnesia, it might be that the effects of severe anxiety cause subtle changes in the brain that make it difficult to remember what happened at the time of a distressing event. In this case, the mind is not attempting to defend against anxiety, it simply cannot focus and consolidate (make firm) a memory when the person is experiencing too much anxiety. Think about how hard it is for you to remember anything when you are very anxious and you will see that this explanation is a plausible one. This possibility should make us cautious about pushing a person to remember the event: we may succeed only in causing the development of a false memory. As I stated in Chapter 4, whenever we retrieve a long-term memory, we reconstruct it from a small set of stored “bits” of information. Any information that others give us when we try to reconstruct a memory may be incorporated into the memory. With regard to therapy for dissociative amnesia, the questions asked by the therapist might help to create false memories. In the case presented above, if the person had been asked, “how dark was it when the storm hit?”, he might now remember that it was night time when his friends fell overboard, even though it actually had been in the afternoon. Given enough time, the person might develop a completely false memory that seems to explain why he/she has forgotten some period of time. Although this does not seem to have been a problem in the case being considered here, I will try to show in my discussion of dissociative identity disorder that such therapy can lead to highly questionable results.

SQ 7-16: Discuss the meaning of the concept of dissociation. Distinguish between the use of dissociation in normal everyday life and its use as a defense mechanism. Describe the major symptoms of dissociative amnesia and discuss problems with diagnosing this mental disorder.

Dissociative Identity Disorder

The mental disorder called **dissociative identity disorder (DID)**; formerly called “multiple personality disorder”) is the dissociative disorder with which you probably are most

familiar. It is thought to involve dissociative amnesia, but it is more complex than the simple forgetting of personal information. DID involves **the development of two or more personalities that, at different times, take control of behavior**. People with this disorder do not seem to show the normal integration of behaviors and mental events. Instead, there is a “core personality,” which contains most of the individual’s memories, that is separated from at least one “personality fragment,” often containing a smaller number of memories and perceptions. The personality fragment or fragments alternate with the core personality in controlling consciousness. According to the *DSM-IV*:

Each personality state may be experienced as if it has a distinct personal history, self-image, and identity, including a separate name. Usually, there is a primary identity that carries the individual’s name and is passive, dependent, guilty, and depressed. The alternate identities frequently have different names and characteristics that contrast with the primary identity (e.g., are hostile, controlling, and self-destructive). Particular identities may emerge in specific circumstances and may differ in reported age and gender, vocabulary, general knowledge, or predominant affect [emotional expressiveness]. Alternate identities are experienced as taking control in sequence, one at the expense of the other, and may deny knowledge of one another, be critical of one another, or appear to be in open conflict.... Aggressive or hostile identities may at times interrupt activities or place the others in uncomfortable situations. (p. 484)

It is the alternation of personalities as well as the conflict among them that makes the disorder so strikingly peculiar both to clinicians and to the general public. It is this peculiarity that has led to widespread awareness of the main symptoms of this disorder. This widespread awareness, as we will see later, may have resulted in further cases of the disorder—cases caused by suggestion. Before I talk about this possibility, however, let’s learn more about DID.

Spitzer, et al. (1994) described the case of “Mary Kendall,” a 35-year-old social worker who was referred to a psychiatrist because of chronic pain. Mary was single and, when not working, spent most of her time volunteering at a hospice. One area of concern was her report of large gaps in her memories of childhood. Mary also noticed that her car often was used during the night—the odometer would show that the car had been driven between 50 and 100 miles—even though she had no memory of driving it. These events suggested to Mary’s clinician that she might have a dissociative disorder. The clinician used hypnotherapy to reduce Mary’s pain and to help in the retrieval of memories. After several months, the hypnotic treatments seemed to lead to a breakthrough:

During a hypnotic induction, the physician again asked about the lost time. Suddenly a different voice responded, "It's about time you knew about me." The (alter) personality with a slightly different name, Marian, now spoke and described the drives that she took at night, which were retreats to the nearby hills and seashore to "work out problems." As the psychiatrist got to know Marian over time, it was apparent that she was as abrupt and hostile as Mary was compliant and concerned about others.... In the course of therapy, some six other personalities emerged, roughly organized along the lines of a dependent/aggressive continuum.... After 4 years of psychotherapy, Mary gradually integrated portions of these personality states. Two similar personalities merged, although she remained partially dissociated. The personality states were aware of one another, and continued to "fight" with each other periodically. (pp. 56-57)

In dissociative identity disorder, the personality fragments that emerge often are described as being of different ages and sexes, and they often seem to have different moods, thoughts, and ways of interacting with others.

Researchers of DID state that the disorder typically begins during early childhood in response to distressing experiences, especially experiences of sadistic sexual abuse. In an attempt to defend against the anxiety caused by experiencing and remembering these events, they argue, the child "splits off" various parts, referred to as "alters," which experience the upsetting events and remember them. The alters are able to interact with the external world although they often are unaware of several or all of the others. The original or "core" personality typically claims to be unaware of any of the alters until the individual enters therapy. Once the disorder is established, the person begins to use the defense mechanism of dissociation in a habitual way. Thus, whenever even mildly upsetting events occur, an alter may emerge (that is, dissociation will occur) to deal with it. As the alters come out more and more, they accumulate more experiences, which causes them to develop a more complex and distinct identity. Eventually, they may become full-fledged personalities of their own, equally as complex as the core personality that gave rise to them. This explanation represents the **dissociative theory** of DID.

You might wonder if people who exhibit different personalities might only be acting. Spitzer, et al. (1994) argued that, although this may be true in some cases, it is not likely to be true in all. They supported this claim by pointing to their experiences with clients: "when one has observed in a patient the emergence of an alter with a completely different speech pattern and body language, one becomes convinced of the validity of the diagnosis" (p. 58). Yet, I have seen actors

who can change their pattern of speech and body language very quickly to a new one. For example, I am thinking right now of the acting of Sally Field in the movie, *Sybil*, a story about a person who was said to have multiple personality disorder: she convincingly played the part of someone with the disorder. If an actor can appear to have DID, it seems possible that people who claim to have the disorder are deceiving others and perhaps even themselves into believing that they have the disorder. This explanation is referred to as the **sociocognitive theory** of DID (Spanos, 1996).

According to the sociocognitive theory, the disorder first develops during adulthood after the person has become familiar with the symptoms of DID and has come to believe that he/she has it. According to this theory, the disorder typically develops through **suggestion**, a term which refers to **the acceptance of an idea by a person who then acts on it uncritically**. In Chapter 4, I claimed that suggestion is an important influence in our everyday lives. For example, if you go out with friends to a restaurant, and someone states that the salad dressing you all are eating tastes as if it's gone bad, it may start to taste strange to you, even though you had noticed nothing until then. In fact, you might even begin to feel sick and may even vomit. Assuming that nothing actually is wrong with the salad dressing, the strange taste in your mouth and the nausea are caused by suggestion. The proponents of the sociocognitive theory claim that the same is true for the development of many (perhaps even all) cases of DID. These theorists argue that people may come into therapy with various problems that are relatively common (such as depression, low self-esteem, overeating, eating too little, etc.). Some therapists, as we saw in Chapter 4, consider such mundane problems to be signs that their clients have experienced traumatic events during childhood, especially sexual abuse that is unremembered because of dissociation or repression. (In Chapter 4, I argued that this inference is probably invalid.) Because sexual abuse is believed by many of these same therapists to cause the development of dissociative disorders, especially DID, these therapists often suspect that their clients might have DID. They communicate this suspicion to their clients. Once the suggestion is made, their clients may begin to act as if they have the disorder. Why would they do this? According to the sociocognitive theory, because the clients believe that they have the disorder, they begin to interpret their experiences differently—especially their fluctuations in mood and thoughts. It now may seem to them that these normal fluctuations actually indicate the emergence of various alters. That is, just as people may really begin to feel ill when it is suggested that the food they are eating has gone bad, people may begin to exhibit the symptoms of DID when it is suggested that they have the disorder. They may even begin to label their fluctuations of mood and thinking with the names of different personalities. Thus, these people do not need to be aware that they are merely acting the role of a person with DID: the

suggestions made by their therapists (or other relevant authorities) have led them to believe that they have different personalities.

This may sound implausible to you, but there is a great deal of evidence supporting the sociocognitive theory of DID. Because of limited space, I can mention only a fraction of the evidence here. (1) First, there have been **historical changes in the symptoms of DID that correspond to cultural beliefs about the disorder**. For example, about 100 years ago, there were many cases of DID in England, France, and the United States. Typically, a DID patient had two personalities (sometimes three)—a core personality that was introverted, depressed, and overly inhibited, and a second personality that was extraverted, happy, carefree, and adventurous. On the other hand, today people with DID may have anywhere from several alters to over 1000 (with an average of about 15). These alter personalities no longer are opposites of the core personality. Instead, they now have all sorts of characteristics, some of them quite bizarre. For example, some alters are animals, babies, supernatural beings, and even aliens. It seems that, in general, the longer a person is in therapy, the greater the number of alters that are discovered and the more exotic are their characteristics. This fact is consistent with the possibility that clients begin to create alters with characteristics that are suggested to them by their therapists or other influences (such as books, magazine articles, or television programs).

(2) Second, there have been **historical changes in the life histories of clients that correspond to cultural beliefs about the cause of DID**. Before 1975, very few people reported any history of sexual abuse. However, during the late 1970's, the number of abuse histories began to increase dramatically. This continued into the 1980's. This increase was associated with the publication of the book, *Sybil*, which was also made into a popular movie. Sociocognitive theorists have argued that this book, which described in graphic detail a horrendous history of sadistic sexual and physical abuse, publicized a "prototype" (something that serves as a model) of the typical DID patient. According to sociocognitive theorists, this prototype now is well known by most Americans and serves to suggest to many people both how to act like a person with the disorder and what sort of experiences one must have had in order to develop the disorder. These suggestions, coupled with therapy designed to "uncover" repressed or dissociated memories, may cause these people to develop false memories of sadistic sexual abuse. A second life-history change that first appeared during the late 1980's involved reports of ritualistic abuse supposedly suffered within cults worshipping Satan. People claimed that they were raised within such cults, forced to murder and cannibalize babies (some of which supposedly were their own babies produced from rapes committed by other cult members), and other horrifying tales of cruelty and torture. Nevertheless, whenever law-enforcement agencies have investigated these

reports, no physical evidence has been found. In fact, some of the people who reported being raped on multiple occasions and forced to have babies were found to have never been pregnant and, as best as could be determined, to have never experienced sexual intercourse. These satanic-ritualistic-abuse histories began to appear after the publication of a book entitled, *Michelle Remembers*, in 1980. This book described a person named Michelle who remembered “that her parents...belonged to a satanic cult, she had seen the ritual sacrifice of both children and adults, she was forced to eat the burnt remains of one victim, she was tied up and bitten by small red spiders...and she was sometimes kept naked in a cage filled with snakes” (Spanos, 1996; p. 269). During the early 1980’s, groups of therapists began to hold workshops promoting the idea that many people had been raised in such cults. As these workshops spread throughout North America and eventually Europe, reports of satanic ritualistic abuse spread with them.

(3) Third, there have been **historical changes in the geographical location of DID cases that are consistent with local beliefs about the disorder**. From about 1880 to 1920, there were many cases of DID reported in France, England, and the United States. These cases were widely publicized, which seemed to lead to even more reports. During the years in which psychoanalysis was prominent (about 1920 until 1970), few cases of DID were reported. Most psychoanalysts did not believe in the existence of dissociation, and this change in view from the earlier period was followed by a large decrease in the number of people exhibiting symptoms of dissociation. Since the 1970’s, most cases of DID have occurred in the United States, Canada, and countries in Europe that have hosted workshops by American therapists. As I have already stated, the disorder began to be publicized in the United States during the 1970s. This was followed by an increase in the number of people exhibiting symptoms of DID. Thus, these changes in frequency and geographical location are closely associated with the beliefs of mental-health professionals and the general public about the validity of the diagnosis. According to sociocognitive theorists, these three pieces of evidence are best explained by supposing that many cases of DID develop because of the suggestions of therapists and the mass media (newspapers, television, movies, and magazines). This does not mean that all cases of the disorder develop in this way; but it does serve as a warning that we should be careful about concluding anything with respect to a particular case until we consider all the evidence.

SQ 7-17: Discuss the major symptoms of dissociative identity disorder and describe the dissociative and sociocognitive theories of this disorder. In your answer, describe how these two theories differ from each other and define the meaning of “suggestion.” Discuss the evidence in favor of the sociocognitive theory.

At this point, it seems most prudent to conclude that therapeutic practices themselves can cause people to develop the symptoms of certain mental disorders through the effects of suggestion. In short, these therapies probably cause, in at least some clients, the mental disorders they were designed to treat. Although much evidence supports this conclusion, there still is a large number of therapists who promote the use of suggestive therapeutic techniques that are likely to cause their clients to develop various problems such as DID and memories for incidents that never happened. These therapists reject the evidence that I presented above and in Chapter 4 and accept evidence using research methods that I have criticized in other places in this book (such as intuitions about case-study material). This state of affairs may not seem to make sense to you. You might wonder why there still exists a controversy between those giving a dissociative explanation of DID and those giving a sociocognitive explanation. Why can't some agreement be reached between the two sides on this issue? I believe that, very slowly, some agreement is being reached. Nevertheless, any gains that are made are very difficult to accomplish. I believe that one important reason for this is that psychology is split into two different "research traditions"—traditions that have differing views of (a) what is most important for us to know about human nature and (b) what are the best ways to gain this knowledge. This division of psychology into two research traditions is the context within which several controversies are occurring at the present time. In the next section, I will describe the main characteristics of these two traditions so that you may better understand why these controversies can be so difficult to resolve.

Research Traditions in Psychology

Think about the reasons why any of us can disagree so strongly with those close to us. Such disagreements usually are due to the fact that each of us has **a unique set of beliefs about the world** and **a unique set of motivations for our actions**. The disagreements often are made even more intensely emotional when at least some of the disputants feel that others should have the same beliefs and motivations they have, and when it is difficult (or impossible) for them to know which sets of beliefs and motivations are most correct. Emotional disagreements in psychology are caused by similar factors. The most intense controversies in psychology often are associated with disagreements over two factors: (1) **different sets of beliefs about human nature**, and (2) **different motivations for performing research investigating this human nature**. The first factor has to do with the topic of theoretical approaches discussed in the last chapter. Each theoretical approach makes its own unique assumptions about human nature and uses its own set of concepts to describe this nature. Such beliefs about human nature are fundamental to how researchers using a particular approach view themselves and others, but the correctness of these beliefs typically is very difficult or impossible to demonstrate. When these

beliefs are challenged, those who hold them may respond emotionally. With regard to the second factor, the motivations that researchers have for performing research are essential to how they go about performing it. Yet, these motivations are very personal and, thus, are also difficult or impossible to justify to others. For example, some researchers might want to better understand their worlds or themselves, others might desire to be involved in a prestigious occupation, still others might want to help people, etc. Because people often view their occupations as a fundamental part of their identity (of “who I am”), their motivations for performing this work are very important to them. As with core beliefs, it often is difficult or impossible to decide which motivations are the best ones to have. Should one desire to help others, to make money, to understand one’s self, to understand one’s world, to be engaged in meaningful or productive work, to have something to do for nine hours each day, etc.? When people differ in such fundamental motivations, and they cannot show others that their motivations are somehow better, very emotional disagreements can develop. Our own motivations seem so “natural” to us that we often are unable to understand how others could have different ones.

Such considerations enter into what I mean by a “research tradition.” By the term **research tradition**, I am referring to a **fundamental approach to gaining knowledge that involves (1) a basic set of goals (motivations) for developing knowledge, and (2) a general way of asking questions and of testing tentative answers**. In other words, a research tradition involves a set of reasons for doing research as well as the manner in which one performs that research. Certain theoretical approaches fit more easily into one tradition than the other. For example, in earlier chapters, you may have noticed that the research approach of behaviorists was very different from that of psychoanalysts. Behaviorists usually measured precisely the behaviors of nonhuman animals under highly controlled conditions in a laboratory environment, whereas psychoanalysts collected the reflections of their human clients under uncontrolled conditions in a clinical environment. Furthermore, the motivations of these researchers differed. Behaviorists were trying to understand the specific causes of a very simple set of behaviors, whereas psychoanalysts were trying to help people in distress. The research performed by behaviorists, on the one hand, and psychoanalysts, on the other, occurs within two different research traditions. Although different people have referred to them by various names, I will call these two traditions the “subjective” and “objective” traditions. In Chapter 2, we used the word “subjective” to refer to what is personal—to an individual’s thoughts and feelings about the world. Researchers from the **subjective tradition attempt to know the thoughts, emotions, and desires of individuals because they want to help them to achieve the fullest expression of their potential**. In trying to accomplish this goal, these researchers tend to study individuals in uncontrolled research situations (for example, in their clinics, clinical

psychologists describe and treat people suffering from mental disorders). Psychoanalysts tend to work within the subjective research tradition. Behaviorists, on the other hand, tend to work within the objective tradition. In Chapter 2, we used the word “objective” to refer to what is impersonal—to what is true about objects in the universe independently of our thoughts or feelings about them. Researchers from the **objective tradition attempt to describe and discover the causes of mental events and behavior because they want to understand the workings of psychological phenomena as completely as possible**. In trying to accomplish this goal, these researchers tend to study groups of individuals in controlled research situations (for example, in their laboratories, experimental psychologists investigate rat learning in a maze). Let’s look at these two traditions in more detail.

Comparing the Subjective and Objective Traditions

The subjective tradition in psychology tends to have the following characteristics. (a) First, **there is a concern with external validity**. As I stated in Chapter 5, external validity is an estimate of the ability of the results of a study to be generalized to a wider range of situations. Subjective research tends to have a great deal of external validity because it often occurs in the natural situations of everyday life where manipulation and control of possible causal variables cannot be performed. In general, subjective researchers rely upon uncontrolled case studies as support for their theories. (b) **There is a strong motivation to use research findings to help people live better lives**. Subjective researchers are not very interested in performing “basic research” designed only to satisfy the curiosity of the researcher. They want their theories to be applied directly to solve everyday problems and concerns. In general, **they tend to have humanistic concerns**—they want to help individuals find fulfillment in their lives. (c) **There is a focus on the ultimate causation of phenomena**. Subjective researchers often study causes that are distant in time from the phenomenon being investigated. For example, many clinicians try to discover the causes of adult problems in childhood experiences.

Let me illustrate the subjective tradition by briefly considering the work of Sigmund Freud. As we discussed in the last chapter, Freud was a clinician who talked in great depth with his patients about what was going on in their lives. Freud’s research shows clearly each of the characteristics of the subjective tradition: (a) *A concern with external validity*. Freud did not manipulate variables potentially important for causing the mental difficulties of his patients. Instead, he often sat quietly while the patient talked about what was on his/her mind. This lack of control was especially evident in Freud’s use of “free association,” in which patients talked freely about whatever came into their minds. (b) *Humanistic concerns*. Freud, of course, wanted to use his theories to help people to function better in their everyday lives. He would have seen little use

in researching topics far removed from the possibility of practical application. (c) *Ultimate causation*. Freud believed that personality problems during adulthood were caused primarily by experiences people had during early childhood. In addition, his whole approach was based on evolutionary thinking: he believed that our present conflicts involve biological urges that have evolved over the history of our species. As I hope you can see from this brief discussion, Freud was a prototypical subjective researcher.

The objective tradition in psychology is characterized by the following. (a) First, **there is a concern with internal validity**. As I stated in Chapter 5, internal validity is an estimate of the ability of a study to provide clear support for the hypothesis being tested. In order for a study to have internal validity, the effects of extraneous variables (those variables in the research situation the effects of which may be confounded with the variable we are investigating) must be controlled. In other words, all explanations but one for a study's results must be ruled out. Objective research often occurs in laboratory situations where manipulation and control of extraneous variables can more easily be performed. (b) **There is a strong motivation to develop scientific knowledge**. Although objective researchers prefer that their research findings have applications to everyday life, they are more motivated by simple curiosity: they desire to know the causes of a phenomenon. In general, **they tend to have scientific concerns**—they want to advance the knowledge in their particular discipline. (c) **There is a focus on proximate causation of phenomena**. That is, objective researchers often study causes that are close in time to the phenomenon being investigated.

We can consider the work of B. F. Skinner as an example of research in the objective tradition. As we discussed in Chapter 3, Skinner was a laboratory-based researcher who studied learned behavior in nonhuman animals. He was especially interested in understanding operant conditioning. Skinner's research shows clearly each of the characteristics of the objective tradition: (a) *A concern with internal validity*. Skinner studied operant conditioning in laboratory situations, and he performed experimental studies that involved a great deal of control. In fact, he developed what has been called the "Skinner box"—a device in which animals are placed for long periods of time so that they can be operantly conditioned automatically under strictly controlled conditions. (b) *Scientific concerns*. Skinner was most interested in understanding the fundamental causes of operant conditioning. He hoped (as do most psychologists) that his results might have a practical benefit, but he was motivated more by a desire to understand how learning occurred. Nevertheless, based on his experimental findings, Skinner developed many practical devices that he tried to market for use in applied situations. He seemed especially concerned with devices that aided in the care and education of children. (c) *Proximate causation*. Skinner studied environmental factors (for

example, discriminative stimuli and reinforcements) that directly caused changes in behavior. He did not often attempt to study causes that had their initial effects years or generations earlier, although he believed that these were important for present behavior. Instead, Skinner wanted to know what could be done right now to change a person's behavior. As I hope you can see from this brief discussion, Skinner was a prototypical objective researcher.

Perhaps the most central dispute between subjectivists and objectivists involves the core motivation each has for doing research. Subjective psychologists tend to have **primarily humanistic concerns**: they tend to be focused on the nature, dignity, interests, and ideals of humans; and they wish to help individuals to find fulfillment in their daily lives. Objective psychologists, on the other hand, tend to have **primarily scientific concerns**: they tend to be focused on constructing detailed knowledge about natural phenomena by performing controlled observational studies and then arranging this knowledge into an organized system. In recent years, this split between the subjective and objective traditions has been most evident in controversies that have arisen between the fields of clinical psychology and cognitive psychology. Clinical psychologists investigate the causes of, and treatments for, mental disorders, whereas cognitive psychologists investigate the mental processes that are important for accomplishing specific tasks. Clinical psychologists are more likely to work within the subjective research tradition, whereas cognitive psychologists are more likely to work within the objective research tradition. In general, the clinical psychologist's primary research question is something like the following: what is bothering this person in front of me right now and how can I help him/her? Control, of course, would be wonderful in such a situation, but it is not very likely to occur. On the other hand, the cognitive psychologist's primary research question is something like the following: what are the specific factors that give rise to changes in this mental process, and how do these changes allow for the completion of particular tasks? The cognitive psychologist must control the research situation in order to rule out all competing answers but one. One important problem over which clinical psychologists and cognitive psychologists have clashed involves the correct explanation of dissociative amnesia and dissociative identity disorder. As I stated above, most clinical psychologists (and other mental-health professionals such as psychiatrists) believe that defensive dissociation occurs in response to distressing experiences such as sexual abuse. In fact, it was clinicians working within the subjective tradition who originally developed the dissociative theory of the dissociative disorders. On the other hand, cognitive psychologists working within the objective tradition have developed the sociocognitive theory of dissociative disorders. According to this theory, the symptoms of the dissociative disorders often are thought to be due primarily to the effects of suggestion. Is one of these theories more likely to

be the correct one? In order to answer this question, we must consider the limitations of the subjective and objective traditions, as well as the quality of the evidence supporting each theory.

SQ 7-18: Define what is meant by the term “research tradition” and distinguish between the subjective and objective traditions in psychology. Describe three characteristics of each tradition. What is the central dispute between researchers within the subjective tradition and researchers within the objective tradition?

Limitations of the Subjective Tradition

A major limitation of research in the subjective tradition is that **it is difficult to develop causal explanations of phenomena when little or no control is used in the research situation**. As I argued in earlier chapters, a major problem with uncontrolled research is that we cannot know how important the effects of extraneous variables are on the phenomenon being studied. That is, one cannot identify the effects of a particular causal variable because these effects get confounded with those of other causal variables. As I stated earlier in this chapter, when two variables are confounded, one cannot identify the causal effects of either variable. The fact that subjective researchers tend to use case studies in their research makes it even more difficult to separate the effects of confounded variables because it is impossible to replicate exactly a unique case in future research. Because of this problem, we cannot know for certain whether the inferences derived from the case study about important causes are valid. For example, Freud used many case studies in his writings. From these case studies, he inferred that particular childhood problems, such as harsh toilet training, cause mental disturbances in adulthood. One problem with making such an inference, however, is that there are many extraneous variables that could have caused the problems in adulthood. It would be best if we could have replicated the entire study with other people who did not experience harsh toilet training but who did experience the extraneous variables. Such a comparison among different case studies is almost never possible because they typically differ in many ways.

In short, the problem with research in the subjective tradition is that it often has poor internal validity: the research often is not adequate for ruling out alternative explanations of the phenomenon being investigated. In order for one to rule out alternative explanations, the study must be well controlled, something which does not often characterize subjective research. Thus, although the research may lead to methods that are effective for helping people to overcome their personal problems and to fulfill their potentials, it does not often lead to a detailed understanding of the actual causes of their problems. This is clearly seen in the vague concept of dissociation: although they have tried, subjective researchers have not been very successful in specifying the

meaning of this term and fitting it into what is known about consciousness and memory. In general, research within the subjective tradition is not very scientific: it does not exhibit to a large degree the attitudes and procedures of the scientific method I have described throughout this book. Thus, I would conclude that the dissociative theory of the dissociative disorders is questionable in a scientific sense. Until better-controlled studies are done ruling out other possible explanations (such as those specified in the sociocognitive theory), I am very cautious about explaining these disorders with vaguely defined and poorly studied defense mechanisms such as dissociation.

Limitations of the Objective Tradition

One major limitation of the objective tradition is that **the strict control required in research situations tends to make them artificial and, thus, difficult to generalize (extend) to more natural situations**. In other words, results obtained under controlled conditions may have little meaning outside the specific situation in which the data were collected. I talked about this problem briefly in Chapter 5. Let's now look at it in a little more depth. Cronbach (1975) gave a good example of the problem of generalization. The animal room at the National Institute of Health had been refurbished several years before Cronbach wrote the article. New cages and supplies for the mice that were kept there had been brought in during this time. After the refurbishing, it was found that the mice responded differently to a particular drug. Before the changes were made in the room, the drug had kept them asleep for an average of 35 minutes; but, after the changes, it kept them asleep for an average of only 15 minutes. It soon was discovered that a change in the bedding of the mice was the cause of this change: the old bedding consisted of maple shavings whereas the new bedding consisted of red-cedar shavings. When the bedding was changed back to maple shavings, the original response to the drug returned. Cronbach drew the following moral from the story:

The experimenter studying the isolated organism has two things working for him in his quest for dependable effects. He arranges the conditions under which he observes to a far greater extent than the social scientist can. When he says that such-and-such a relation is true, "other things being equal," *he is speaking from the experience of having made a lot of things equal*. When pine versus hardwood interacts, he can get rid of the interaction; investigators of drug effects need only agree hereafter to bed animals down on maple shavings. *The results will be specific to a world of maple shavings, but they will be orderly.* (pp. 121-122; italics added)

Although the results may be orderly, they will not necessarily be relevant to the natural world where mice make "beds" out of all sorts of material, nor to results in other laboratories where

different material may be used, especially if the relevant but seemingly trivial factor has not been recognized to be important. **Treatments have effects in particular circumstances. If you change those circumstances (even in seemingly minor ways), you may get very different results.** The danger of objective research, then, is that one can become so focused on describing in detail a phenomenon in a very limited set of laboratory conditions that one can forget the potential effects of more natural conditions on this phenomenon. Because one forgets that this natural variation in conditions was not specifically studied in one's controlled research, there may be a temptation to generalize too much beyond the very specific conditions used in the research.

In short, the problem with the objective tradition is that it leads to research that may suffer from poor external validity. The research performed within the objective tradition may not be comparable in important ways to the natural situations that one is trying to understand. Unless one has studied the natural situation in detail and determined which factors are important for the phenomenon being investigated, one will be unable to create a laboratory situation that includes such factors. Because researchers within the objective tradition focus on creating controlled research situations, it is difficult without performing further research using natural situations to determine the meaning of the results outside of the laboratory. Nevertheless, researchers within the objective tradition often work hard to increase the external validity of their research. For example, in Chapter 4, we saw that work on false-memory formation used more natural situations to show that certain techniques used to recover "repressed memories" (such as hypnosis and repeated imaginings of scenes from early childhood) can lead to the formation of false memories. With this in mind, I would conclude that, although the sociocognitive theory is able to explain what might be going on in the everyday world with respect to DID and dissociative amnesia, more studies need to be done to make the link between laboratory studies and real-world phenomena more solid. Because laboratory studies have shown clearly that suggestion can cause false memories and production of multiple personalities, I am confident that the sociocognitive theory is a good one. But I am not certain to what extent the sociocognitive theory can explain most cases of DID and dissociative amnesia.

Therapy and the Scientific Method

At various places in this book, I have talked about the need to adopt certain attitudes when one is taking a natural-science approach to explaining a phenomenon—the attitudes of empiricism, skepticism, and naturalism. Carol Tavris, a social psychologist who is primarily a writer of textbooks as well as articles and books meant for nonspecialist audiences, has claimed that many therapists do not adopt the attitude of skepticism when trying to explain and treat mental disorders:

At the heart of this divide between many therapists and scientists is skepticism—their attitude toward received wisdom. Scientists are trained to be skeptical of received wisdom, to question it, to seek other explanations. Many therapists are trained to accept received wisdom uncritically from whatever authority their particular school endorses. That's why many therapists call themselves Freudians or Jungians or Rogerians or whateverians. Scientists don't take their identity from the name of some expert.... (quoted in Shermer, 1999, p. 73)

Instead of being trained to be skeptical, therapists are more likely to be trained to trust their intuition. This intuitive process of arriving at decisions about the causes of a problem in a person is referred to as **clinical judgement**. I discussed some problems with using intuition in Chapter 5. Because of these problems, psychologists receiving a natural-science education are trained to use their intuition only as a starting point: based on a “hunch” about a particular idea, one designs a controlled research study to show that the hunch is either likely to be true or likely to be false. Thus, scientific psychologists get a hunch based on their intuition, but they learn very quickly that they must test this hunch with controlled research before they can convince others. Many therapists, on the other hand, learn very quickly that hunches, in the form of “clinical judgements,” may be accepted by other therapists as an important source of knowledge, especially when the person having this hunch is a respected figure in the field. When therapy is based on good scientific research, it has often been shown to be of much value for helping people to deal with their problems. When therapy is based on intuition, its value is unknown until the intuition is tested with controlled research. In the controversy over the dissociative disorders, I believe that the use of intuition and other questionable methods of developing knowledge are at the heart of the problem.

SQ 7-19: Describe the major limitations of research performed within the subjective and objective traditions. How does this distinction between research traditions help us to understand the controversy surrounding the dissociative disorders? Define what is meant by the term “clinical judgement” and discuss why one should be skeptical of such judgement.

A Final Word

We have come a long way in our discussion of psychology, and I hope that you have learned much about the discipline. My major goal for this book has been to help you to examine your beliefs about mind and behavior more critically. I have tried to show you where we often go wrong in our thinking so that you can avoid these pitfalls. I also have tried to show you which kinds of thinking are more likely to lead to accurate knowledge. I hope you now realize how much

work it takes to justify a knowledge claim. It is very difficult to know anything with much certainty until we have tested the idea scientifically. I have found that some students get very frustrated with the difficulty of the scientific approach to testing knowledge claims, especially with the need to be tentative about the truth of such claims until we have discovered a large amount of supporting evidence. I sometimes hear them say things such as, “I just want to know what the correct answer is!” In such cases, I cannot tell them what the correct answer is because there is no answer that is supported by enough evidence. I tell them that they will need to examine the evidence themselves and figure out which answer seems to be best supported. That is, I want them to realize that, for the really difficult questions, they should not uncritically accept anyone else’s answers. Instead, they need to realize that almost all of our knowledge is uncertain to varying extents and that, if they don’t want to be misled by the faulty reasoning of others, they must try to figure out the answers for themselves.

You need to be patient in the face of uncertainty. This patience is required if you are to do the hard work of finding answers: sifting through evidence, weighing it, and coming to a tentative (uncertain) conclusion. We have no choice but to be uncertain about what we think we know; but by making the effort to understand and weigh the evidence, we will be led to conclusions that are more justifiable and often more accurate. If you take it seriously, your education will allow you to become better and better at doing this. In other words, your education should help you to develop the quality usually referred to as “wisdom.” This, to me, is the most important goal of education.

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Practice Test for Chapter 7

1. I believe that I might have special powers that help me in my everyday life. I also think that the tuna sandwich in my refrigerator may be important to my fate in some way, but I am not certain about this. I dress in very odd ways. For example, I wear my underwear on the outside of my pants, and I often wear my shirts inside out. I have never suffered from a hallucination or delusion. I MOST likely would be diagnosed as having

- A: schizophrenia.
- B: schizoid personality disorder.
- C: schizophreniform personality disorder.
- D: schizotypal personality disorder.

2. What is the MOST proximate cause of any mental disorder?

- A: learning to act in abnormal ways
- B: traumatic experiences that occurred during childhood
- C: a social factor
- D: a biological factor

3. Based on what you read in the book, schizophrenia probably would be MOST frequent

- A: in urban areas.
- B: in rural areas.
- C: in nonindustrialized countries.
- D: among Mexican-Americans.

4. Roger enjoys gambling so much that he does it every day, totally neglecting his family and job.

Roger's behavior BEST satisfies which characteristic of abnormality?

- A: maladaptive behavior
- B: personal distress
- C: mentally disordered behavior
- D: psychotic symptoms

5. According to the book, most children who are experiencing frequent nightmares and are diagnosed with nightmare disorder

- A: probably will outgrow the problem within a few years.
- B: will develop severe anxiety disorders during adulthood.
- C: are usually treated with mild narcotics.
- D: are probably sleeping too much during the day and should stop taking naps.

6. Which of the following statements is TRUE?

- A: Some schizophrenics have enlarged brain ventricles.
- B: Most normal people have enlarged brain ventricles.
- C: Schizophrenics have no brain ventricles.
- D: Normal people have no brain ventricles.

7. A distortion or exaggeration of a mental/behavioral function is known as a(n) ____ symptom of schizophrenia.

- A: negative B: positive C: subjective D: objective

8. Dissociation may be thought of as

- A: a normal mental process.
B: a defense mechanism that protects us from anxiety.
C: a separation of some mental content from other mental content.
D: all the above

9. The Diagnostic and Statistical Manual of Mental Disorders (4th edition) uses the ____ in its definition of mental disorder.

- A: concept of psychogenesis C: psychological model
B: concept of somatogenesis D: medical model

10. What is the biggest problem with defining a mental disorder as an "internal mental dysfunction"?

- A: It is merely a "definition-by-exclusion."
B: We are unable to directly observe such a dysfunction.
C: Such a definition tends to stigmatize people.
D: We have no idea how we might treat such a dysfunction.

11. Researchers who study multiple personality have collected many case studies in which their clients state, typically while hypnotized, that they were sexually abused as children. Based on such case studies, these researchers have developed the following theory about multiple personality disorder in adults: it is caused by the use of dissociation caused by early childhood experiences. This theory obviously is a production of the subjective research tradition in psychology because it

- A: proposes proximate causes of the disorder.
B: is based on research having a great deal of internal validity.
C: uses case studies as the main source of evidence.
D: all the above

12. Researchers have found that some drugs cause people to become depressed whereas other drugs seem to relieve depression. Such findings provide evidence that depression may be caused by abnormalities in

- A: thought processes. C: liver functioning.
B: neurotransmitters. D: immunological responses.

13. According to the book, the difficulty we have in identifying particular internal dysfunctions has led clinicians to focus on _____ when DIAGNOSING mental disorders.
- A: deviations from important social norms
 - B: damage to the brain
 - C: biochemical abnormalities
 - D: problems in medical histories
14. Which of the following statements about multiple personality disorder is TRUE?
- A: A person with the disorder is suffering from hallucinations and delusions.
 - B: The alternate personalities are almost always aware of each other.
 - C: The alternate personalities are typically all very similar to one another.
 - D: Since about 1975, there has been a large increase in the diagnosis of this disorder.
15. Delusions of ____ are the most common type of delusion experienced by schizophrenics.
- A: cognition
 - B: persecution
 - C: reliability
 - D: hallucinations
16. Supporters of the diagnosis of multiple-personality disorder believe that authentic cases of this disorder typically are the result of
- A: extremely overprotective parents.
 - B: a traumatic childhood often involving sexual abuse.
 - C: extremely distorted communication patterns in the family.
 - D: a person being reinforced for acting in a "crazy" manner.
17. The medical model asserts that the overt symptoms of a mental disorder
- A: must be caused by physical damage to the central nervous system.
 - B: can be cured only with drugs
 - C: are due to a single, underlying cause.
 - D: should be treated by medical doctors.
18. Which of the following disorders is so common that it has been referred to as the "common cold" of mental disorders?
- A: major depression
 - B: schizophrenia
 - C: conversion disorder
 - D: bipolar disorder
19. People who consistently make _____ attributions for negative experiences are more likely to become depressed.
- A: internal, specific, unstable
 - B: internal, general, stable
 - C: external, specific, unstable
 - D: external, general, stable
20. A person suffering from a manic episode is likely to show all of the following symptoms EXCEPT:
- A: very high self-esteem.
 - B: very high energy.
 - C: amnesia.
 - D: racing thoughts.

21. George experiences episodes of extreme euphoria, which are always followed by episodes of extreme depression. George MOST likely is experiencing
- A: cyclothymic disorder. C: dysthymic disorder.
B: major depression. D: bipolar disorder.
22. I am suffering from major depression. Which of the following symptoms would I be LEAST likely to have?
- A: hallucinations B: anhedonia C: insomnia D: suicidal thoughts
23. A person is said to have _____ when he/she has strongly held beliefs that are not commonly believed in his/her culture and that are based on little or no evidence
- A: hallucinations B: delusions C: obsessions D: illusions
24. When a person experiences sudden episodes of a brief loss of muscle tone while experiencing an intense emotion, that person probably is suffering from
- A: sleep apnea. B: narcolepsy. C: somnambulism. D: sleep terrors.
25. Which of the following is the BEST treatment for bipolar disorder?
- A: light therapy C: electroconvulsive therapy
B: antidepressant drugs D: lithium carbonate
26. Which of the following is a difference between subjective and objective researchers in psychology?
- A: Subjective researchers tend to be analytic whereas objective researchers tend to be holistic.
B: Subjective researchers tend to focus on proximate causes whereas objective researchers tend to focus on ultimate causes.
C: Subjective researchers tend to be from clinical areas of psychology whereas objective researchers tend to be from nonclinical settings.
D: Subjective researchers tend to study observables whereas objective researchers tend to study unobservables.
27. Someone who alternates among several personality fragments, each having different abilities, memories, and names would be diagnosed with
- A: schizophrenia C: bipolar disorder.
B: dissociative identity disorder. D: dissociative amnesia.
28. Which of the following is NOT one of the characteristics of the objective tradition in psychology?
- A: It tends to study organisms in their natural habitats.
B: It tends to use much control of the research situation.
C: It tends to be most concerned with developing scientific knowledge.
D: It tends to be most concerned with internal validity.

29. Some schizophrenics feel as if thoughts and sensations are pouring all at once into their minds, a symptom known as

- A: loose associations.
- B: mania.
- C: stimulus flooding.
- D: psychomotor agitation.

30. The major criticism of OBJECTIVE research is that

- A: it may often lack external validity.
- B: it often uses uncontrolled research situations.
- C: it focuses too much on the use of case studies and correlational studies.
- D: it does not consider the possible importance of proximate causes.

31. Mary believes that while she sleeps at night, the FBI and the CIA are spying on her. She also states that space creatures from the planet Zoltar are living inside her uterus, where they are multiplying until they are ready to take over the world. Other than these bizarre delusions and some hallucinations, Mary has mostly mild symptoms of schizophrenia. Mary would MOST likely be diagnosed as being a(n) _____ schizophrenic.

- A: paranoid
- B: catatonic
- C: disorganized
- D: atypical

32. I am having difficulty sleeping at night. I seem to wake up every hour, on the hour. Thus, my sleep is highly "fragmented." I most likely am suffering from

- A: circadian rhythm sleep disorder.
- B: REM-sleep behavior disorder.
- C: a dyssomnia.
- D: a parasomnia.

33. Which of the following personality disorders is NOT thought to be related to schizophrenia?

- A: schizotypal personality disorder
- B: borderline personality disorder.
- C: paranoid personality disorder
- D: schizoid personality disorder

34. If one member of an identical-twin pair develops schizophrenia, the other member of the pair will develop schizophrenia about ____% of the time.

- A: 5
- B: 15
- C: 30
- D: 80

35. The typical age-of-onset of schizophrenia is about

- A: 5-10 years.
- B: 10-15 years.
- C: 15-25 years.
- D: 25-35 years.

36. Most of the drugs that are useful in the treatment of schizophrenia are known to _____ activity in the brain, suggesting that disruptions in the activity of this neurotransmitter may contribute to the development of schizophrenia.

- A: increase norepinephrine
- B: decrease norepinephrine
- C: increase dopamine
- D: decrease dopamine

37. The sleep of a narcoleptic "sleep attack" is different from the sleep of hypersomnia in that the sleep of narcolepsy
- A: involves frequent nightmares.
 - B: lasts much longer than the sleep of hypersomnia.
 - C: leads to "sleep drunkenness" as the narcoleptic awakens.
 - D: typically leaves the person feeling rested.
38. According to the research that has been done to date, which area of the brain is probably the MOST important one for causing symptoms of schizophrenia
- A: the limbic system
 - C: the brain stem
 - B: the cerebral cortex
 - D: the corpus callosum
39. The existence of schizoaffective disorder suggests that
- A: certain personality disorders may be related to schizophrenia.
 - B: schizophrenia and mood disorders may be related.
 - C: sleep problems may be basic to schizophrenia.
 - D: hallucinations and delusions may not be the primary symptoms of a psychosis.
40. Which of the following is one aspect of what is meant by the term "research tradition"?
- A: the integrated set of concepts and general principles designed to explain a phenomenon
 - B: the particular explanation of some event
 - C: the fundamental set of motives that inspires the work of a researcher
 - D: the assumptions and concepts about human nature shared by a group of theorists
41. Dissociative identity disorder, at present, is most commonly seen in
- A: all countries in which physical and sexual abuse of children are common.
 - B: the United States and Canada.
 - C: Asian countries (especially Japan).
 - D: France.
42. A disorder in which there is a break with reality resulting in the experiencing of delusions or hallucinations is known as a(n)
- A: psychosis.
 - C: somatogenic disorder.
 - B: neurosis.
 - D: psychogenic disorder.
43. Which of the following has research SHOWN to be a possible environmental influence on the development of schizophrenia?
- A: poor mothering
 - C: the earth's magnetic fields
 - B: viral infections
 - D: all the above

44. Many clinicians have tried to subtype schizophrenia. The goal of subtyping schizophrenia is based in the belief that

- A: schizophrenia actually is several different disorders each having a different cause.
- B: schizophrenia and bipolar disorder are the same disorder.
- C: we will never be able to find an adequate treatment for schizophrenia until we have split it up into different categories.
- D: some kinds of schizophrenia are due to unconscious conflicts and other kinds are due to childhood experiences.

45. Insomnia is most common during

- A: childhood.
- B: adolescence.
- C: young adulthood.
- D: late adulthood.

46. The development of which of the following disorders seems to be BEST explained by psychological (instead of biological) theories?

- A: bipolar disorder
- B: schizophrenia
- C: major depression
- D: obstructive sleep apnea

47. When a person is awakened many times during the night because he/she stops breathing for a short period of time, that person probably is suffering from

- A: sleep apnea.
- B: narcolepsy.
- C: somnambulism.
- D: sleep terrors.

48. A NONpsychotic person who is very suspicious about other people's motives and who believes, without much evidence, that most people would try to exploit or even harm him if they could gain something from it would probably be diagnosed with

- A: schizophrenia.
- B: major depression.
- C: paranoid personality disorder.
- D: schizoid personality disorder.

49. The most common hallucinations of schizophrenia are ____ hallucinations.

- A: auditory
- B: paranoid
- C: tactile
- D: visual

50. Those who are skeptical about the diagnosis of multiple-personality disorder believe that, for the MAJORITY of people who are diagnosed with this disorder, the symptoms of the disorder are due to all of the following EXCEPT

- A: severe sexual or physical abuse during early childhood.
- B: suggestions made by the therapist.
- C: the labeling of normal fluctuations in mood and behavior with the names of different personalities.
- D: suggestions made in books, magazines, and movies.

Answer Keys for Practice Tests
(Chapters 1-7)

Answer Key: Practice Test for Chapter 1

No.	Answer	Study Question	No.	Answer	Study Question
1	A	SQ15	34	B	SQ16
2	D	SQ9	35	B	SQ9
3	A	SQ7	36	D	SQ5
4	C	SQ7	37	B	SQ13
5	A	SQ10	38	D	SQ7
6	B	SQ7 & 8	39	A	SQ1
7	B	SQ16	40	B	SQ8
8	B	SQ17	41	B	SQ10
9	B	SQ8	42	D	SQ16
10	C	SQ16	43	C	SQ12
11	D	SQ17	44	A	SQ8
12	B	SQ11	45	A	SQ16
13	C	SQ2	46	A	SQ9
14	C	SQ10	47	B	SQ6
15	D	SQ12	48	B	SQ5
16	C	SQ14	49	C	SQ7
17	D	SQ11	50	D	SQ14
18	D	SQ7			
19	A	SQ12			
20	A	SQ6			
21	C	SQ7			
22	A	SQ7			
23	A	SQ3			
24	B	SQ10			
25	B	SQ15			
26	A	SQ15			
27	C	SQ9			
28	A	SQ10			
29	D	SQ4			
30	C	SQ8 & 10			
31	A	SQ5			
32	B	SQ7			
33	B	SQ2			

Answer Key: Practice Test for Chapter 2

No.	Answer	Study Question	No.	Answer	Study Question
1	D	SQ13	34	B	SQ13
2	C	SQ9	35	D	SQ5
3	A	SQ15	36	A	SQ11
4	B	SQ4	37	A	SQ15
5	A	SQ4	38	B	SQ12
6	D	SQ6	39	D	SQ15
7	A	SQ3	40	B	SQ7
8	B	SQ15	41	B	SQ9
9	A	SQ5	42	B	SQ5
10	D	SQ10	43	A	SQ14
11	C	SQ5	44	B	SQ13
12	B	SQ14	45	C	SQ5
13	D	SQ5	46	C	SQ15
14	D	SQ12	47	D	SQ13
15	D	SQ3	48	C	SQ15
16	C	SQ9	49	A	SQ10
17	D	SQ15	50	C	SQ8
18	A	SQ10			
19	D	SQ14			
20	D	SQ11			
21	C	SQ2			
22	C	SQ4			
23	A	SQ12			
24	B	SQ9			
25	D	SQ15			
26	A	SQ2			
27	C	SQ13			
28	B	SQ2			
29	B	SQ15			
30	A	SQ5			
31	A	SQ15			
32	A	SQ14			
33	C	SQ11			

Answer Key: Practice Test for Chapter 3

No.	Answer	Study Question	No.	Answer	Study Question
1	A	SQ8	34	A	SQ12
2	B	SQ21	35	C	SQ9
3	B	SQ8	36	C	SQ14
4	A	SQ17	37	B	SQ22
5	C	SQ16	38	A	SQ4
6	C	SQ8	39	A	SQ22
7	D	SQ5	40	A	SQ5
8	B	SQ2	41	A	SQ21
9	B	SQ3	42	B	SQ12
10	D	SQ12	43	C	SQ14
11	A	SQ14	44	C	SQ11
12	A	SQ15	45	D	SQ21
13	C	SQ8	46	A	SQ9
14	D	SQ17	47	D	SQ13
15	C	SQ22	48	C	SQ12
16	D	SQ14	49	A	SQ16
17	D	SQ3	50	D	SQ19
18	D	SQ19			
19	B	SQ3			
20	B	SQ6			
21	C	SQ11			
22	D	SQ5			
23	C	SQ14			
24	D	SQ9			
25	D	SQ6			
26	A	SQ9			
27	D	SQ5			
28	C	SQ22			
29	A	SQ22			
30	A	SQ22			
31	B	SQ12			
32	A	SQ14			
33	B	SQ16			

Answer Key: Practice Test for Chapter 4

No.	Answer	Study Question	No.	Answer	Study Question
1	A	SQ9	34	A	SQ15
2	B	SQ11	35	B	SQ5
3	B	SQ8	36	D	SQ8 & 10
4	A	SQ7	37	C	SQ6
5	D	SQ6	38	C	SQ5
6	C	SQ11	39	B	SQ6
7	D	SQ5 & 8	40	A	SQ12
8	D	SQ7	41	A	SQ5
9	B	SQ6	42	A	SQ12
10	C	SQ6	43	C	SQ7
11	B	SQ15,16,17,19	44	B	SQ5
12	C	SQ6 & 14	45	C	SQ17 & 18
13	B	SQ14	46	B	SQ19
14	B	SQ14	47	D	SQ10
15	A	SQ13	48	D	SQ11 & 12
16	D	SQ5	49	B	SQ10 & 11
17	C	SQ6	50	D	SQ1
18	B	SQ18 & 19			
19	D	SQ13			
20	C	SQ5 & 8			
21	A	SQ10			
22	C	SQ14			
23	B	SQ6			
24	A	SQ1			
25	D	SQ12			
26	B	SQ8			
27	A	SQ9			
28	B	SQ5			
29	B	SQ14			
30	D	SQ8			
31	D	SQ14			
32	A	SQ14			
33	D	SQ8			

Answer Key: Practice Test for Chapter 5

No.	Answer	Study Question	No.	Answer	Study Question
1	A	SQ11 & 12	34	C	SQ20
2	B	SQ1	35	B	SQ11
3	B	SQ8	36	A	SQ11
4	D	SQ6	37	A	SQ10
5	C	SQ17	38	A	SQ1
6	B	SQ9	39	C	SQ2
7	A	SQ20	40	B	SQ18
8	A	SQ6	41	D	SQ19
9	B	SQ6	42	C	SQ6
10	B	SQ4	43	C	SQ8
11	B	SQ5	44	C	SQ14
12	A	SQ8 & 9	45	A	SQ16
13	C	SQ3	46	A	SQ7
14	B	SQ11	47	D	SQ9, 18, 20
15	C	SQ8	48	B	SQ12
16	A	SQ4	49	B	SQ20
17	D	SQ17	50	C	SQ20
18	B	SQ3			
19	A	SQ11			
20	D	SQ1			
21	A	SQ12			
22	A	SQ6 & 8			
23	B	SQ7			
24	C	SQ8			
25	C	SQ5			
26	D	SQ5			
27	D	SQ9			
28	D	SQ7			
29	C	SQ4			
30	D	SQ4			
31	A	SQ4			
32	C	SQ10			
33	C	SQ11			

Answer Key: Practice Test for Chapter 6

No.	Answer	Study Question	No.	Answer	Study Question
1	C	SQ6 & 11	34	A	SQ1
2	B	SQ17	35	B	SQ9
3	A	SQ10 & 11	36	D	SQ1
4	A	SQ8	37	C	SQ11
5	C	SQ24	38	B	SQ16
6	D	SQ18 & 25	39	A	SQ14
7	A	SQ24	40	D	SQ22
8	B	SQ8	41	A	SQ6
9	A	SQ17	42	D	SQ12
10	B	SQ11	43	A	SQ21
11	A	SQ8	44	A	SQ13
12	A	SQ11	45	B	SQ8
13	B	SQ11	46	A	SQ3
14	B	SQ21	47	C	SQ9
15	A	SQ3	48	D	SQ25
16	C	SQ8	49	B	SQ11
17	B	SQ26	50	A	SQ21
18	B	SQ3			
19	C	SQ9			
20	B	SQ14			
21	D	SQ15			
22	C	SQ15			
23	A	SQ10			
24	C	SQ18 & 25			
25	D	SQ2			
26	A	SQ12			
27	A	SQ19			
28	D	SQ10			
29	C	SQ21			
30	A	SQ25			
31	C	SQ8			
32	C	SQ12			
33	C	SQ4			

Answer Key: Practice Test for Chapter 7

No.	Answer	Study Question	No.	Answer	Study Question
1	D	SQ9	34	C	SQ8
2	D	SQ4	35	C	SQ5
3	A	SQ6	36	D	SQ7
4	A	SQ2	37	D	SQ15
5	A	SQ15	38	A	SQ7
6	A	SQ7	39	B	SQ14
7	B	SQ5	40	C	SQ18
8	D	SQ16	41	B	SQ17
9	D	SQ2	42	A	SQ1
10	B	SQ2	43	B	SQ8
11	C	SQ18	44	A	SQ7
12	B	SQ11	45	D	SQ15
13	A	SQ3	46	C	SQ11 & 12
14	D	SQ17	47	A	SQ15
15	B	SQ5	48	C	SQ9
16	B	SQ17	49	A	SQ5
17	C	SQ2	50	A	SQ17
18	A	SQ10			
19	B	SQ11			
20	C	SQ13			
21	D	SQ13			
22	A	SQ10			
23	B	SQ5			
24	B	SQ15			
25	D	SQ13			
26	C	SQ18			
27	B	SQ17			
28	A	SQ18			
29	C	SQ5			
30	A	SQ19			
31	A	SQ7			
32	C	SQ15			
33	B	SQ9			

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