can have an adverse effect on health by straining the cardiovascular system and disrupting immune responses, which normally function to protect the body from invaders such as bacteria, viruses, cancer, and tumor cells (Ader, 2006).

**THE NERVOUS SYSTEM**

So what is actually happening during a fight-or-flight response? To understand, we have to talk about the brain and the body. The following is a brief summary of how the nervous system works, but of course there are many books devoted exclusively to detailing these processes. If you find you are fascinated by this topic, you may wish to track down a book such as *The Complete Mind: How It Develops, How It Works, and How to Keep It Sharp*, by Michael S. Sweeney (2009), or any of the many other reviews and textbooks of the topic out there. Students in my classes joke that they will never be able to read all the books I recommend, but somehow I just can’t help myself!

To get back to the brain, the nervous system is actually made up of three components. The brain and the spinal cord form the central nervous system, while all of the connections from the brain and the spinal cord to and from the rest of the body are called the peripheral nervous system. The peripheral nervous system is itself divided into the somatic, or skeletal, nervous system, which controls voluntary movements such as clenching your hand, and the autonomic system, responsible for the control of less-conscious functions, such as the ways your glands work. The autonomic system, in turn, is comprised of a parasympathetic component and a sympathetic component. The parasympathetic system regulates the resting, or homeostatic, functions of the body, including resting respiration, heart rate, and digestion. The sympathetic system, on the other hand, mobilizes metabolic resources to enable the body to respond to stress. These messages are carried by nerves, or bundles of cells, called neurons. These cells run throughout the body, travel up and down the spinal cord, and enter the brain itself as cranial nerves.

The brain itself is actually a mass of specialized cells, packed into a bony version of a football helmet. It is surrounded by three membranes. The outermost one, called the dura, looks almost like saran wrap, but is actually a tough protective layer on the outside of the brain. The middle layer, called the arachnoid membrane, resembles a spiderweb, and the last one, the pia, closely adheres to the bumps and crannies of the brain. The space between the arachnoid layer and the pia is filled with a clear liquid called cerebrospinal fluid (CSF). This
fluid flows through hollow chambers called the ventricles and circulates around the spinal cord. In addition to providing a cushion, it also transports nutrients and waste throughout the central nervous system. If the drainage of CSF is blocked, hydrocephalus occurs, and can result in permanent brain damage.

**IS IT ELECTRICAL OR CHEMICAL?**

Cells called neurons are found in the brain, spinal cord, and the peripheral nervous system. Neurons carry and receive information. Although they vary in shape and size, they tend to have a long fiber, called an axon, which conveys information away from the cell body, and other branchy projections, called dendrites, which receive information. Although the neurons in your brain are microscopically small, there are actually neurons that stretch, uninterrupted, from the base of your spine out to your big toe. In the case of many of our pro basketball players, that would be a really long neuron!

Within neurons, messages are conveyed electronically through a rapid—but complex—exchange of ions, or charged particles, across the membrane of the neuron. This is called an action potential or depolarization. When this signal reaches the end of the axon, it triggers the release of chemicals called neurotransmitters. Since neurons don’t actually touch each other, these chemicals travel across the synapses, the gaps between them, to bind to the dendrite on the other side. This signal can then cause the second neuron to fire, or can inhibit firing. Since neurons are actually arranged in complex networks, an individual neuron is typically

Figure 2. Neuron cell diagram.
receiving input from a number of other neurons. If the sum of the signals is excitatory, it fires. If the sum is inhibitory, it does not. Amazingly, all of this happens in milliseconds, which is why neurons can respond to the environment in a rapid, continuous manner.

What these signals mean in functional, biological terms, is another thing altogether. The actual arrangement of neurons is based both on genetic and experiential factors. During development, the cells that eventually become the nervous system gradually migrate to form the brain and the spinal cord. Within the brain they differentiate into structures that control everything from breathing and heart rate to memory. They are assisted in this process by cells called glial cells, which continue to exist in the fully developed brain and spinal cord, to provide structure, as well as the transportation of nutrients and waste. Specialized glial cells also wrap around neurons to provide a form of insulation called myelin. Myelin enables neurons to transmit signals efficiently and recover rapidly so they can respond again as soon as possible. Without this ability, neuronal communication is seriously compromised. For example, multiple sclerosis (MS) is an autoimmune disease characterized by the degradation of myelin. Over time, people with MS gradually lose control of their bodies, and eventually develop cognitive difficulties as well.

Messages between neurons are conveyed by specialized chemicals called neurotransmitters. These compounds are produced in the axons of neurons and released from their very tips into gaps called the synapses. These chemicals then travel across this synaptic gap to bind with specialized receptors on the other side of the gap. Perhaps the easiest way to think about this is by putting it in terms of a lock and a key. Each transmitter has a specific shape or configuration, and can only fit into—and activate—certain types of protein structures, called receptors. Think of it as a key sliding into a lock. If it isn’t the right key, it may not go in or it may not turn. On the other hand, some master keys can fit into and activate more than one lock. This means that the same transmitter can have different effects on different parts of the brain or body.

The impact of a transmitter depends both on what type of transmitter it is and on how it interacts with the dendrite on the other side. We are not sure how many transmitters there are in the brain, but we have identified more than 100. To further complicate the picture, many transmitters have more than one type of receptor, further multiplying the possible signals they can carry. For example, there are seven known types of receptors for serotonin, a transmitter found in numerous places in the brain and also throughout the gut. Since serotonin is involved in a variety of functions, including the regulation of mood, sleep, and eating, its actions depend both on where it is located and which receptors it is activating. The drugs Prozac and Lexapro, commonly taken for depression, actually increase serotonin activity in the brain by slowing the rate at which serotonin is cleared from the synapse. In fact, most of the drugs that act on the brain do so by affecting the actions of neurotransmitters. Sometimes they increase or decrease their release from the axon, at other times they mimic or block their effects at the receptor. Some even interfere with the rate at which enzymes break down loose transmitters in the synapse, or the speed at which neurons recycle transmitters that are left over in the synapse (a process called reuptake).
If all of this is confusing, imagine transmitters as passengers on a subway system. When they leave the first train (the neuron) and enter the station (the synapse), a number of things can happen. Some cross the gap and board the next train by binding to the receptor on the other side of the synapse. Others linger in the gap and miss the train. They can wait around to cross and bind later, or get back on the first train (reuptake), or occasionally, they get mugged (broken down by enzymes in the gap). Disruption of any of these processes alters neuronal function. Certain diseases also play havoc with the action at a synapse. For example, in the case of Parkinson’s disease, the parts of the brain that usually produce dopamine (a transmitter involved in motor control, among other things) stop making the transmitter. The result is a major disruption in the patient’s ability to stop, start, and control their own movements.

The Terrain of the Brain

Throughout this discussion, I have been talking about the brain in terms of structures that control different functions. Although I can, and have, spent 15 full weeks of a class talking about the brain and how it works, I will try to keep this discussion under control! The brain itself can be described in a number of different ways because it is three dimensional. If you look down on it from above, you will see that the surface looks like a crumpled up tissue with lots of bulges and crevices. This is the outer part of the cerebral cortex, made of white myelinated neurons, so it is often called the white matter. In contrast, the layer below, called the gray matter, is made up of unmyelinated dendrites and cell bodies. Overall, this crumpled up mass of cortical tissue would be about the size of a pillow case if it were spread out flat, instead of being folded into our skulls. The complexity of human thought, language, and abstract reasoning occurs in this cortical area, which is more dense and convoluted than the cortex of any other animal, including our primate ancestors (Sweeney, 2009).

The top of the cortex over your forehead is called the frontal lobe. The back part of this area contains neurons that specialize in controlling motor movements. The anterior, or forward, part of the structure is involved in planning, goal setting, organizing behavior, and personality. The areas on the sides of the cortex above your ears are called the temporal lobes. Those on the right side are involved in visual memory and those on the left in language, including the production and understanding of speech. Behind the frontal lobe are the parietal lobes (on top of your head) that specialize in receiving and coordinating sensory input from the body. The occipital lobes, where the light signals relayed by your eyes are unscrambled, identified, and interpreted, are found in the back of the brain. If this area is damaged, you may be functionally blind, even if your eyes themselves are intact. Seen from above, the brain can also be viewed as two halves, or hemispheres. The left side of the brain actually controls the right side of the body and vice versa, and the left side is generally the more verbal side of the brain, with the right side being more visuospatial.

Below the forebrain, there are a number of other key brain structures that help us respond to the world. These include the thalamus and the hypothalamus, which are easy to confuse, but have

Figure 3. Median section of the brain.
heart rate and the dilation of blood vessels. In response to signals from the pituitary, the thyroid gland secretes thyroxin, which also increases metabolism, respiration, heart rate, and blood pressure.

During a fight-or-flight response, you actually become less aware of pain, probably because of the release of chemicals called endorphins, which act as natural opiates in the body. Your eyes dilate and your attention becomes very focused, and your skin may become cold and clammy because your body is rerouting blood to large muscles to increase their strength. Your body puts digestion on hold, as it is not crucial for your immediate survival.

The sympathetic nervous system also inhibits the function of your immune system when activated. Although this seems illogical at first, it actually reflects a complicated triage plan. The immune system is made up of billions of white cells circulating through your blood, lymph glands, and body, which are specialized to detect and destroy invaders like bacteria, viruses, and tumor cells. When your immune system is activated, it uses up a lot of energy producing cells to recognize and neutralize invaders. It also increases your pain sensitivity so you will protect yourself, raises your body temperature to create an inhospitable environment for the invader, and makes you sleepy to conserve energy. If you are running from a tiger, none of these functions is particularly helpful, and they all use up energy. So, during fight-or-flight, your body prioritizes needs and uses all available energy to combat the threat. If you escape the tiger, you can take the time to hole up somewhere to rest and heal any injuries you sustained. As part of this process, the same cortisol increases your metabolic processes and reroutes the cells of the immune system into the bone marrow. That way, if you get cut running away, your precious immunity won’t be lost as you lose blood. In an aside, cortisol has also been shown to impact the formation of memories during stressful events, which may account in part for the fact that our memories of extremely stressful events may be very focused or very vivid.

While remembering the details of a dangerous event may help us to avoid a similar situation in the future, it may also contribute to the development of a disorder called posttraumatic stress disorder (PTSD). Essentially, some people who experience unusually stressful events such as combat, natural disasters, the violent death of loved ones, car accidents with fatalities, or rape or torture are later plagued by flashbacks, trouble with concentration and attention, nightmares, and feelings of unreality. Brain studies suggest that the stress hormone cortisol can cause damage to neurons in the hippocampus, which may contribute to disruptions in memory and other PTSD symptoms.

The problem however, is that while the fight-or-flight response is extremely helpful when you are faced with an immediate threat for which a physical response is appropriate, many of the stressors we face in the modern world are more chronic than acute, meaning that they last for days, hours, or years rather than minutes. There may be no way to eliminate the stress physically, no matter how tempting it feels to run away or hit your boss! Over time, the mechanisms of the sympathetic response put pressure on our cardiovascular system. They contribute to high blood pressure, high cholesterol, damage to blood vessels...
and protect a variety of resources, and that the loss—or even the anticipated loss—of these resources constitutes stress. These resources include objects or material goods and belongings, conditions such as marriage, seniority, etc., personal characteristics or skills, and energies such as time, money, and knowledge. Threats are those things that represent the potential or actual loss of such assets. So, stress occurs when resources are lost. Plus, the fewer resources one has, the more stressful the loss since you then have fewer resources with which to cope.

According to Hobfoll, these resources have instrumental value in that they can meet needs and help respond to specific threats, but they also have symbolic value as they help to define who we are. A home provides shelter and can be a sign of prestige. Marriage promotes child rearing, but also defines a person within his or her culture. In some cultures, not being married can lead to extremely low standing in the community, especially for women. This conceptualization of stress is important in that it allows for the evaluation of both actual and perceived losses as some stressor, such as an impending job layoff due to downsizing of a company, which may have a negative impact on individuals long before they actually occur, even if the anticipated loss never materializes. In addition, these broad definitions of resources enable the model to account for the stressful nature of threats to psychological resources such as power or self-esteem, as well as more easily measurable losses of objects and characteristics such as money and good health.

The Conservation of Resources model of stress also accounts for the robust finding that negative events (such as divorce) impact health far more than positive ones (such as marriage), even though both may require significant changes in our lifestyles. Transitions, then, are stressful when they represent loss, but not gain. Moving to a new city for a great new job where you quickly make friends is different from moving because your family moves, resulting in the loss of your support and resources without a compensating gain. Sometimes the distinction is made between distress or responses to negative life events and eustress, or responses to events which may require adaptation, but are also considered positive because they result in fulfillment or satisfaction.

Other approaches to quantifying stress have focused on the impact of smaller stressful events on well-being. These stressors, often called hassles, are not huge, negative events but rather smaller, annoying happenings such as traffic, dealing with rude people, losing things, and breaking things (Kanner, Coyne, Schaefer & Lazarus, 1981). There is some evidence that such experiences can have a cumulative negative effect on health and well-being. Interestingly, we seem to focus less on the small positive events, called uplifts, that occur in our daily lives. Much like eustress, they do not seem to generate happiness for us as reliably as negative events cause distress, leading some researchers to postulate that we are predisposed to focus on the negative, since identifying and avoiding threats is crucial for survival.

At the university where I teach, all students are given the opportunity each semester to rate their classes and make comments on the content of the course and the way it was taught. A common topic of conversation among my colleagues and me is why it is so easy to discount the good comments we get and to focus—and ruminate—on the couple of students who complain about a course. Sometimes the comments are contradictory:
CHAPTER 2
Technology: Who Is in Charge, Anyway?

Key Points
- Technology has made our lives easier, but not simpler.
- Technology has changed our entire view of the world.
- We live longer, but feel more stress than ever before.

The Good Old Days?
Most people in the Western world expect to live longer, physically easier lives than our grandparents. In 1900, the average life expectancy in the United States was 49.2 years (Shrestha, 2006) while today we live an average of 77.8 years (Kung, Hoyert, Xu, & Murphy, 2008). In the same period of time, infant mortality rates, which ranged from 10 to 30% in the United States, have now dropped to less than 1% (CDC Report). In real terms, that means that 100 years ago 14 out of every 100 babies died before reaching a year. To see this in human terms, all you have to do is walk the paths of any small-town cemetery. One of my great grandmothers, who lived in far northern Maine, is buried next to a small headstone that simply says, “Baby.” When I asked my great aunt why they hadn’t named the baby, she told me that it was born “poorly,” so they didn’t want to get too attached. It is hard to imagine modern-day American parents taking such a resigned approach to their infant’s health and well-being.

Of course, the fact that we can keep most infants alive now isn’t without financial and psychological costs. It has been estimated by the March of Dimes (2009) that the average baby born before 37 weeks’ gestational age costs about $49,000 in the first year of life, in contrast to the average of $4,551 for a full-term, healthy child. According to the National Institutes of Health, total expenditure for premature births equals $26 million a year. Although we could quibble about whether families, hospitals, or governments should cover these costs, the bottom line is that saving infants’ lives is not
that they maintained for company use, we now feel we should coordinate the color schemes and decor of our entire homes and try to maintain them at Martha Stewart levels, to boot.

On the hygiene front, we no longer take a bath once a week or less and wear the same clothes for days at a time. Most Americans shower at least once a day, and tend to wash clothes after one wearing. According to Juliet Schor, the author of *The Overworked American*, an American mother with two kids who used to have to manage two baths a week, is now responsible for 14 baths in the same period of time. In fact, research suggests that the number of hours spent on housework remained virtually constant for full-time housewives from the 1920s to the 1990s, despite major changes in how that work was accomplished.

We have also increased the volume of things in our home and spend a great deal more time organizing and managing the things we have accumulated. Witness the proliferation of books, stores, television shows, and services designed to help you organize your house. Chances are your grand or great grandparents grew up in the Great Depression of the 1930s, when they learned to save everything for future use. In today’s world, the greater challenge is letting go of things to avoid being swamped by clutter. Anyone who has bought an older house with limited closet space has faced this struggle. Not surprisingly, during the mid-1970s, self-storage units for home use started popping up throughout the suburbs.

Although there are those who suggest that the need to acquire things is simply proof of modern greed, it is actually a much more complex phenomenon. It’s not that people in the past didn’t hope to acquire things—in fact, tours of mansions and castles in Europe suggest that people did indeed like to own fine furniture, art, decorations, and clothing. The difference was that the production of such items was so costly that only the very wealthy could afford them. In the meantime, the poor and middle classes were struggling to eke out the basics of their existence.

As technology progressed, this pattern changed. Mass-produced clothes, furniture, even houses (the Sears Catalog offered modular houses for sale from 1908 to the 1940s) became popular and were accessible to people of modest means. Advances in transportation allowed people to distribute products on a large scale and eventually to reduce the costs of both necessary items (dishes, shoes, fabric, etc.) and luxury goods, including toys, electronic devices, and comfort items. For people who grew up during the Great Depression, the fact that you can buy clothes at Wal-Mart for less than it would cost you to purchase the material and make them is indeed a change in perspective.
CHAPTER 3
THE MEDIA: IS IT ANY WONDER WE FEEL STRESSED?

KEY POINTS

- Information has always been power, but the problem in the modern world is not too little input, but too much.
- Not only do we have access to 24-hour news coverage, but it is disproportionately sensational and negative.
- The standards for lifestyle, beauty, and material success espoused by the media are largely out of reach for most of us.

CAN WE TALK?

If the ancient stories are to be believed, humans have long been obsessed with finding ways to share information. Whether using drumbeats, smoke signals, or messengers on foot or horseback, people have sought to find ways to start and end wars, convey information about dangers and disasters, promote trade, and facilitate social interactions. Of course, throughout much of history such communication was slow and difficult. Certainly, with the advent of the printing press the ability to share information blossomed exponentially (Moran, 2001). In 1440, Johannes Gutenberg, the creator of the first movable type printing press, produced a set of one-sheet documents sold by the Catholic Church, thought to be the first instance of a mass printing. By the 1600s, early versions of newspapers were appearing in Europe and America. By the end of the U.S. Revolution in 1783, there were 43 newspapers being published; naturally, freedom of the press was
access to the war, which did limit the scope of viewer exposure. During the second Iraq war, reporters were officially embedded with the military, living and traveling with troops. Although this raised concerns about their impartiality regarding the people who were protecting them, the advent of camera phones, text messaging, and the Internet also ensured that both reporters and military personnel routinely relayed information back home. Pictures of atrocities and heroism as well as personal messages and ongoing blogs changed our experience of war once again. As wave after wave of protests have swept the Middle East, viewers are again experiencing the events through live media coverage as well as Facebook blogs and Twitter feeds. Clearly, access to up-to-date information has changed beyond all recognition.

Of course, news media coverage is not limited to wars. Viewing both positive live events such as celebrity weddings, inaugurations, and sports competitions, and negative ones such as disasters and crimes from our living rooms enables us to feel more personally involved. This is particularly evident in regard to high-profile events such as the marriage and eventual funeral of Princess Diana, the Oklahoma City Bombing, the Columbine School shootings, and, of course, 9/11 and Hurricane Katrina. The death of Princess Diana resulted in public outpourings of emotion and increased distress about her death in those women who were exposed to high levels of coverage of the event (Pillow & McNaughton-Cassill, 2001). A number of studies have shown that watching television coverage of the attack in Oklahoma resulted in significant levels of stress in both adults and adolescents who were not actually there. The scope of these tragedies pales however, in comparison to the wholesale destruction, loss of life, and disruption of the economic and transportation functions of an entire nation, watched nonstop on live television on September 11, 2001. The news media response to these attacks was rapid and extensive and resulted in depression, anxiety, and stress in individuals far removed from the events. See Gomery (2008) for a comprehensive review of the history of broadcasting.

A study of posttraumatic stress disorder (PTSD) in relation to the attacks suggested that rates of PTSD were significantly higher in New York than anywhere else in the country, but that nationally the number
are rare, catastrophic, unfamiliar, and uncontrollable as very risky, even when these may in fact pose little actual threat to most people. On the other hand, if a person is familiar with the risk and sees it as temporary or under their control, they will downplay it. This, of course, is why so many people fear airline accidents, despite the fact that they are statistically at much greater risk of being hurt in a car accident. Similarly, we worry about AIDS, which kills far fewer people than heart disease, and about nuclear accidents that are man-made over natural disasters such as tornadoes and hurricanes. The less familiar and predictable an event is, the more we worry.

Applying this breakdown of risk assessment, it becomes easy to see how news media that thrives on showing us immediate, sensational, fatal events plays into our sense that we live in a dangerous, threatening world. This, in turn, generates feelings of dread and as news spreads through the media and by word of mouth, the sense of risk is amplified further. Because learning to respond to actual risks with rapid, automatic, emotion-driven responses has survival value, it can be hard to override these responses, even in the face of logical, analytical information to the contrary.

Even though more people in the United States die in hurricanes than earthquakes in an average year, people tend to fear earthquakes more because they are perceived as being catastrophic, uncontrollable, and unpredictable. Hurricanes, on the other hand, happen every year, and leave us with the feeling, at least, that we can predict and escape them. In fact, in particularly prone states such as Texas and Louisiana, a common problem is getting people to evacuate when a hurricane is approaching. Soon after moving to Texas, I was struck by the number of salesclerks in stores who looked at my California license and asked in all seriousness how I could have lived in a place that was going to fall into the ocean from earthquakes? Of course, Hurricanes Katrina, Rita, Ike, and Sandy proved that these events are actually common and can be more deadly than earthquakes.

Following the same logic, it is easy to see why parents worry about strangers abducting their children when they are more likely to be hurt while riding their bikes or swimming; why we worry about terrorist attacks instead of changing our lifestyles to decrease our heart attack risk, and by the threat of crime, rather than the threat of smoking.
death of entertainer Michael Jackson, search engines crashed as people sought information about his life and death.

This never-ending flow of entertainment also exposes us to a variety of emotions and lifestyles we might otherwise never encounter. On the one hand, these images are often glamorous, beautiful, and affluent. On the other, they can be seedy, depressing, and downtrodden, but in both cases they transport us out of our reality and often cause us to question just what that reality is. Our hairstyles, home decor, and clothing are constantly influenced by what we see in the media, as are our views of the lifestyles of people living in countries and circumstances that differ from ours.

**CAN YOU BUY HAPPINESS?**

The advertising world floods us with a ubiquitous, well-researched onslaught of messages designed to make us unhappy with our current lives and motivated to pursue shopping, travel, exercise, diet, and entertainment options, all at the expense of our self-esteem and pocketbooks. In the past, people’s sense of the world was based on comparisons to people around them. Today, no matter where you live or how affluent you are, there is always going to be someone ahead of you, which makes it hard to achieve contentment.

Advances in the field of advertising in the last 50 years have also caused unprecedented changes in our lives. Throughout most of history, shopping was a luxury reserved for the rich. This is not to say that sales practices were unknown. Door-to-door salesmen and peddlers certainly sought to influence people’s purchases, as did catalog and newsprint adds. However, the systematic study of how best to make people buy products really emerged in the past century. Advertising agencies, marketing specialists, and targeted selling began to emerge. Books were written on how to engage people in conversation, or how to give them a small gift, like a pen or name labels in order to make them feel indebted enough to buy something from you.

The idea of malls, devoted to enticing people into one site to shop, eat, and seek entertainment, also emerged in the past century. It is no surprise that most malls and stores have convoluted floor plans to ensure that you get disoriented, thus making you more likely to be exposed to things you might want to buy. In grocery stores, it is standard practice to put staple items like milk and meat in the back of the store, forcing customers to walk by the chips, candy, and soda on every trip. The use of lighting, color, air conditioning, and even fragrances to influence purchasing behavior all came into vogue. Stores even began to develop themed departments like the bridal area and the toy area, and restaurants strove to create a themed experience in which the setting, food, and music all created a “buying-friendly” mood.
few Americans today can imagine entertaining themselves without television, movies, radio, and computers. In fact, even the content of such electronic programming has changed significantly over time.

In the fascinating book *Everything Bad Is Good for You* (2006), author Steven Johnson explores the increasingly complex nature of television programming and computer games. It is his assertion that as our exposure to media has risen we have become increasingly sophisticated media consumers. Johnson systematically compares the plot and structure of early television shows such as *I Love Lucy* to later shows such as *Hill Street Blues* and then to programs such as *The West Wing* and *The Sopranos*. In these analyses, he illustrates how shows have changed from simple plots that are resolved in a single episode to convoluted, complex stories that carry over from show to show, season to season, and even jump across shows, and move about in time. It is his claim that early television viewers would be baffled by the complexity of modern programming, but that it is this density that motivates us to watch such shows over again online, or on videos or DVDs.

He also compares simple early video games like Pong to the complex, simulated games available now and argues that the interactive nature of today’s computer game actually challenges the human brain to perform in new and complicated ways. He further argues that because this type of entertainment is interactive, it requires more complex cognitive involvement than reading, that time-honored mental activity. He even asserts that the advent of social networking and blogging actually offers us a chance to interact in new and innovative ways, which are also cognitively challenging. As proof of his contention that changes in media technology and programming have not been all bad for us, he highlights the fact that during the time that media usage has skyrocketed, IQ scores have been steadily increasing as well. He does however, acknowledge that some of the skills being fostered by the Internet are better suited to the process of sifting through huge amounts of information than of sustaining interest in less interactive sources of information such as books or lectures.

### On Overload or Bored?

The most ironic thing about the complex, entertaining world we live in is the fact that boredom is still common and may actually be on the rise. In the book *Still Bored in a Culture of Entertainment*, Richard Winter (2002) explores the fact that the electronic overload we experience today may itself lead to boredom because it causes us to periodically shut down as a response to being overloaded. Winter argues that as entertainment sources have become more sophisticated, we have continually raised the standards. As a result, its producers must continually endeavor to be more sensational to hold our attention, and the real, mundane world in which we live seems more and more boring compared to the fantasies we experience in books, movies, television, and games.

### Starring in Our Own Personal Reality Shows

In his book *Life: The Movie*, Neal Gabler (2000) argues that we all now actually view our lives as an unfolding movie script, in which we are constantly striving to build an image of ourselves and assessing how others...
and vacation destinations. In effect, learning to expect so much success and prosperity from life actually results in much higher chances of our being disappointed on at least one front.

At the same time, according to poll data—and caused in part by our ever increasing knowledge of the failures of famous people—the press have eroded our sense of confidence in social organizations, including the government and judicial system, politicians and political organizations, religions, academic and medical institutions. For example, compare the public’s views of Presidents John F. Kennedy and Bill Clinton. Although both had affairs while in office, the Secret Service and the media did not reveal that fact during Kennedy’s time, while Clinton’s actions were made very public and had a major impact on his career. In the same vein, we all know far more about the failings of religious leaders than ever before, which has made it hard for many people to see their churches or other places of worship in the same light.

While most of us would not wish to go back to a time when the media withheld such information from us, it is certainly harder to trust organizations or to have heroes when we know so much about their failings and foibles. According to Seligman, the combination of expecting so much more from life with increasing distrust of social structures leaves people feeling that they are solely responsible for their successes or failures, and have few supportive structures to turn to if things go wrong. He attributes rising rates of depression, anxiety, and suicide over the past half century to this combination of factors.

Recognizing that the exponential increase in information available to us today is both helpful and harmful is the first step to learning to manage the impact of the media on our attitudes, expectations, and emotions. Consciously managing our exposure to information and monitoring and choosing our reactions to what we see can allow us to manage this very modern source of stress. Perhaps it can be said that when it comes to the media, the old saws like “ignorance is bliss” and “no news is good news” might be more prescient than we know.

**What Do You Think?**

1. How much time do you think you spent following coverage of the events of 9/11 the week it happened?
2. Do you find yourself avoiding the news altogether or feeling that you need to have it on all the time to “stay in touch?”
3. How often do you compare yourself or your lifestyle unfavorably to things you see in the media?

**References**


best mentally in the morning. Owls, on the other hand, tend to prefer to stay up late and sleep in and show increased mental alertness and activity much later in the evening than larks. Despite the cultural pressures of school and work times—and the temptations of our electronic environment—the patters appear to be firmly anchored in our genetic makeup and are difficult to change. In response to data indicating that teenagers on the whole are less alert in the morning, many high schools have shifted to later start times and report increased school performance and decreased tardiness (Mindell, 1999).

As a lifelong owl raising a daughter who has shown owl tendencies since babyhood, I am very sensitive to these distinctions. During college and graduate school I was perfectly happy studying from 8:00 in the evening until 2:00 or 3:00 in the morning, starting my workday around 10:00 a.m. However, when the twins came along, my husband and I went into a five-year-long sleep deficit free fall. No matter what we tried, the girls would not sleep on the same schedule. To make matters worse, our little owl, who barely napped and routinely fought falling asleep, wanted someone to stay awake with her when she couldn’t sleep. One tortured night I finally took her downstairs so her dad and sister could sleep and fell asleep myself, in the middle of the family room floor. I awoke a couple of hours later to find that the Barney video she had been watching had turned to fuzz and she had been crawling back and forth from her toy box to get blocks, books, and toys, which she had been using to outline my body and pile on my stomach. It was years before she reliably slept through the night, but what really saved us was her learning to read, which enabled her to occupy herself when she couldn’t get to sleep. As a teenager constrained by her high school and extracurricular schedule, she still struggles to fall asleep earlier in the evening, even after taking melatonin in an attempt to shift her circadian cycle.

Unfortunately, disrupted sleep is actually a problem for a huge number of Americans. In addition to sleep problems caused by jet lag and nocturnal work patterns, stress, depression, anxiety, exercise, diet, and pharmaceuticals are all known to alter sleep. Difficulty sleeping is a diagnostic criteria for depression, which is often characterized by waking in the middle of the night or waking earlier than you wish to and being unable to go back to sleep. Anxiety, on the other hand, often results in difficulty falling asleep, as can other forms of stress. Surprisingly, overall sleep deprivation, or simply awakening depressed individuals each time they enter REM sleep, can actually ameliorate their symptoms, suggesting that some sort of dysregulation of REM sleep is a component of depression.

Exercising too close to bedtime, eating and drinking foods high in sugar and caffeine, and taking medications for conditions ranging from colds and allergies to sleep problems can all influence our sleep patterns.
CHAPTER 5
NATURE AND DOWNTIME: WHAT DOES QUIET SOUND LIKE?

KEY POINTS
- Most Americans spend very little time outdoors.
- We are asking our brains to do things that humans never did before.
- In today’s busy world, people must actually schedule time to relax.

HOW NOISY IS MODERN LIFE?
The backdrop to modern life is so noisy that most of us aren’t even consciously aware of it anymore. Radios, televisions, computers, beeps, ringtones, vacuums, jackhammers, heaters and air conditioners, plane and automobile engines, people on cell phones, Muzak, dogs barking—the list is seemingly endless. This is not to say that life was silent in the past. Weather, animals, and humans interacting certainly still make a considerable amount of noise, as is evident in many of the less developed parts of the world. However, in the absence of electronic advances, those noises are not sustained and amplified. The amazing thing is how quickly most of us have adapted to the constant stream of noise and activity around us. In fact, if you stop for a minute right now you might be surprised to notice how many sounds you weren’t even consciously aware of hearing. If the sounds are low, and you aren’t trying to concentrate on something difficult, this may be no problem for you. But if you find you need to concentrate, the situation changes. Certainly, many harried parents have surprised themselves by yelling “be quiet, I can’t think,” in a noisy room or car. The reality is that there is a limit to how much information our brain can process simultaneously, and the modern world frequently pushes us to that threshold both physically and mentally. In fact, research suggests that high levels of noise are associated with poor sleep and also linked to cardiovascular and immunological problems (Ising & Kruppa, 2004; Ising & Prasher, 2012).
Artificial light may also have a negative impact on our well-being. Both the fluorescent and incandescent lights commonly used in residential and commercial settings fail to replicate the full natural-light spectrum, despite their brightness. Not surprisingly then, people often prefer to work in offices and buildings that offer windows and natural light. Such settings have been shown to decrease eyestrain, headaches, and overall stress levels and to increase productivity. We are more likely to experience stress in settings with more artificial light (Leather, Pyrgas, Beale, & Lawrence, 1998). Natural light increases attention and alertness, especially when performing boring or routine tasks. Some researchers have even found that absenteeism, and employee turnover are decreased in offices that offer natural light. For example, one survey indicated that 35 percent of office workers at one company reported that working in a space with no windows was their biggest work-related difficulty, while in another study, 96 percent of respondents said they preferred to work in natural light (Edwards & Torcellini, 2002).

Similar findings regarding light preferences have also been reported among students and teachers, and natural light has even been related to increased achievement scores on standardized tests. This may be particularly important in an era when the emphasis on school performance and test results has caused many schools to reduce the amount of time children spend outside. Studies in Wal-Mart and Target stores even suggest that people spend more time in stores featuring daylight. A number of medical studies have indicated that people were less likely to get depressed and to recover more quickly from surgery if their hospital room had a window (Joseph, 2006). Finally, exposure to vitamin D from sunlight has long been known to protect people from a disease called rickets, which disrupts bone growth and causes muscle weakness. Ironically, as our knowledge of the link between sunburn and skin cancer led to increases in sunblock use, some physicians are now arguing that many Americans are not getting enough sun exposure to maintain the level of vitamin D their bodies need and so are at risk for fatigue and depression (Heaney, 2005).

Clearly, our bodies and brains are predisposed to function most effectively in the presence of natural light. Of course, not all of us work or live in settings where natural light is available. Fortunately, the incorporation of green spaces and plants in our environment has also been shown to improve psychological well-being. Even walking through an arboretum has been shown to boost memory and attention, as opposed to walking through an urban setting. In settings without windows, people also indicate a preference for art or posters depicting natural scenes or for artificial windows which provide views of nature scenes (Fjeld, 2002; Eisen, 2008). Light, color and even exposure to nature can improve health and increase rates of recovery in hospitalized patients (Ulrich, 1984; Oberacher, 2002; Franklin, 2010).
For example, in a study conducted in my lab, participants were asked to rate their own communities and the country in general on a variety of indicators including crime, corruption, drug use, and school and personal safety (McNaughton-Cassill & Smith, 2002). As predicted, higher levels of television viewing were associated with elevated ratings of risk and danger for the nation as a whole but not one community in particular. It appears that when rating our own communities, we have access to a broader data set. We may know about a crime that happened in our neighborhood, but also be aware of how the neighbors helped, or we may know that some of the teachers at our child’s school are bad but others are highly dedicated and competent. When judging settings where we have no personal experience on the other hand, we tend to assume the worst—because that is predominantly what we hear in the news.

Ironically, overall crime rates have been dropping in the United States for decades, and yet many people aren’t aware of this fact. As the mother of young children, I constantly found myself telling other parents that I thought they should be more concerned about their child’s safety riding a bike without a helmet, swimming, and riding in a car than about their being abducted by strangers. Nevertheless, in the past and even today, surprising amounts of time at parenting and PTA meetings are devoted to talking about stranger danger, teaching your child not to talk to people they don’t know, and even to purchasing bracelets or dental IDs in case a child is kidnapped.

The irony of this is that in spite of all the media coverage of the abductions of Polly Klaas and Elizabeth Smart, the vast majority of child kidnappings involve family members, friends, or custody struggles. In addition, the children abducted by strangers are almost never toddlers. Typically, they are teen girls who are runaways or living in other types of unsafe settings. The fact is that your child is statistically more likely to be hit by lightning than to be kidnapped by a total stranger (Louv, 1991; Stokes, 2009). Regardless, many parents, scared by the perceived threat, struggle to teach their children to protect themselves and seriously curtail the amount of time these kids spend outdoors or in unstructured settings.

Growing up in the 1960s and 1970s, everyone I knew walked to and from school unless it was pouring rain. By the time my daughters went to school in the late 1990s, the line to drop off and pick up kids outside the school caused significant traffic jams in our neighborhood. While I understand that this may in part be a reflection of complex family schedules, many of the parents I spoke with cited stranger danger as a reason they didn’t let their kids walk or bike to school. After school, my sister and our friends played outside for hours at a time. In the summer we went back out after dinner and roamed the neighborhood until dark, played ball in the street, and floated in and out of each other’s yards and houses.

Today, such freedom is almost unimaginable. If kids aren’t participating in organized sports, music, language, or other classes, they are at home doing homework. Elementary school-age children rarely escape their parents’ immediate surveillance, and middle school and high school kids check in with their

Nowadays, children are sedentary and spend the majority of their time indoors. Their outdoor exercise is mainly limited to organized sports.
unprepared people were to cope without the modern amenities. Despite nationwide efforts by groups like the Red Cross to get people to plan for natural disasters with their families, the reality is that most Americans have neither the supplies nor the knowledge necessary to survive on their own for even a few days. Contrast this to many of our ancestors, who cleared land, grew food, and lived directly off the land. While going off the grid is not a feasible option for many of us, increasing our familiarity with the natural world can be a matter of life and death.

**The Spiritual Side of Nature**

Besides providing physical benefits and increasing psychological well-being, exposure to nature also seems to be strongly related to spirituality. Throughout the ages, literature has been filled with links between spirituality and natural settings. From the Bible to Native American stories, to Thoreau and Whitman, to the Dalai Lama, there are human accounts of spiritual experiences involving mountains, forests, deserts, oceans, lakes, and rivers. The feelings of being one with nature or the universe or mankind are often reported in conjunction with time spent in the wild. Visiting huge mountains or canyons or bodies of water seems to inspire awe in many of us, which paradoxically can also be generated by observing the miniature complexity of an ant hill or a beehive or the delicacy of a flower or a leaf.

Not surprisingly, there are those who argue that such experiences are simply the result of physiological changes in oxygen levels in the mountains or ions in the water, or that nature simply offers an opportunity for people to get out of their normal mental ruts. However, others believe that the brain may indeed be wired for spirituality, which can be triggered by beauty in nature, art, music, or architecture or by prayer, meditation, or relaxation practices. The parietal lobes in the cortex, responsible for processing sensory information, and the prefrontal lobes of the brain have all been implicated in spiritual experiences. Specifically, the parietal lobes show decreased activity during prayer and meditation, which may account for the reduction in the sense of space and time associated with these practices. Activity in the prefrontal cortex and even changes in the size of the thalamus, a sensory relay situation, have also been observed in relation to prayer and meditation. Furthermore, religious practices and spirituality have been associated with better physical and mental health and longevity (Seeman, Dubin, & Seeman, 2003; George, Larson, Koenig, & McCullough, 2000).
thiamine deficiency, disrupted growth and development resulting in malformation and even death. Of course poor nutrition also weakens the body and diminishes the efficiency of the immune system, leaving people more susceptible to illness and disease in general.

Of course, over the course of history, people’s food options were more limited even when it was available. In early human society, diet was constrained by what was naturally available in the area, effectively limiting the variety of foods available to people. Substances such as salt and spices that could preserve and enhance the taste of food were rare and expensive. Of course, there were always a few people who were wealthy enough to eat as much as they wanted, and paradoxically, obesity actually came to represent prosperity in some cultures. The problem in today’s world, of course, is that those of us living in Western cultures rarely suffer from too little access to food, and instead are surrounded by an amazing array of cheap, easy, and enticing food choices.

Prior to World War II, many people in rural settings grew and raised their own food, and only ate out when traveling. Although people in the cities had greater access to food through stores and restaurants, choices were still limited by the season, cost, and the difficulties of transporting fresh food. With the advent of electricity, refrigeration, rail commerce, and the interstate highway system, all of that changed rapidly. Have you ever wondered why so many cities in the Southwest had stockyards near the railroad tracks? In San Antonio, these yards were used to corral cattle brought in from all over the state prior to shipping them to Chicago and other northern cities to be butchered. The cows were transported live to prolong their freshness. Of course, now we have become accustomed to grocery stores featuring huge arrays of meat and produce, shipped from all over the world by plane, train, and truck. In addition, changes in food preparation and manufacturing have exponentially increased the variety of processed food we have available. While many of us don’t think twice about the floor-to-ceiling shelves of cereal and chips in our local supermarket, they actually represent advance in food preparation and advertising that weren’t even dreamed of a hundred years ago.

Patterns in dining out have changed significantly as well. While dining in restaurants in the past was primarily the domain of the rich and those who were celebrating big events, today it is simply another expression of our driven lifestyles.

Dining in Italy throughout history—a thermopolium in Pompeii offered an early version of fast food to diners (c. 79 A.D.), travelers in the 1800s enjoyed meals at osterias like this one in Rome painted by Carl Heinrich Bloch (1866), and diners today enjoy food at an outdoor café in Rome (2006).
The issue of how and when we stop eating is still only part of the process. How does your body regulate weight over the long run? It appears that we also have a complex biological mechanism for regulating our weight (Geary, 2004). The fat cells of our body produce a peptide called leptin that signals the brain to eat less, and become more active. Another chemical signal, called ghrelin, released from the stomach when food is not present, appears to trigger a series of signals that result in hunger. Strains of mice that lack the genes necessary to make leptin end up gaining huge amounts of weight. Although a few humans have a similar disorder, in most humans taking leptin does not actually decrease their appetite or weight gain. However, many obese individuals have high levels of leptin, suggesting they might be insensitive to its effects (Klok, Jakobsdottir, & Drent, 2007).

**Maybe All of Our Heads Are Fat**

Naturally, the coordination of all of these functions ultimately resides in the brain in a structure called the hypothalamus (Blevins & Baskins, 2005). In terms of food, the arcuate nucleus, a tiny subsection of the hypothalamus, receives both hunger and satiety signals, some of which are based on taste sensations. The lateral hypothalamus has been implicated in eating, and the paraventricular nucleus is thought to inhibit lateral hypothalamic eating signals. Yet another structure, the ventromedial hypothalamic area, is involved in meal frequency, weight gain, and insulin release. Clearly, regulating hunger, satiety, and body weight is a complex process (Broburger, 2005). Rather than rely on a single control system, the brain and body frequently utilize disparate mechanisms to ensure redundancy in the case of malfunctions. But the next time that someone tells you that weight control is merely a matter of limiting your caloric intake, feel free to laugh and tell them that we could only wish it were that simple!

As if the biology of food intake wasn’t complex enough, our eating patterns are also subject to a variety of emotional, social, and cultural influences. Because food is a basic, primary reinforcer, eating is a soothing, comforting activity. Sucking is immediately calming to infants, even if they are sucking on their own thumb. The taste of sweet, fat, and salty foods also seems to be inherently satisfying, as evidenced by the fact we don’t have to teach children to appreciate them—they do it automatically. It’s a rare parent who doesn’t occasionally offer their child a cookie or candy as a reward, and many of us continue to self-medicate with food when we are upset. Often, we turn to the same specific foods when stressed because we associate them with happier times. These “comfort foods” might be things our mothers made when we were sick, foods that remind us of happy people or places, or foods that we particularly savor. In my family, potatoes were a staple of every meal (influenced perhaps by the number of Irish ancestors in our family tree). Baked, boiled, fried, mashed, I like them all and to this day turn to mashed potatoes and gravy or a baked potato with butter when under duress. My husband, who is Japanese American, feels the same affinity for rice, and many of my Hispanic students in San Antonio report they are comforted by tortillas. Clearly, the food we are exposed to as children will take on meaning for
Another means of measuring body makeup is the body mass index (BMI), calculated by measuring body weight in kilograms and dividing that number by height in meters squared. Using these standards, people’s weight can be classified as desirable, under- or overweight, and obese. However, the actual numbers assigned to these cut-offs are under debate. Since BMI does not factor in age, gender, or ethnicity, many people have argued that it fails to accurately reflect a person’s actual body weight status, especially among people who are very short, very tall, or very muscular. Even more confusing is the fact that in 1999, the BMI guidelines were changed such that people who weren’t overweight the day before suddenly were.

Of course, changes in the desirability of a certain weight are not new either. If you were to go to an art museum and walk around with an eye to figuring out which sorts of body types were in vogue at any given time or place in history, you would quickly realize that the ideal body weight is a moving target (Haughton, 2004). From Botticelli’s lush portrayals of Renaissance women to Degas’s ballerinas, it is clear that the form society valued most was not a look that most women possessed the genetic or monetary means to attain. In today’s world, that translates into female models and actresses who are far taller and thinner than the average American and who often maintain that look through extreme dieting, exercising and smoking—all practices that can end up hurting their health in the long run. Nevertheless, awash in a world of movies, television, and advertising, most of us have internalized these images and come to think of being thin as a mark of attractiveness, success, and good health. Although research in this area indicates that girls and women are most susceptible to the negative effects of the media on body images (Grabe, Ward, & Hyde, 2008), recent work indicates that boys and men are increasingly experiencing similar dissatisfaction in regard to the onslaught of all the heavily muscled models with 6-pack abs they see (Olivardia, Harrison, Borowiecki, & Cohane, 2004; Mazur, 1986).

Furthermore, research indicates that even Miss America winners and Playboy centerfolds have gotten thinner over time, while the average weights of Americans have risen (Garner, Garfinkel, Schwartz, & Thompson, 1980; Spitzer, Henderson, & Zivian, 1999). This is ironic given the number of beauty, diet, exercise, and clothing companies that are based on selling us products or services guaranteed to help us achieve these unrealistic looks! Gaesser actually argues that worrying about weight and subsequent efforts to lose weight by dieting set up patterns of weight loss and gain (the so called yo-yo effect), which make it harder to maintain lower weights because the body compensates for the diet (or fasting periods) by becoming more metabolically
of you if you know that they are lost, than if you think they are doing it as a power play against you? Have you ever found your anger diminishing if another driver waves in apology after cutting you off? However, in the absence of words, shrugs, smiles, and other ways in which we convey our intentions to others when we deal with them face to face, it is easier to assume that the other driver’s motivations are negative and to respond negatively as a result.

The Social Brain

So, how and why are we wired to need social support? What happens if your brain is not good at recognizing or managing emotions? Over the past 20 years, advances in the ways in which we study the brain have revealed some interesting things. As mentioned earlier, the limbic system, located below the forebrain, seems to play a key role in generating emotions in response to incoming input from the thalamus and the cortex. Increased limbic system activity has been linked to emotions ranging from love and empathy to anger and disgust. Structures called the amygdala and the insula seem to play key roles, although the specific mechanisms of how these areas generate emotions are still under study.

The discovery in the 1990s of mirror neurons may be a key to these explorations (Rizzolatti, Fogassi, & Gallese, 2006). Mirror neurons, found in the cortex of the brain, fire when we enact goal-directed motor activity like picking up a pencil or throwing a ball. What makes them interesting from a social point of view is that they also fire when we watch someone else perform a motor act. It has been hypothesized that it is mirror neurons that enable us to learn by imitation—which, of course, begins with babies responding to their parents and continues across the life span as we attempt to learn to walk, drive, hit a golf ball, or make a quilt—by watching someone else do it first. But in addition to simply echoing that movement in isolation, mirror neurons also seem to help us understand the intent or emotion behind the action. Pictures of brain activity made with functional magnetic resonance imagery or (fMRI) scans suggest that inhaling a bad smell or seeing an expression of disgust on someone else’s face activates the same mirror neurons in the insula of the cortex. In short, we can literally feel someone else’s disgust or pain or joy, thanks to motor neurons. To carry the story even further, research in a number of labs suggests that disorders such as autism, in which individuals seem to lack the ability to recognize, respond, or empathize with other people’s emotions, are characterized by dysfunctions in their mirror neuron systems. While it is sometimes possible to teach autistic children to recognize the behavioral expressions of emotions on others’ faces (mean, smiles, frowns, etc.) they do not seem to have the ability to do this spontaneously. In a way, it may turn out to be the case that autistic individuals are deaf to emotional cues, in much the same way that deaf individuals cannot pick up and process auditory signals (Piggott et al., 2004). In both cases, learning
businesses; by the 1990s, people began to worry about whether offering their offspring the chance to compete in sports year round while playing in the band or orchestra, learning a foreign language, taking a variety of summer science and computer enrichment camps in the summer, was too much structure. While such opportunities never were available to the less privileged, the sense that childhood was a crucial developmental period became a key component of parenting. The irony is that children are actually far more resilient than typically assumed (Masten, 2001).

PROTECTIVE, PAMPERING, PUSHY PARENTS?

Paradoxically, the more energy we have focused on making sure our sons and daughters become as accomplished and successful as possible, the more we have worried about how safe and healthy they are. At the turn of the century, as many as 15 percent of infants did not live to see their first birthday, and older children were at risk from illnesses such as measles, polio, and whooping cough, as well as the injuries common to people working on farms, in factories, and around animals. When I was growing up in the 1960s, kids rode their bikes with no helmets or shoes and sat in the backs of cars with no seat belts (I bet a few of you still remember sleeping on the shelf in the back window of your parents’ old car). Most of us walked to school without supervision, and our parents knew we were home when we got there: they couldn’t check up on us with cell phones and GPS units. Certainly, parents knew about the dangers of car accidents, kidnappings, and pedophiles, but having grown up themselves with relative freedom they didn’t feel the need to watch their children constantly.

However, as the news media focused more and more on how dangerous the world is, many adults have decided that to keep their children safe, they need to drive them to and from school, teach them not to talk to strangers, and in some cases even to get ID bracelets or tooth bands to identify them if they are kidnapped. Unfortunately, such decisions have actually resulted in a generation of children who don’t exercise enough, in part because they spend little time outside alone, and who are afraid to talk to strangers, even though they are far more likely to be kidnapped or abused by someone they know (Louv, 1991).

Paradoxically, parents who so judiciously protect their son or daughter’s physical safety may, at the same time, be pushing them to excel at school and in extracurricular activities to such a degree they leave little time in their schedules for unstructured play, or even sleep. A perusal of many middle-class kid’s schedules leaves little doubt that they and their parents need complicated planners simply to keep track of where they are supposed to be. The question, of course, is whether these activities are designed to allow the youngster to pursue their own interests and desires, or are they actually a reflection of the parents’ need to be seen as a super parent or to make up for things they feel they missed in their own upbringing. Certainly, anyone who has ever taught a gymnastics or dance class or coached a baseball or soccer team has dealt with the parent who is attempting to live their own dreams through their children, often to the child’s detriment. Ironically, individuals from less affluent backgrounds who have to struggle much harder to gain access to the resources necessary to realize their academic, athletic, or performance goals are far more likely to be personally invested in the process than those kids whose parents over-manage things for them.
trying to look far younger than you are your whole life. Again, the media, through its portrayals of youth and beauty, plays a central role in encouraging us. The media literally sells us on the idea that we can somehow avoid aging if we try hard enough and spend enough money.

WHERE ARE THE ADULTS?

Adulthood also carries with it a number of stresses and strains. Even individuals who have managed to complete the necessary training or education in their chosen career field may find that they are unable to start at a salary that enables them to live at the same economic level as their parents. While the children of the 1930s and 1940s were almost always able to increase their standard of living relative to their parents, their offspring have not always been able to do so. It is a fact that as humans’ experiences expand and grow, it is hard for us to go backward. When people of my generation went to college, we didn’t have much trouble adjusting to shared dorm rooms with no individual phones or TVs, because we were used to sharing rooms with our siblings and sharing the family phone in the kitchen. However, when our kids go to college, they want individual dorm rooms with ample room to hook up their stereos, televisions, computers, and other electronic paraphernalia, not because they are intrinsically greedier than we were, but because that is the level they have come to expect in the homes we provided for them!

FIRST COMES LOVE, THEN COMES MARRIAGE? NOT ALWAYS

Negotiating the process of finding a partner in the modern world can also be stressful. Arranged marriages may lack the romance and sense of self-determination common of Western expectations, but they did and do ensure that those involved share at least some common cultural experiences and values. When marriage was largely an economic choice, having a wide variety of choices regarding your partner’s personality and connection with you was less important. Today, we find ourselves expecting our partners to be attractive, successful, sensitive, and devoted to us, over increasingly long lifespans, with little guidance on how to find or engage such a person (Cherlin, 2009). If randomly meeting people at work, school, the gym, social events, and bars doesn’t seem to be working, we can now try sophisticated chat room or dating services that offer to vet the person for us, so we don’t have to waste time getting to know someone who would not be a good match for us. Even after we do find someone we deem compatible, getting and staying married is a complex process in a multicultural society, where people’s experiences of family life and expectations for their partners often differ significantly and may be unrealistically shaped by the media. Although living happily ever after has long been a staple of fairy tales, I have always found it hard to believe that Cinderella would truly be happy in the long run with a prince who urges her to get him a drink of water, even after she lets him know that her stepmother will be angry at her if she does! The reality is that conflict is inevitable in long-term relationships and that communication and conflict resolution are key to negotiating the changing stages of

Children place large demands on parents’ time and the family finances which could lead to diminished marital satisfaction.
Learning from Consequences

As we have previously discussed, humans tend to be problem solvers. If it is cold and we have the means to light a fire, we will do so. If the food we have is too hard to chew easily, we will cook it on the fire, and if the smoke from the fire becomes bothersome, we will find a way to divert it from us. However, we don’t always have the resources or skills necessary to fix or avoid problems, and not all problems have a physical solution. In addition, some of our solutions may themselves cause other problems. If the fire we lit gets out of hand and starts a wildfire, being cold may no longer be a problem, but being homeless might be.

Not surprisingly, early psychologists devoted a great deal of time to thinking about how behaviors emerge and why they persist or disappear. The foremost thinker in this area, B. F. Skinner, postulated that behaviors can be specifically linked to the things that precede them (antecedents) and the things that follow them (consequences). According to Skinner, antecedents can stimulate a response, but the consequences determine whether or not a behavior is emitted again. Take, for example, learning to be polite. If a child who says “please” is consistently given a cookie, they will probably learn to use the word routinely. If they are swatted on the hand for just grabbing the cookie, they will learn not to do the behavior. Obviously, these two scenarios exemplify what we typically call reinforcement and punishment (Skinner, 1953 & 1976).

However, Skinner also described two other possible behavioral consequences. Sometimes we do learn to commit a behavior to remove something negative, which he called negative reinforcement. Taking an aspirin to minimize pain is a good example. In other cases, we learn to stop doing a behavior that results in our losing something we like, sometimes called negative punishment. When a teen is grounded for missing their curfew, it is an example of punishing a behavior by taking away something the individual values, namely, their freedom.

Occasionally, the outcome of a behavior includes elements of more than one type of consequence. For example, most people find getting a speeding ticket to be extremely aversive. First of all, it is embarrassing to be pulled over to the side of the road and chastised. This is classic punishment. But for most tickets, we also have to pay a fine or pay to take a defensive driving course. Both of these outcomes are examples of negative reinforcement, since the state is taking away something you value in order to change your behavior. Unfortunately, since there aren’t enough police to catch every instance of people speeding, getting a ticket doesn’t tend to deter people’s speeding in the future. When the punishment is intermittent, we may gamble and go back to speeding. But if a reward is intermittent—and especially if we don’t know when the next payout will come—we may continue to do the behavior long after we have been awarded. Think of people playing slot machines or the child of an abusive parent who keeps seeking approval from the parent, although it is delivered in an inconsistent manner.

But understanding the basics of behavior is not enough. We also have to consider the skills underlying the behavior and the value of the reward associated with that behavior. For example, I might believe that getting a gold medal in the Olympics is a great goal, but I also know that I don’t have the athletic skills and ability necessary to compete at that level. Conversely, I
THE TALKATIVE SIDE OF YOUR BRAIN

So how do our brains generate and produce language? You have undoubtedly heard that the left side of the brain is the language center, while the right side is more spatial or nonverbal. It is, in fact, true that two specific structures have been identified on the left side of the brain, which are crucial for language (Gershwind, 1972). The first, called Broca’s area, after the French physician who first realized that damage to this area interfered with people’s ability to speak, is located in the left frontal cortex. When it is damaged, people can talk and understand language, but their speech is not normal. They tend to use short phrases which lack grammar and structure, much like small children do. This inability to produce language is called aphasia.

In contrast, a German neurologist named Carl Wernicke identified an area in the left posterior temporal cortex, which, when damaged, results in difficulty understanding language or speaking meaningfully. Such patients produce language and even use words grammatically—for example, they will use the correct past tense of a word, but the overall sentence makes no sense. So, while a Broca’s patient might painfully say, “Me water” to indicate they are thirsty, a Wernicke’s patient might say something like “I drink pencils very well, please.”

Of course, the actual production of speech also involves numerous other brain functions. Broca’s and Wernicke’s areas are connected by numerous bands of neurons and surrounded by what are known as association areas, which seem to be involved in the coordination and integration of speech production. Of course, to actually speak a word we also have to activate the motor pathways that control our mouths, lips, vocal cords, and tongues, and our brain also instigates complex timing mechanisms to coordinate what we say. However, language is certainly not just a simple matter of sound production. In order to produce meaningful language, we also must integrate sensory, emotional, and memory circuits in our brain.

Assuming that our Broca’s and Wernicke’s areas are intact, how then do we organize and use language to move beyond simple descriptions of objects and demands for milk or water? It turns out that our brains are also exceedingly good at building what we call categories, or concepts, which we use to organize our thoughts. While we as adults know that beagles and German shepherds are both dogs and that all dogs are mammals, it may take children a while to fully understand the complexity of these concepts—in fact, small children will often mistakenly call all four-legged animals dogs for some time before figuring out the rules about what constitutes a dog. As we get older, we tend to move from learning simple categories to more and more abstract ideas. Hence, we start thinking in terms of Liberals or Conservatives, Christians or Muslims, Caucasians or Hispanics. Each of these categories can, in fact, be described by rules, but the more abstract they become the harder it is for us to identify and agree on those rules. Humans also use language to describe time—for instance, whether you did something in the past or plan to do it in the future—and to talk about ourselves in the abstract.

BUILDING AN ABSTRACT WORLD IN OUR HEADS

This ability to project our actions and to think about ourselves thinking, appears to be uniquely human. It both enables us—and dooms us—to spend much of our time thinking about things that have already happened or may never happen and to worry about things like death and dying. This ability to consciously think about who we are, why we are here, and where we are going allows us to write novels, lose ourselves in movies, debate philosophy and

We will all confront issues and worries surrounding aging and dying.
tortured have reported they were able to cope and maintain hope by retaining the sense that no matter what happened, they could control their own thoughts.

However, as anyone who has ever lost their temper and said things they didn’t mean knows, sometimes thoughts seem to be a poor match for feelings. Strong anger, sadness, and anxiety seem to take us by storm. We feel our bodies tense or sag, our faces flush, and our hands chill, as though we have no control over them at all. Often, we blurt out things that we do not really mean or at least did not want to tell that person in such a way.

WE AREN’T CAVEemen ANYMORE, ARE WE?

This is actually not an accident. Going back to the way the brain is structured, the parts of the brain that initiate and control emotion are located under the cortex. They are phylogenetically older structures, which have strong survival value. Fighting when you are threatened, running when you are scared, or taking care of offspring you feel attached to, all promote the well-being of the species. In fact, through much of human history, stressors were acute, life threatening, and required immediate responses. If you did not run you were eaten; if you didn’t hide your offspring, they were eaten, and so forth. Frequently, this meant that survival was a matter of snap, reflexive decisions, not reflective ruminations. To some degree, this is still true in modern life. If a car swerves into your lane, chances are you will respond almost automatically to avoid a crash, and may later even think that you weren’t really aware of making the decision to do so at the time. Similarly, people who survive building collapses, plane crashes, and other catastrophes often report that they operated almost on automatic pilot at the time, following their gut responses, and only later thought about the ramifications of those actions.

Unfortunately, however, modern life is filled with stressors which are not life or death or even physical, but which still trigger strong, rapid cognitive and emotional responses. Assuming that the person ahead of you cut in line because they wanted to cheat rather than that they didn’t realize you were in line, can rapidly raise your blood pressure; a tendency to say something could result in a fight. Blaming your spouse for wasting money before you realize that they used the cash to buy you a gift may make you say something you wish you hadn’t said.

In our quest to make sense of a complicated, rapidly changing world, we often jump to conclusions, filter information through our expectations, and fall back on familiar irrational beliefs. Neurologically, this makes sense. Emotions, controlled by structures deep in the brain, are necessary for survival. Their control varies little between rats, cats, chimps, and humans because they are nonverbal, physiological responses. Thoughts, on the other hand, stem from the cortical areas, which evolved after the emotional system was already firmly in place. In order to allow us to formulate thoughts and convey them verbally, the cortex has to integrate a vast amount of information from the sensory, emotional, and memory centers of our brain.

The language centers in the left frontal and temporal parts of our brain have to form words, produce them in the right sequence, and modulate the tone in which we say them. It turns out, though, that this often happens very quickly, without our conscious awareness. When the ways in which we interpret a situation
use colors to try to communicate. “She was green with envy,” “he felt sad and blue,” and “he was so mad he saw red” are such common phrases we don’t even have to think about what they mean. Clearly, emotions are ubiquitous, nonverbal, and visceral experiences that often literally leave us speechless.

I DON’T KNOW HOW I FEEL

To further confound our understanding of emotions, they tend to ebb and flow in ways we are not always consciously aware of. Sometimes, it seems as though our feelings are irrational or inappropriate and other times they seem to be too extreme for our circumstances. In addition, many emotions are uncomfortable and disturbing. The basic emotions commonly are fear, anger, disgust, sadness, surprise, and happiness; all of these have strong survival value. If you are afraid, you hide; if you are scared, you protect yourself or your offspring; if you experience disgust, you avoid behaviors that could be dangerous like eating spoiled fruit. Among social beings like humans, sadness is often a cue that you need to address problems within social relationships which promote survival and well-being. Surprise motivates people to explore, and happiness promotes bonding and caring for others. If such responses are absent, animals and humans may be less likely to survive. In fact, you have probably heard someone complain about a child who “isn’t scared of anything” and so takes risks and gets hurt more than other cautious children. While the survival value of maintaining strong social connections may not be immediately apparent to you in the modern world, it is still the case that humans depend on each other in interdependent ways. Having people who will provide us with support, advice, or protection can mean the difference between being homeless, making decisions that harm us, or getting hurt by others.

THE SEAT OF EMOTIONS

In part, the mystery surrounding our own emotions stems from the way in which they are produced deep within our brains. The limbic system, commonly considered the heart of our emotional world, consists of two curving networks of structures (Morgane, Galler, & Mokler, 2005), sometimes described as ram’s horns. Essentially, these phylogenetically older parts of the brain are designed to enable us to respond rapidly to life-threatening events and are structurally and functionally very similar in rats, cats, dogs, primates, and humans.
Even putting on an emotional expression, such as smiling when you aren't happy or frowning when you aren't sad, has been shown to generate the emotion that was mimicked. It may well be that the people we consider to be great actors because of their ability to convey emotions so clearly, can do so because their mirror neurons enable them to be particularly attuned to the nuances of facial expressions. In contrast, people with autism have great difficulty reading and responding to emotions, and there is some evidence that people with autism do indeed have a dysfunctional mirror neuron system.

**Memories and Emotions**

Clearly, memory plays a strong role in our experiences of emotion as well (McGaugh, 2006). The sights of places we have been, the sounds of familiar activities and smells, can all trigger emotional responses, sometimes regarding things we thought we had long forgotten. While most of the time we are able to recognize that these triggered emotions are related to something in our past, there are cases where the system goes awry. In the case of posttraumatic stress disorder (PTSD), people who have experienced extremely stressful situations such as rape, torture, combat, serious car accidents or disasters, may be plagued by nightmares and sudden memories or flashbacks of the event years later (Gilbertson, Rauch, Orr, & Pitman, 2008). One Vietnam veteran I worked with had trouble smelling wet grass because it reminded him of being in the jungle, and many Iraqi and Afghani vets report that even though they know they are back in the United States, they have trouble not jumping and hiding when they hear loud noises such as fireworks or thunder. This jumpiness, called hypervigilance, is often seen as an aspect of the fight-or-flight response that, once activated, fails to turn off once the threat is over. It is believed that under extreme emotional stress, our bodies produce a great deal of a hormone called cortisol as part of the fight-or-flight response (Roozendaal, McEwen, & Chattarji, 2009).

This hormone, involved in both metabolism and immune function, also seems to have a strong effect on the hippocampus. In short, people who develop PTSD symptoms in response to extraordinary stress also show a reduction in the volume of their hippocampus, the very structure necessary to consolidate and form memories. Whether this cell loss in the hippocampus is reversible depends on a number of factors, including the age of the victim, the amount of time the stress lasts, etc., but it clearly indicates that in the presence of major stress, our body's and brain's attempts to cope generate strong emotional responses, which can affect coping even after the stress has abated. Studies of children growing up in abusive homes, or disrupted settings such as refugee camps, suggest that such prolonged childhood stress may actually predispose them to increased stress responses and higher rates of depression in later life.
our memories of childhood and early life are actually an amalgamation of things we actually did, and the stories, pictures, media images and other things we incorporated into the memories over the years.

Research on long-term memory by Elizabeth Loftus (1997) actually suggests that people will alter their personal stories if questions are asked in leading ways and that some people can be convinced they remember events that, in fact, never happened to them, but were only suggested or insinuated. In my learning class, I often tell students about my “memory” of watching President John F. Kennedy’s funeral on television. In my mind’s eye, I see myself sitting on the rug in the family room in my parents’ home, watching the funeral with my mother who was visibly upset by the death. The problem is that in 1963, when Kennedy was killed, our house did not have that family room—it was added on several years later. I suspect what happened is that somewhere along the way I did see video clips of the funeral on the television in that room, and somehow incorporated them into my story of the event.

If you doubt that people’s recall of events can differ over time, perhaps you might want to see if you can remember your own response to some seminal event such as the death of John Lennon, the Oklahoma City bombings, or 9/11. Then see if your recall makes sense given what other people who were with you remember of the event. Researchers Neisser and Harsch (1982) asked students to record what they were doing and thinking when the space shuttle Challenger exploded. They then compared the responses they got just after the crash to their version of the event several years later, and they found significant discrepancies in many people’s reports. But rather than see this as a depressing sign that our memories are fallible, it can be argued that having the ability to reframe or reassess the things that happen to us actually means that we are not doomed to live our lives at the mercy of our past.

Revisiting old assumptions about how things happened in the past, reevaluating the blame we assigned ourselves or others in our narratives, and refocusing on aspects of prior events and our behaviors may all give us new insight into how we feel about those events and how they shape our future choices. If, in fact, a failure to achieve a goal was all our fault, then perhaps it is reasonable to assume that we should just give up on trying to pursue new goals in the future. If a divorce really was all our partner’s fault, then feeling hopeless and deciding never to trust anyone again is understandable. However, if we can rethink the event in terms of how our behaviors interacted with our partner’s in the context of our lives at that time, we are in a much better place to think about learning from the experience and risking another relationship, in which we avoid some of the pitfalls we fell into the first time.

Even people coping with extremely difficult situations such as the loss of a child through potentially preventable events such as sudden infant death syndrome or a car accident can pay attention to how they are thinking and feeling about the event. They can determine whether the narrative they have repeated to themselves about who is to blame and how things might have gone is the only way to think about—and respond to—the situation. While many events are truly tragic and our negative emotional responses to them are inevitable, we nevertheless have the capacity to deal with those events by finding ways to use the knowledge, empathy, faith, and strengths we develop while coping to help ourselves and others.
Disorders such as chronic fatigue syndrome and fibromyalgia also appear to be influenced by tension and stress, perhaps through immunological and inflammatory processes (Van Houdenhove, Ulrich, & Luyten, 2005). Interestingly, in the case of many pain disorders, continuing to exercise actually mitigates symptoms, although convincing people who hurt that they should push themselves physically can be difficult.

Equally confusing is the link between stress and skin (Koo & Lebwohl, 2001). We know that sympathetic nervous system responses cause changes in sweat gland activity and temperature and so can impact the skin. People who flush easily, young adults with acne, and individuals with sensitive skin can all provide stories of times when stress appeared to trigger or exacerbate these problems. The fact that the skin itself is an incredibly complex system doesn’t help. The emphasis in many cultures on unblemished, unwrinkled skin as a mark of attractiveness, youth, and health also comes into play, since skin disorders are often themselves a source of stress.

**Stress and the Immune System**

In the past 30 years, a great deal of research has been devoted to the relationship between stress and infectious diseases. Prior to that time, it was assumed that the cells of the immune system functioned autonomously to detect and combat invaders (called antigens) to the body, including bacteria, viruses, parasites, and rogue cancer cells. However, with the 1981 publication of the first edition of the book *Psychoneuroimmunology*, edited by Robert Ader (2006), it became clear that immunity is a complex process involving the coordination of numerous types of cells, transmitters, and brain functions. In order to understand how stress impacts this system, it is necessary to present a brief overview of this process.

Basically, the immune system is made up of a series of specialized cells, which we are still trying to understand (see Sompayrac, 2012 for a comprehensive review of how the immune system works). These cells, called white cells, circulate in the blood, are found in the tissues of the body, and are particularly concentrated in the body’s lymph glands and lymphatic system. These glands, including the tonsils, thymus, and appendix, serve as incubators for immune cells, as does the bone marrow. From the body’s point of view, invaders that can cause danger are called antigens, and they come in many versions. For example, bacteria are independent organisms and fortunately can be destroyed by antibiotics. Parasites are also organisms that invade and disrupt normal function. Viruses, on the other hand, carry their own DNA/RNA but can only exist by taking over other cells and co-opting their mechanisms to produce more virus. In order to damage a virus, it is often necessary to damage the cells they have inhabited. Cancer, basically cells that have mutated and are spreading in the body, is also very difficult to destroy without damaging the rest of the body. So how does the immune system recognize and eliminate these threats?

If you cast your mind back to your high school biology class, you may remember videos (or film strips as the case may be!) of animated cells running around the blood vessels, responding to emergencies. The front runners belong to a class of cells called phagocytes. They tend to be dispatched to sites of injury or invasion because they have the ability to engulf, digest, and destroy antigens using a complex series of enzymes. They
it may go to work on other environmental components, even if they are not problematic. In the most extreme cases, a potentially fatal immune response called anaphylaxis can occur. This response is often triggered by food, insect stings, or snake bites. Anaphylaxis occurs when specialized immune cells, called basophils and mast cells, respond to an antigen. Symptoms can include rashes and flushing, vomiting and diarrhea, wheezing and coughing; and cardiovascular complications such as low blood pressure and tachycardia.

Specific antibodies can be used to determine whether you have ever had a particular illness before because you will only have that antibody present in your blood if your immune system has been exposed to the antigen. For example, tests for the human immunodeficiency virus (HIV), responsible for AIDS, are typically based on detecting the antibody to HIV, not the HIV itself. Incidentally, the HIV virus is so deadly precisely because it targets a specific component of the immune system—T-cells. Essentially, HIV is able to enter T-cells and co-opt their functions so that they begin to produce more HIV and eventually die. As a result, the immune systems of people with HIV are unable to combat infection, so they often suffer and die from infections and tumors. The treatments typically used to treat AIDS today are designed to destroy the HIV virus, allowing the immune system to stabilize and continue to work efficiently.

Other diseases, called autoimmune diseases, are the result of an overactive immune system. These include rheumatoid arthritis, Type 1 diabetes, and multiple sclerosis. In these cases, the immune system, often for as yet undetermined reasons, begins to attack elements of the person’s own body. In rheumatoid arthritis, the immune system attacks the lining of joints, causing crippling, swelling, and damage. The insulin-producing cells in the pancreas are destroyed in Type 1 diabetes, and in multiple sclerosis, the myelin-insulating neurons are degraded, leading to a host of neurological deficits. Unfortunately, efforts to treat such diseases using drugs that suppress immune function cause other problems, including increased susceptibility to viral infection. Yet another component of the immune system, natural killer cells have the ability to respond to foreign invaders without being dependent on signals from other immune cells, providing another layer of protection for the body. The complement system, made up of at least 25 proteins, help or complement antibody responses. In the process, they are responsible for many of the symptoms we recognize as an infection, including redness, warmth, swelling, and pain.

Clearly, protecting your body from invaders is a multilayered process (Linnemayer, 2008). A bacteria or virus first has to cross the barrier presented by intact skin, either through a cut in the skin, or through natural openings such as the mouth, eyes, and ears. These openings, however, are protected by mucous, saliva, tears, and other fluids that can also repel or destroy invaders. If they manage to survive these barriers, they are attacked by macrophages, complement, and T-cells that in turn call in B-cells so they can multiply and produce the relevant antibodies. This process can take several days, which accounts for the common comment that people are often contagious before they even know they are sick. In fact, the symptoms we associate with being ill—fever, swelling, pain, etc.—are actually the result of the immune system’s assault on the invader.
inhibit immune responses. For example, cortisol increases metabolic energy, but also causes the redistribution of B- and T-cells to the bone marrow. If you think about it, this is an elegant adaptation. Assuming you are running from a tiger or some other physical stress, it is likely that you will experience injuries that result in blood loss and the potential loss of B- and T-cells, antibody, and other components of immunity. If instead you sequester immune cells in the bone marrow closet, you are more likely to avoid infection later. You probably didn’t know it, but if you have ever had a cortisone shot to decrease swelling from an injury or used a cortisone cream on a rash, you have seen this phenomenon for yourself. In the short run, you probably felt better. The problem occurs if the stress is chronic rather than acute, and so results in long-term immune suppression.

**The Link Between Stress and Cancer**

Of particular interest to many people is the link between stress and cancer. However, studying this potential relationship has proved difficult. First off, cancer—the uncontrolled growth of cells in the body—is really not a single disease (National Cancer Institute, 2006). Differences in where the cells develop, what sorts of cells they are, how fast they spread, and how strong the immune system is to begin with—all influence the progression of the disease. Over the course of a lifetime, it is likely that the immune system detects and destroys numerous mutated cells, but scientists are still not sure about why the system sometimes breaks down. Age-related changes in immune function, environmental exposure to toxins or carcinogens, and temperamental and psychological responses may all play a role. But it is difficult to know who will eventually develop cancer, so studies of such factors must either involve huge numbers of people over long periods of time in order to predict who will develop a particular form of the disease, or retrospective studies, in which people who are already sick are asked to recall the risk factors they may have experienced before getting sick. Given the faulty nature of memory and the human desire to make sense of bad events, this is not always an unbiased process. Furthermore, when people are dealing with a potentially fatal disease and experiencing pain and discomfort, either from the cancer or from attempts to treat it with surgery or radiation, it is difficult to assess how they might have functioned prior to the diagnosis.

It is somewhat easier to study whether interventions designed to boost mental or physical health slow or halt the progression of cancer, but again, such studies are complicated, given the variable symptoms and progression of cancer and the complexity of psychological responses to intervention. For example, studies conducted in the 1980s (Spiegel, Bloom, & Gottheil, 1989) of women with advanced breast cancer suggested that women who participated in support groups were statistically likely to live longer than women who did not join the groups. However, later studies failed to find significant differences. Of course, in the intervening years, the ways in which we treat cancer and cancer patients have changed. In the early part of the last century, a diagnosis of cancer was virtually a death sentence. Physicians often opted to not even tell patients they had the disease, for fear it would cause them to give up hope. When former first lady Betty Ford announced in
signal the occurrence of a second stimulus. The paired stimuli can summon feelings and desires to behave in ways that range from highly desirable to highly undesirable.

For example, many people eat out of habit when they are watching television, experiencing stress, socializing, working, or driving. If they decide to try to change their eating behavior, they may find that in the early stages of change, it is difficult not to fall back into old patterns. However, even if they do manage to change their actions, dieting can lead to aversive sensations like hunger or feeling light-headed. Eating is also rewarding and consequently influences behavioral choices. Unfortunately for dieters, the best way to combat hunger is to go back to their prior eating habits, with the result that they either don't lose weight or can't maintain the loss they have achieved. To avoid this pattern, dieters may need to expand their eating behavior skill set as well as change their attitudes about food. Learning how to compare calories, cook healthy foods, or manage stress in ways that don't involve food can help people substitute new behaviors for old ones.

However, dieters may also need to learn to focus on the difference between short- and long-term gratification, such that they learn to tolerate short-term discomfort or distress for long-term gain. If the dieter is not yet ready to accept that trade-off, they may not be ready to make a real attempt to change their eating behaviors. University of Rhode Island researcher James Prochaska studied smokers and determined that people vary in their readiness to change a particular behavior. He went on to empirically investigate his hypothesis and distilled five distinct levels of readiness to change (Prochaska, DiClemente, & Norcross, 1992). According to Prochaska's theory, people who don't see any need to change are categorized as precontemplators. Thus, smokers who claim that they know lots of people who smoke and don't have cancer are examples of people in this category. On the other hand, contemplators are people who suspect that they may need to change a behavior, but are not yet actively trying. In this stage, people may be gathering information, learning specific skills, or talking about changing, but have yet to put their intentions into action. The preparation stage is when people have had some experience with change and plan to do so within the next month. They are “testing the waters.” When people actually start to try to quit smoking, they enter into the active stage. The final stage, labeled the maintenance stage, is when smokers are trying to maintain or make their new behavior consistent.

Of course, smoking, like eating, is not simply a matter of education and willpower. In both cases, there are complex brain mechanisms at work. Through their ability to activate brain reinforcement pathways, food and nicotine are immediately satisfying. Thus, impactful short-term reward effects tend to counter potential positive long-term effects. According to Prochaska, psychologists must first determine what stage of change a person is in and then develop a plan that will move them to the next stage. Perhaps precontemplating smokers need exposure to more accurate facts about the health problems caused by smoking, while contemplators and preparers need to be made aware of available smoking cessation services and techniques. Changers may need significant support and even tangible help in the form of antismoking medications. Whereas, people trying to maintain smoking cessation may need to identify the situations and triggers that are likely to cause them to want to revert to their old behavior patterns.
trying to manage their emotions about the event. Unfortunately, much of the early coping literature lumped responses ranging from avoidance to prayer to seeking social support under emotion-focused coping and argued that these reflected ineffective coping techniques.

Consider elderly individuals who are starting to have trouble remembering names, dates, and where they put things. Initially, they may assume that they are just busy or tired and may try to organize better or to use lists that trigger memories. However, if these techniques don’t help, they may decide to see their doctor. If it turns out that they have an infection (e.g., urinary tract infections in the elderly sometimes cause confusion), are low on something like vitamin B-12, which can affect thought and memory, or are taking a medication that is affecting them adversely, they may be able to easily fix the problem with antibiotics, supplements or a change in medications.

However, if the diagnosis is Alzheimer’s disease, there is no easy solution.

Recent advances in therapy and medication suggest that we can slow the process of the disease, but we cannot stop or cure it. Most people with Alzheimer’s disease live for eight to 11 years after the diagnosis, but their memory problems become progressively worse. In these cases, problem-focused coping may help the patient or their family find ways to cope with daily life, but dealing with the emotional response to the event is a necessary and unavoidable piece of the equation.

When I was in graduate school, I actually worked on a research project looking at stress among Alzheimer caregivers. I remember one couple in particular because of the loving way they interacted. The husband had Alzheimer’s disease and had been losing his cognitive abilities over several years. Prior to his illness, he had loved working on his car and always kept it in top condition. However, his wife was afraid to let him drive anymore and eventually had to take away his car keys. Not being able to get in the car to clean or putter made him angry and agitated. Then his wife hit on the idea of having a set of keys made that opened the car door, but wouldn’t start it. From that point on, the husband was quite content to wash and clean the car, check the oil, and putter for hours on end. When he would decide to try to drive the key wouldn’t work, so he would come into the house complaining. His wife told me that at that point she would distract him by offering him a snack or asking him a question until he forgot he had wanted to drive. While this was an ingenious example of problem solving, she teared up when she told me the story, suggesting that despite finding a practical approach to managing his behavior, she still felt quite bad about the fact that she was losing the husband she had married. More recent research supports that people tend to use both problem- and emotion-based approaches to coping with bad events and that either can be appropriate depending on the circumstance.
world, many of us do not have the land, resources, or knowledge to grow or raise our own food. When a natural disaster such as a hurricane, flood, or earthquake causes widespread damage in an area, people have no choice but to depend on others for sustenance. Without electricity, telephones, cash registers, and ATMs no longer function. Even if resources are available, the normal standards of commerce break down and bartering becomes the only option.

Furthermore, since most cities only have enough food to sustain their population for a few days, disaster victims often find themselves depending on government and aid groups for shelters, meals, water, ice, and transportation. If these response efforts break down, as they did during Hurricane Katrina, people rapidly become anxious, depressed, or angry. In the meantime, people around the world not directly affected by the disaster find themselves watching news coverage of the event and feeling powerless to help in meaningful ways. Their frustration can, in turn, lead to compassion fatigue or frustration with the victims of the disaster. Fortunately, most of us don’t face such drastic sources of stress on a daily basis, but in an uncertain world, political, economic, and environmental stressors can strike without warning and threaten or destroy the resources people have struggled to stockpile. Even though such losses are rare and unpredictable, simply thinking about the possibility of such a calamity can activate sympathetic nervous system responses, without an actual physical need to respond. The fact that the news media records, replays, and amplifies the negative impact of the event and the possibility that its ill effects will spread does not help people to cope, either.

Of course, the physical loss of resources is only one type of stress. Humans, like most mammals, are warm-blooded, sociable creatures. Our young must be fed and nurtured for extended periods of time before they can survive on their own, and we live in social groups which provide sustenance, security, and emotional closeness over long periods of time. It is ironic, but not surprising, then, that disruptions in our social network are perceived as extremely stressful. The death of someone we care about can take humans months to accept and years to really come to terms with. If a separation is due to interpersonal conflict such as a break-up or a divorce, the anger and acrimony brought about by the separation often extends far beyond the original disagreement. Losing a job, being rejected for a club or team we aspire to or simply being excluded from a social activity is enough to cause significant distress in many people. The fact such losses don’t have the same immediate disastrous consequences as being ostracized by your herd and subsequently eaten by a predator, doesn’t mean that they are not stressful. Because of our mental ability to magnify the meaning of a given event, many of us can catastrophize one lost or broken relationship into a lifetime of loneliness at the drop of a hat.

Even if we have an intact circle of friends, our need to belong—probably a crucial element of social survival in the past—is being severely tried in our electronic present. Comparing yourself to the real people around
you, whose resources, lifestyle, and appearance reflect reasonable effort and resource allocation, is far less threatening than comparing yourself and your lifestyle to people who have enough material resources to outsource much of their daily household and self-care. The fact that media depictions of wealthy people’s homes, cars, hairstyles, tans, clothes, and partners are often selective, photoshopped, or even staged also does not help. And yet, knowing that even the people who appear perfect in glossy pictures aren’t in real life does not always eliminate our longing to bridge the gap between the lifestyle we lead and the one we think celebrities are party to. In actuality, lottery winners, reality show stars, celebrities, politicians, and even people born into real royal families (the Windsors) or dynasties such as the Kennedys and the Bushes are often even more unhappy than we are. Still, even knowing this doesn’t always keep us from feeling that we are falling behind.

Even when we aren’t facing major gaps in our resource accumulation or social connections, daily modern life has its challenges. Deadlines, time pressure, noise, lack of sleep, lack of exercise, artificial environments, electronic sensory overload, and multitasking all take their toll. All too often, we find ourselves trying to achieve impossible to-do lists, both at home and in our professional or academic lives, with little opportunity to rejuvenate our bodies or our minds. As I sit here typing at 12:43 a.m., when I know I have an important meeting in the morning, I am struck by just how ingrained the pressures of modern life really are. Over the course of the evening, I have carried on several phone and text conversations, checked my email twice and Facebook once, and half watched several television shows, all the while trying to work on this chapter. And now that everyone else has gone to bed, the sounds of the refrigerator, the fish tank, and the air conditioner simply become more prominent. Clearly, our daily (and nightly lives) are far removed from the nature-based, circadian-driven cycles of our ancestors. Learning to listen more to our bodies and less to the electronic chatter around us, bridging the gap between our insidious adoption of technology, and our need to stay connected with the natural world is yet another task of modern life. While the odds of rolling back or eliminating technology in our lives is probably as unrealistic as aiming for a stress-free life, the option we do have is to eliminate stressful situations when we can and mind the way we deal with unavoidable circumstances.

When we can solve a problem by getting more information about our options, enlisting social support, or changing a situation, the impact of the stressor can be fleeting. For example, finding out that you can change positions in your company, garner support from those around you, or even go to work somewhere else can all minimize the stress of having a bad boss. However, if there is not an easy solution to a problem, your only option may be to focus on your inner life and choose how you wish to cope with the situation. Whether the gap is real or actual, learning to use your mind to bridge it becomes the difference between tripping and falling and successfully moving on in your life. To do so, it is essential to understand the interaction of your thoughts, feelings, and physical sensations with each other and their influence on your behavioral choices, as well as how those behaviors alter subsequent responses.

Certainly, people have long struggled to understand how thoughts and feelings interact. While we still don’t fully understand the anatomical and structural basis of these brain processes, in practice, most of us simply want to find ways to analyze and respond to stress effectively. Of course, this is easier said than done.