

From: Thanks! How Practicing
Gratitude Can Make You
Happier by
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HOW GRATITUDE IS EMBODIED

 ON A RECENT TRIP to Washington, D.C., I visited the National World War II Memorial. Like other memorials, it is intended to foster remembering, in this case, the sixteen million men and women who served their country in the Second World War. A light rain fell on this cool fall morning, and I drifted through the central plaza, stopping in front of several of the semicircular granite pillars that are dedicated to a single state or commonwealth. A wreath had been placed at the foot of one. I bent down to take a closer look at it, but even before I could read the inscription I was suddenly overwhelmed with a mixture of different feelings — admiration, sadness, grief, but most of all, gratitude. Certainly gratitude is what one is expected to feel at places like this, but that did not make my feelings any less authentic. This emotional reaction propelled me to contemplate my own ancestral contribution to the “greatest generation.”

Three of my uncles had served in the army during the conflict, yet I had never really stopped to recall and recognize the meaning of what they had set out to accomplish and the sacrifice that they and millions of their comrades had made. On the way out of the plaza, I stopped to look them up in the Registry of Remembrances, a computerized listing of Americans who contributed to the war effort. I remember one in particular, Uncle Ed (whom we affectionately called “Unky”), whom I was particularly close to when I was growing up.

My father had chronic health problems and was in and out of

the hospital repeatedly during my childhood. Unky became something of a surrogate dad. Physically imposing yet soft-spoken, he wore his hair in a crewcut befitting his military past. He had participated in the liberation of Dachau and received four different medals and the Bronze Star for his heroics. After the war, he served for over thirty years on the police force in the city that he grew up in, working his way up the ranks and eventually becoming captain, the second-highest-ranking position in his department. In retrospect, what struck me the most about him was his humility — he never spoke of his World War II experiences, nor did I know about the numerous honors he had earned in both the military and as a civilian. As a kid it never occurred to me to ask him about his war experiences, though knowing him as I did, I’m sure he would have deflected attention away from his contributions. By the time I was an adult, I had moved away and visits with Unky were few and far between. Today, I remember him gratefully.

The psychologist Jonathan Haidt has described the emotion of elevation, a warm, uplifting feeling that people experience when they see unexpected acts of human goodness, kindness, and compassion. A warm feeling in the chest, tears welling up, even chills and a lump in the throat characterize elevation, and it was these changes that accompanied seeing Uncle Ed’s picture in the registry, reading his accomplishments, and reflecting back on his life as I knew him.

Although we associate tears with sorrow, positive emotions can also result in crying. Tears are a common response to profound gratitude. Tears have been referred to as “the most substantial and yet the most fleeting, the most obvious yet the most enigmatic proof of our emotional lives.” Feeling an overwhelming sense of gratefulness, as I did on this occasion, can cause a person to overflow with tears. One man writes:

There are times when I am driving my car, mentally reviewing some of the financial pressures I am under — two kids in college, debts piling up, no end in sight. Just when I start feeling

overwhelmed, I think about all that I have to be grateful for — my health, the love of my wife, good friends who care about me, and two wonderful children. I just feel so fortunate I want to thank God, so moved sometimes I cry.

It was this feeling of being overwhelmed with gratitude that the Catholic saint, Ignatius of Loyola, was well familiar with. His prayer life was said to be so intense that during Mass he often had to pause as his eyes filled with tears and he could not see. After a while, the constant tearing began to adversely affect his eyes. He sought a special papal dispensation to relieve him of some devotional duties so that his health might be preserved. In his spiritual diary, he wrote, “because of the violent pain that I felt in one eye as a result of the tears, this thought came to me: If I continue saying Mass, I could lose this eye, whereas it is better to keep it.”

THE EMBODIMENT OF GRATITUDE

Gratitude does not bring most of us to painful tears the way it did Ignatius (I might say, gratitude does not always bring us to painful tears. But most of us could, in an extreme situation, cry from gratitude). Yet gratitude, like other emotions, is embodied. It is felt and expressed physically. When psychologists set out to study an emotion such as gratitude, they are compelled to pinpoint several components. First, there should be something external that triggers the feeling — an elicitor. A cousin or a family friend could give us a much needed present, or tell us that they were going to do us a big favor. Second, we experience a particular perception of the elicitor that determines the subjective feeling and its corresponding intensity. Our brain processes our cousin’s announcement and realizes that they are offering to help us out in a significant way. Third, the elicitor should provoke a measurable, physiological response. We might feel the welling in the throat, the warm, rising physiological feeling of

gratitude, as we process our cousin’s offer. Then, the response — this feeling, in other words — should cause motivational and other changes to one’s thinking. We realize our cousin is someone we can trust when we are in a tight situation. Finally, there is often an expressive component that allows us to communicate the emotion to others. This expressive component consists of ways in which we deliberately change our actions to reflect the fact that we feel grateful, as well as ways in which our facial expressions and physical body change, whether we want them to or not, to broadcast to our fellow humans the emotion we are experiencing. As we consider our cousin’s offer, we smile and show that we are experiencing gratitude; we also decide on what we will say as a response to the offer.

These elements of a grateful reaction apply to other emotions as well. Consider anger. Anger arises in contexts where we perceive that an offense has been intentionally committed against us. We perceive the offender as blameworthy and therefore as deserving our ire. Our blood pressure and heart rate rise, and stress hormones such as epinephrine and cortisol surge throughout our body. The rate of our breathing increases and our muscles become tensed. Fists clenching and jaws tightening are also common signs of anger. As our thinking narrows and constricts, we find that our problem solving and other mental abilities are compromised, hence the lament, “I was so mad that I couldn’t think straight.” We may wish to see harm inflicted upon the target of our anger, either delivered by us or meted out by a third party. We may reveal our anger through movement or facial expression, and we may act on the emotion in ways we later regret.

The expressive component of emotions is extremely important, especially as to how we communicate our feeling facially to other humans. This expressive component is critical: if we do not look happy, angry, grateful, or sad, others find it hard to believe we are really feeling these emotions. Social interactions rely upon our ability to communicate emotion through the face, and if we can’t express our emotions, our social lives become disrupted. Those who have fa-

cial disabilities can find that people do not react to them in the same way they do to those with normal facial expressions because their emotions are accompanied by a static, unnatural expression. Some persons, for example, those with right hemispheric stroke damage, are unable to recognize facial emotional expressions in others, which contributes to impaired social exchanges.

Researchers have documented that the basic emotions of anger, joy, disgust, happiness, and fear have universally recognizable facial displays. Around the world, whether in primitive or advanced countries, people can recognize when another person is angry, or disgusted, or happy, or surprised. For example, in the case of anger, lowered eyebrows are pulled together to form wrinkles in the skin of the forehead, lips are tensed and thinned, and a glaring look is achieved by the raising of the upper eyelids. The University of California researcher Paul Ekman and his colleagues have gathered evidence of the universality of seven facial expressions of emotion: anger, happiness, fear, surprise, disgust, sadness, and contempt. In every culture they studied — in Japan, throughout Europe and the United States, and among the nonliterate Fore tribesman of Papua New Guinea — a sizable majority could recognize the basic emotional expressions portrayed by people in other cultures, and others could recognize their own.

In contrast to the basic emotions, gratitude does not appear to have a distinct, recognizable expression. An exception may be most evident in the case of religiously inspired gratitude. In churches, temples, and shrines, worshippers prostrate themselves in grateful praise to their God or otherwise adopt a prayerful stance with closed eyes in a kneeling or standing position. More than any other part of the body, hands and arms express thanksgiving to God. For example, charismatics worship with hands raised, palms open, in a posture of receptiveness. This signifies gratefulness both for past blessings received and for God's continuing work in the believer's life. But apart from these religious contexts, it may be difficult to read a person's

face or body language and determine if they are grateful, or happy, or relieved, or mildly amused, or not feeling anything at all in particular.

In his classic work on the expression of emotions, Charles Darwin attributed considerable importance to the voice as a carrier of emotional information. Oftentimes we do infer emotions and attitudes from not only *what* is said but also *how* it is said. There are acoustic cues — qualities such as loudness, pitch, and tone that provide information as to the speakers' emotional state. I sometimes notice that when a person is reciting what they are thankful for, their eyes water, they become choked up, and their voices shake a bit. Yet on many occasions, the sentiment of gratitude may be too subdued to reach the threshold for expression. Or there may be a time delay between the eliciting event and the grateful feeling. Many times we feel grateful only in retrospect, long after the original eliciting circumstance has passed. For example, it was not until I reached middle adulthood that I began to sense a deep gratefulness toward some of my college professors. This grateful acknowledgment resembles more a cognition than an emotion, and hence it would not be associated with a particular facial expression, vocal pattern, or visceral reaction.

Because gratitude is a secondary, more complex social emotion, we have learned ways to feign it when necessary and also to conceal it when needed. I recall the Christmas that my first wife's grandmother gave as a gift to all the men in our family the same plaid polyester cardigan. Try as I might, I could not visualize wearing this family uniform in public. Yet of course the correct thing to do was to express my thankfulness to Grandmother, which I dutifully did. There is evidence from research that observers have the ability to correctly infer true emotional state from the voice at a much better rate than chance. Across a number of studies and different emotional states, the average accuracy reported is about 60 percent. I can only hope that on that particular Christmas morning, my acoustic cues did not give me away.

To further deconstruct the physicality of gratitude, imagine your-

self right now feeling a profound sense of gratefulness toward someone. Now, imagine that you are being observed or videotaped. Express how thankful you are to this person. Would an observer be able to tell from your face or from your body that you are grateful? Has your facial expression changed? If you are speaking, what is happening to your voice? Has your pitch, intensity, or intonation changed? Is your rate of speaking faster or slower? What about your posture? Has it shifted? You might be inclined to offer a gentle touch. If the feeling is strong enough, you are likely to notice other bodily sensations — perhaps your eyes will well up with tears, perhaps you will feel warmth in your chest, perhaps you will compress your lips slightly. It is likely that gratitude will be felt more from the neck down than in your face.

In an ingenious experiment conducted a number of years ago, groups of observers were shown videotapes of women who had either lied or told the truth about whether they were experiencing the emotion of “enjoyment” from watching a pleasant nature film. Half of them were actually watching gory films, but they were lying about both what they were seeing and how they were feeling. They claimed falsely that they were feeling positively about the nature film that they claimed they were viewing. The observers saw either the face or the body of the participants when they were being interviewed about how they felt but could not hear what was being said. Observers made more accurate judgments when they saw the body than when they saw the face, but only in the deceptive videos. Thus it appears that the body is a better source of information than is the face. Yet most people believe that the face is more diagnostic. The women who had been videotaped lying and telling the truth about what film they had seen were asked after the experiment what aspects of their behavior they had focused on controlling when they lied. Nearly all mentioned the need to conceal facial expressions; only a few referred to the need to manage their body movements. When we receive an appalling gift like a plaid cardigan, we may try to conceal our disappointment and

work hard at conjuring up a sense of thankfulness, yet the lesson to be learned from this research is that we’d better pay close attention to managing the messages that our bodies are sending. And when it comes to figuring out what others are feeling, important information may be missed if we look only at their face.

Although our bodies may send certain messages to signal an inner feeling of gratitude, there is no direct, necessary relation between the subjective inner response of gratefulness and the body’s outer display. Although we may have hunches based on our own personal experiences, research has yet to systematically examine the specific verbal and nonverbal cues that unequivocally lead us to infer that another person is experiencing heartfelt gratitude. We don’t yet know how felt gratitude appears on the face; therefore we need to look creatively in other places to understand how gratitude is embodied.

A GRATEFUL HEART IS A HEALTHY HEART

The University of Connecticut psychologist Glen Affleck likes a good challenge. His research studies have included patients with chronic pain disorders, parents of acutely ill newborns, developmentally disabled children, infertile couples, and victims of heart attacks. In an intriguing study, he and his colleagues showed that the explanation a person fashions for why he or she has had a heart attack has implications for future cardiac health. When an unexpected event happens, people try to figure out why. Why did my spouse, who expressed no dissatisfaction with me, leave? Why did the identity thief single me out? Why was I fired after thirty years of faithful service? Why did I get sick after eating a gourmet meal at that posh bistro?

Affleck and his colleagues at the Department of Community Medicine and Health Care asked patients to rate the degree to which various factors were seen as responsible for their heart attacks, and also asked whether or not they had seen any possible benefits, gains, or advantages from their illness. Cardiac patients who blamed their

heart attack on others were more likely to suffer yet another heart attack within the next eight years! On the other hand, perceiving benefits and gains from an initial heart attack, including becoming more appreciative of life, was related to a reduced risk for subsequent attack. A substantial number of patients said that the heart attack caused them to reconsider their values and priorities in life and that they believed they had grown in their capacity to not take things for granted. Echoing these findings, one man in my study wrote:

It is hard to put into words how many times I have felt grateful with such a great family and kids. Now grandkids. My daughter was in high school and knew the signs of a heart attack to call the ambulance when I had my first heart attack. My wife was always at my side when I needed her. When I had a cardiac arrest in New York she was there. Also the young man from California that did CPR to save me. When I came home from the hospital all my family of twelve was there to meet me. When I was waiting for my transplant my wife was there to take me to the hospital. Every time I went into heart failure, and three years ago I had a hematoma on the brain, my wife and family were there for me. Life just does not get better than that.

According to mind-body folklore, cardiac patients tend to be “hot-reactors” — they respond to everyday slights with reactions ranging from mild irritation to full-blown rage. Research has backed up this belief. People who are anger-prone are nearly three times more likely to have a heart attack than are emotionally calmer individuals. Anecdotal evidence suggests that heart attack victims often view their illness as their body’s way of saying to them, “shut up, stop complaining, and count your blessings.”

By the same token, counting blessings, itself an expression of gratitude, can be a coping strategy for dealing with the stress of cardiac procedures such as catheterization. Cardiac catheterization involves passing a catheter (a thin flexible tube) through an artery or a

vein to the heart — usually from an entry point in the groin — and into a coronary artery. In most cases, this procedure is recommended when a partial or complete arterial blockage is suspected. It is used to evaluate how well the heart is functioning and to obtain information about blockages. If blockage is found, the procedure takes two to three hours to perform and patients are required to remain immobile for four to six hours following the cardiac catheterization. It is exceedingly stressful — it is simply unnatural to have sharp implements inserted into the groin.

A study conducted at the Duke University Medical Center compared nearly 3,000 patients that had significant levels of coronary artery blockage with patients that had less blockage. Among other forms of coping, the researchers asked patients the degree to which they typically “count their blessings” as a characteristic way of coping with stress. Patients with significant blockage *and* who were more socially isolated were substantially less likely to say they count their blessings by comparing themselves to less fortunate others. Social support influenced pain indirectly by encouraging the use of counting blessings as a coping strategy. Thus closeness to others might encourage the use of positive role models or otherwise facilitate the use of grateful thinking in persons undergoing stressful cardiac procedures.

A far more radical procedure than catheterization is transplantation. When asked to write about a time in which a profound sense of gratitude was felt, a transplant recipient in one of our studies recounts:

I’m not sure when it sank in that I had a heart transplant and a new lease on life. I do remember as an outpatient having choices and calling some of my shots again. I also remember when I got back home after two months as an outpatient. I remember being grateful for a new life. I remember driving to work again and hearing songs that connected me to my donor and crying hap-

pily. I remember meeting my donor's parents live for the first time and being beyond grateful and feeling some of the void in their life from the loss of their son. Then that weekend my donor's friends and family had a party in celebration of his life. I felt a little uncomfortable but glad to meet them all and connect. I had a new lease on life and he was gone. Even before being sick I was thankful and grateful for little to big things. But now it is way amplified.

In the context of receiving a new heart, what good is feeling grateful? Gratitude drives out toxic emotions of resentment, anger, and envy and may be associated with better long-term emotional and physical health in transplant recipients. In a study with 119 heart transplant patients conducted at the University of Pittsburgh, thankfulness and appreciation as an aspect of religious faith in heart recipients was positively related to their perceived physical and mental health at one year posttransplant. Thankfulness was also predictive of greater compliance with the medical regimen and of fewer difficulties with diet and medications.

A GRATEFUL LIFE, A LONG LIFE

The lengthening of the average American life span by twenty-seven years over the last century has led to efforts to understand the determinants of longevity. Although genes play a large role (if your Aunt Hilda lived to 99, then your chances for a long life increase), experts report that as much as 75 percent of longevity is related to psychological and behavioral factors. A number of recent studies have shown that attitudes and emotional predispositions are associated with a variety of indicators of poor health, including accelerated aging, increased illnesses, and even premature death. For example, chronic negative emotions — especially depression and pessimism — are linked to objectively shorter life spans. Pessimistic cancer pa-

tients do not survive as long as their more optimistic counterparts. Pessimists agree with statements such as, "If something can go wrong for me it will," "I hardly ever expect things to go my way," "Things never work out the way I want them to," and "I rarely count on good things happening to me." The underlying theme in all of these items is the expectation of a bleak future.

One of the most famous pessimists in history was the nineteenth-century economist William Jevons, who wrote a book called *The Coal Question* in 1862. In that book, he predicted the nation's supply of coal would soon run out. The coal age, as we know, went on for a hundred years or more after that, and it's continuing today. Jevons was also alarmed by the approaching scarcity of paper owing to deforestation and stockpiled such vast stores of writing and packing paper that fifty years after his death it had still not all been used up by his family. Jevons died at the ripe old age of 47. His brief life span might be contrasted with that of the legendary optimist Norman Vincent Peale, who was still writing and speaking about the power of positive thinking well into his nineties.

Hopelessness and despair can adversely impact the endocrine and immune systems, even hastening death. Conversely, being an optimist may help reduce your risk of dying from heart disease and other causes. A thirty-five-year longitudinal study of male Harvard students found significantly less disease at midlife in the optimists, after taking into account their health earlier in life. Even more compelling is a recent study conducted at the famous Mayo Clinic in Rochester, Minnesota. Here, researchers found evidence suggesting that pessimists have a shorter life span than that of their more hopeful counterparts. Researchers evaluated results from a personality test taken by participants more than thirty years ago and compared them to subsequent mortality rates. They found that people who scored high on optimism had a 50 percent lower risk of premature death than those who scored as being more pessimistic. A third study, with elderly Dutch men and women, found that people who described

themselves as being highly optimistic had lower rates of cardiovascular death and less risk of any cause of death than people who said they were highly pessimistic. Those who reported high levels of optimism had a 55 percent lower risk of death from all causes and a 23 percent lower risk of cardiovascular death than people who reported high levels of pessimism.

Optimism is related to gratitude, but it is not the same thing. We have yet to establish whether gratitude can add years to one's life, but there are clues that it might. Dr. David Snowdon is a professor in the Department of Neurology at the University of Kentucky Medical Center. He is the director of the Nun Study, a longitudinal study of health and aging. The Nun Study has become famous for uncovering factors associated with an increased risk for Alzheimer's disease. Nearly seven hundred nuns of the School Sisters of Notre Dame order have participated in the project. Because of their homogeneous lifestyle (same occupation), similar reproductive and marital histories (none), alcohol consumption (probably very little), this population offers a unique opportunity within which to examine health and longevity. One of the most interesting findings to emerge from the project came from linguistic analyses of autobiographies written by the nuns in early life. This particular order has a tradition of requiring brief, handwritten autobiographies of novitiates. The researchers found that "idea density" — the number of distinct ideas expressed in a writing sample — was predictive of which nuns would later develop Alzheimer's disease. Low idea density and low grammar complexity in autobiographies written early in life were linked with poor cognitive function and Alzheimer's disease later in life, some sixty years after the autobiographies were written. From a one-page autobiography, the research team was able to predict with 85 percent accuracy who would get Alzheimer's disease sixty years later and who would not.

Identifying cognitive risk factors that foretell dementia is a significant scientific accomplishment. But Snowdon and his colleagues

were staking bigger game. The unique nature of their data allowed them to explore other factors that contribute to health and longevity. In a highly publicized study on positive emotions and health, Snowdon and the psychologist Deborah Danner examined the association between positive emotional content in autobiographies from 180 Catholic nuns written at age 22 and risk of mortality in later life. At the time these data were analyzed, participants in the study ranged in age from 75 to 107 years old.

Every word written in these autobiographies was coded for emotional experience. Several sisters, like 90-year-old Sister Genevieve Kunkel, flooded their autobiographies with grateful emotions:

How thankful I am that He selected me to be one of a large family for now I realize there is no compensation for those who miss its joys and sorrows . . . the seeds of vocation were first sown when my oldest brother and special pal left at 16 to become a Jesuit . . . our visits each Thanksgiving and summer made a deep impression . . . His growth in physical health and spiritual peace made me reflect and it is to his example of courage and perseverance that I gratefully attribute my own following of Christ's call.

The results of this now classic study, published in 2001, were nothing less than startling. The more positive emotions expressed in the life stories of these nuns (contentment, gratitude/thankfulness, happiness, hope, and love), the more likely they were to still be alive six decades later. In fact, the astonishing finding was that there was nearly a seven-year difference in longevity between the happiest and least happy nuns! Stated another way, the nuns who used the fewest positive emotion words had twice the death risk at any age when compared to those who used the most positive emotion words. Now, nuns tend to have a much longer life expectancy anyway than that of the general population; even the least happy nuns in the study lived well into their eighties. The life-extending effects of autobiographical

writing have received additional research attention. In an extension and partial replication of this study, Sarah Pressman and Sheldon Cohen, health psychologists at Carnegie-Mellon University, found that the longevity of famous psychologists could be predicted from their usage of social words in their autobiographies, as well as from word use indicating humor, interest, determination, and high activation (for example, excited, enthusiastic, alert). This adds more grist to the research mill on social integration and longevity.

HEART RHYTHMS AND THE RHYTHM OF GRATITUDE

“Close your eyes and relax. Shift your attention away from the mind to the area around your heart. If it helps you to focus, put your hand on your heart. Visualize your breath going in and out through the area of your heart and take very slow, deep breaths. Now focus on creating a genuine feeling of appreciation and care for someone or something positive in your life. Really try to feel the emotion of appreciation, not just the thought. Try to sincerely sustain those feelings of appreciation and love as long as you can.”

You have just read an excerpt from instructions given by researchers at the Institute of HeartMath in Boulder Creek, California, to induce the positive emotion of “appreciation,” a state similar to, though not identical with, gratitude. They call this the “heart lock-in” technique. It consists in consciously disengaging from unpleasant emotions by shifting attention to one’s physical heart, which most people associate with positive emotions, and focusing on feeling appreciation toward someone, appreciation being an active emotional state in which one dwells on or contemplates the goodness of someone. Were you able to do it? Some people find that it is helpful to place their hand over their heart while they focus. Because it is pleasant, desirable, and focused in a specific area of one’s life, appreciation is one of the most concrete and easiest of the positive emotions for individuals to self-induce and sustain for longer periods. HeartMath

researchers believe that the heart communicates with the brain and the rest of the body through various communication systems and that through these systems, the heart has a significant influence on the function of our brains and all our bodily systems.

Rollin McCraty and the founder of HeartMath, Doc Childre, were pioneers in developing state-of-the-art technologies for examining heart-brain interactions and using these technologies to enhance human health, stress management, and performance. McCraty has developed analytic procedures for taking heart rate (normally measured in beats per minute) and mathematically converting it to a user-friendly index using something called *power spectral density analysis* (don’t try this at home). This procedure produces a heart rhythm pattern that reflects a noninvasive or indirect test of “neurocardiac function” — basically, healthy or unhealthy communication between the heart and the brain. Heart rhythm patterns associated with appreciation differs markedly from those associated with relaxation and anger. Even when we are experiencing a desirable internal state of relaxation, our hearts may not be functioning in as efficient a manner as when we cultivate appreciation. These patterns are shown in Figure 3.1.

As we experience emotional reactions such as anger, frustration, anxiety, and insecurity, our heart rhythms become incoherent or jagged, interfering with the communication between the heart and brain. This jagged pattern is evident in the top panel. Negative emotions create a chain reaction in the body — blood vessels constrict, blood pressure rises, and the immune system is weakened. This kind of consistent imbalance can put a strain on the heart and other organs, and eventually can lead to serious health problems.

On the other hand, when we experience heartfelt emotions such as love, caring, appreciation, and compassion, the heart produces coherent or smooth rhythms that enhance communication between the heart and brain. This smooth, sine-like pattern can be seen in the bottom panel of Figure 3.1. Positive heart qualities produce harmoni-

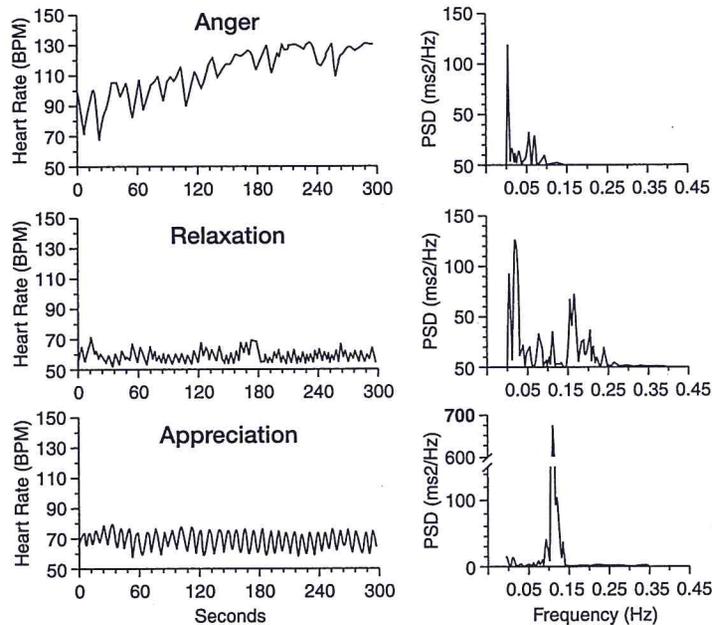


FIGURE 3.1

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ous rhythms that are considered to be indicators of cardiovascular efficiency and nervous system balance. They've also been shown to produce beneficial effects that include enhanced immunity and hormonal balance. When people consciously experience appreciation and gratitude, they can restore the natural rhythms of their heart.

These findings would have come as no surprise to Robert "Butch" McGuire or to Richy Feinberg. Nearly every day for forty-four years, McGuire has owned and operated Butch McGuire's, an Irish pub and restaurant on Chicago's North Side. Two massive heart attacks and an eventual heart transplant provoked significant changes in McGuire's

life: he quit smoking, lost over a hundred pounds, and has a whole lot more energy and a renewed appreciation for life. "I'm a changed man and no longer take a healthy heart for granted," he told a reporter. Similarly, at age 58, Richy Feinberg, an art teacher from New York, suffered a massive heart attack followed by quadruple bypass surgery. Two months later, he had another heart attack. For the first time in his life, he began to meditate for stress reduction. After twelve years, he has been given a clean cardiac bill of health and has attributed his 180-degree turnaround to emotional skills training that promotes appreciation, gratitude, and compassion.

McGuire and Feinberg, like those systematically studied by researchers from the HeartMath organization, showed measurable physical changes resulting from cultivating appreciation and other positive emotions. In one experiment, practice of the technique for fifteen minutes with a focus on appreciation resulted in a significant increase in levels of immunoglobulin A, the predominant antibody found in the nose and mouth that serves as the body's first line of defense against viruses. Other research has documented significant favorable changes in hormonal balance with these emotional restructuring techniques over a period of thirty days. In a study of thirty subjects, a 23 percent average reduction in the stress hormone cortisol and a 100 percent increase in a hormone known as DHEA (which reflects a state of physiological relaxation) were found after one month of practice. Increases in DHEA were significantly correlated with increases in "warmheartedness" (represented by kindness, appreciation, tolerance, and compassion), whereas decreases in cortisol were significantly correlated with decreases in perceived stress.

UNKNOTTING ONE'S EMOTIONS

There is a scene in the movie *City Slickers* when Curly, the grizzled trail master (played by Jack Palance in his Oscar-winning performance), stops his horse, shakes his head disapprovingly at Billy Crys-

tal, and says to him, "You city slickers spend fifty weeks of the year getting yourself tangled up in knots, and then think you can come here and get untangled in two weeks. It don't work that way." Few viewers probably recall Curly's insight here into stress management (it's not nearly as memorable as his finger-raised, "one thing" lecture). But contemporary research in positive psychology has recently put Curly's hypothesis to the test.

The psychologist Barbara Fredrickson of the University of North Carolina reports that positive emotions are physiologically beneficial because they "undo" or "unknot" the harmful effects of negative emotions. Undoing means to replace one set of emotions (normally negative or unpleasant states that feel bad) with contrary emotions (positive or pleasant ones that feel good). Positive emotions thus correct the effects of negative emotions by restoring physiological and emotional balance.

The basic observation that positive emotions are somehow incompatible with negative emotions is not a new idea and has been demonstrated over several decades. Back in the 1950s, this basic principle of *emotional incompatibility* provided the basis of behavioral therapies designed to treat phobias and other anxiety disorders. One simply cannot be relaxed and stressed at the same time. Try it. You can't. Relaxation drives out anxiousness and vice versa. There is an ancient wisdom here that has been ratified by modern research. The Buddha said that "Hatred cannot coexist with loving-kindness, and dissipates if supplanted with thoughts based on loving-kindness." You cannot be grateful and resentful at the same time, or forgiving and vengeful. When we are savoring the moment, we cannot be regretting the past. Our brains are wired to prevent the emotional confusion that would result from the simultaneous activation of opposite emotional states. The parts of the brain that are active when positive emotions are experienced are not the parts of the brain that are active when the person feels depressed or anxious, and vice versa. Rather, each type of emotion is controlled by different hemispheres — the left prefrontal

region is more active in happiness, whereas the right prefrontal region is more active during negative emotions.

Fredrickson's strategy was the first to induce negative emotional arousal in all participants, using either a fear-eliciting film clip (for example, a scene from the movie *Cape Fear*) or an anxiety-eliciting speech task. These sorts of tasks reliably speed up a person's heart rate and elevate blood pressure. Next, into this context of negative emotional arousal, she induced amusement, contentment, neutrality, or sadness, again using film clips. Again, it is relatively easy to evoke an emotional state by this procedure. Sometimes we choose a comedy because we feel blue and want to cheer ourselves up. Other times, say if we have broken up with a romantic partner, we might choose a weepy film in order to wallow in our hurt feelings. I have a friend who could not pull himself away from the film *Ghost* after his wife unexpectedly left him. Across three different experiments, the two positive-emotion films — the amusement film and the contentment film — each accelerated cardiovascular recovery relative to the neutral and sad films.

NO PAIN, NO GAIN?

It is estimated that forty-eight million people in the United States suffer from chronic pain and twenty-two million Americans take prescription painkilling medications. These same persons spend \$100 billion annually on pain care and nearly 4 billion workdays are lost annually to pain. Medical science has known for years that there is not a direct, one-to-one correspondence between physical damage and felt pain, the latter influenced not only by the severity of the painful stimulus but also by psychological and emotional factors.

Pain is both a physical and a psychological phenomenon. It is generally believed that unpleasant emotional states intensify the experience of pain, whereas pleasant emotional states diminish it. There are three things that I always do before I venture into my dentist's of-

fic. The goal is the same for each. First, I take two aspirin. Second, I avoid all caffeine for at least four hours before the appointment. Third, I try to make sure that I am in a good mood (or at least a non-negative one), for I know that the pain unintentionally inflicted upon me will be magnified by my mood state and my arousal level. Experiments have shown that fear and disgust, created by exposing subjects to slides depicting snakes and mutilated bodies, respectively, reduces tolerance for a painful stimulus. Pain tolerance is experimentally measured by the length of time a person is willing to keep his or her arm submerged in ice water, a procedure that is said to produce a “crushing” or “aching” pain. These same studies find that viewing humorous images increase pain thresholds and tolerance levels. A mind and body resonating with gratitude and other uplifting feelings provides an inhospitable dwelling place for pain. In a recent review of over two dozen studies, the Carnegie-Mellon health psychologist Sheldon Cohen found that through stimulating the release of endogenous opioids, positive emotions produce less sensitivity to pain and greater pain tolerance. Positive emotions may have analgesic effects, stimulating the release of the brain’s own morphinelike substances.

Jeffrey Friedman is a physician in San Luis Obispo, California, specializing in the treatment of chronic pain. He conducted a study with chronic-pain patients in which he examined changes in subjective pain ratings over a four-week period. The treatment was feeling gratitude for things that were deeply appreciated in their lives. Ratings of depression and pain were obtained for each subject. Depression scores were pretty stubborn and were not affected by the gratitude meditation. But pain ratings did go down slightly.

When the average pain rating score pre-meditation versus post-meditation was compared, there was a highly significant drop in the rating scores as a result of the meditation. Did the twenty-eight days of meditation lead to improvement in pain? The average of the first three days’ pain rating scores for each subject was compared with the last three days’ scores; also compared were the average for the first

fourteen scores against the average for the last fourteen scores. There was a hint toward declining post-meditation pain rating scores during the twenty-eight days of testing. This was a small study, but the results were promising and indicate that gratitude interventions might be helpful with chronic-pain patients.

A team of researchers in the pain prevention and treatment research program at Duke University recently tested an eight-week loving-kindness program for chronic low-back pain patients. Loving-kindness meditation has been used for centuries in the Buddhist tradition to develop love and transform anger into compassion. Meditation is often associated with solitary retreat, if not preoccupation with one’s own concerns. How, then, does such a practice promote compassion for others? Taught by the Buddha himself, this form of meditation emphasizes feelings of love, happiness, and compassion. Basic meditative practices for cultivation of compassionate love, or *metta* in Pāli, have a long tradition. A widely used loving-kindness practice starts with engaging compassion toward the self, with the repetition of short phrases while in a meditative state:

May I be free from suffering.
 May I find my joy.
 May I be filled with love.
 May I be at peace.

These phrases are then repeated, but with the focus shifted to others — first to a benefactor, then a good friend, then a neutral person, then someone with whom we experience interpersonal difficulties, or even an enemy, and finally to all beings in the world.

In this study, the intervention consisted of eight weekly ninety-minute sessions. Research and clinical observations suggest that loving-kindness meditation is related to a shift toward more positive emotions such as tranquillity and joy, and a decrease in anger, stress, and anxiety. Patients were randomly assigned to the intervention or to standard care. As it was employed in this study, there was also a

specific gratitude component to the meditation. The protocol included a “body-scan exercise” that encouraged patients to accept their bodies as they are and feel gratitude for what their bodies have enabled them to accomplish in life. Standardized measures assessed patients’ pain, anger, and psychological distress. Post and follow-up analyses showed significant improvements in pain and psychological distress in the loving-kindness group but no changes in the usual care group. Furthermore, more loving-kindness practice on a given day was related to lower pain that day and lower anger the next day. The researchers suggested that the loving-kindness program can be beneficial in reducing pain, anger, and psychological distress in patients with persistent low-back pain. This groundbreaking study was the first published demonstration of the clinical effectiveness of loving-kindness meditation, despite its use by thousands of practitioners over many centuries.

COUNTERFACTUALS AND BRAIN DYSFUNCTIONS

We are often told to always remember to count our blessings, to be grateful for what we have in life, and to avoid dwelling on what we lack. This mode of thinking can help us when we encounter the blows life throws at us, even when they are severe and bleak indeed. Psychologists refer to this as counterfactual thinking: the ability to imagine alternative, what-if scenarios to the world around us. When we imagine rosier scenarios than our current present reality, our emotional reactions are negative — we feel the emotions of envy and resentment. But when we use our counterfactual abilities to imagine darker scenarios to our current reality, the standard emotional reaction is gratitude. Gratefulness or thankfulness to someone who has done you a kindness may often be accompanied by a thought about how things could have gone differently: “He or she didn’t really have to help me,” or “I wonder what would have happened if that passerby hadn’t been so helpful?”

Many survivors of Hurricane Katrina expressed gratitude despite losing all of their personal possessions in the devastating storm and ensuing floodwaters; they were simply grateful that they and their loved ones were still alive. Jessica Newman was a first-year law student at Tulane University who fled New Orleans at the height of the flooding. With a cell phone in one hand, she and a friend drove through flooded streets, being guided by her mother, who looked up maps online and told them where to turn. When one street was blocked, she tried another route, over and over again until they got out. In an interview, she recounted thinking about the ways in which her situation could have turned out differently. She might have ended up in the Superdome or at the convention center. “I could have been there,” she said. “We made out very lucky. Not everyone I knew was so fortunate.” Karl Teigen, a Norwegian psychologist, requested that his research participants tell a story about two occasions when they felt grateful and then later asked them if they had thought of what might have happened instead (that is, engaged in counterfactual thinking). He found that there was indeed a close relationship between gratitude and counterfactual thinking.

A recently published study in a leading neuroscience journal found a counterfactual deficit in patients with frontal lobe dysfunctions, so there may be a connection between ability to adopt a grateful attitude and ability to generate counterfactuals. To test the general conclusion that gratitude differentially relies on limbic-prefrontal networks, the neuropsychologist Patrick McNamara and I conducted a pilot investigation with individuals who evidence clinically significant prefrontal dysfunction — namely, individuals with mid-stage Parkinson’s disease (PD). Brought into public awareness by such high-profile cases as Muhammad Ali and Michael J. Fox, PD is a brain disorder that results in the loss of smooth, coordinated function of the body’s muscles and movement. PD is primarily characterized by tremors, slow movement, stiffness, and difficulty with balance; these symptoms are caused by the loss of dopamine production

in the brain, particularly in key regions in the prefrontal cortex. Psychological and cognitive deficits that have been linked to prefrontal dysfunction include poor planning and poor problem solving, impaired working memory, and speech monitoring deficits. Bouts of depression are common in persons with PD as well, so that if an intervention such as gratitude training can alleviate depression and prevent future episodes, this will be an important discovery in helping PD sufferers to maintain a positive attitude.

We believed that measures of gratitude should correlate with measures of prefrontal brain function. In addition, we thought that individuals with prefrontal dysfunction should not display the normal benefit in mood that occurs when an individual conjures up a memory of an experience that induced gratitude. Normally if you ask an average person to remember a time when they felt grateful for something that someone did for them or for something that happened to them, their mood slightly changes into a more positive, happy one. If, however, gratitude and its beneficial effects depends critically on prefrontal networks, then we would expect no such mood improvement in persons with prefrontal dysfunction when they are asked to recall an experience involving gratitude. That is what we indeed found when testing PD patients. We compared a group of mid-stage PD patients to age-matched healthy controls on the mood induction procedure. We asked participants to recall either a gratitude memory or a "control" positive memory and then measured changes in their mood. While neither group reported a mood change when recalling a positive memory, there was a slight improvement in mood in the healthy controls after recalling a gratitude memory, but no such improvement in mood for the PD patients. We also found significant group differences in the time it took to recall a gratitude memory as well as the mean length (in number of words) of gratitude memories. Patients with PD took longer to retrieve memories that were also significantly more wordy or verbose than those of control subjects. Here is an excerpt from an interview with one of our patients with PD:

- A: So now once again I'm going to ask you to try to remember something from the past month. All right, I want you to tell me about a specific event that happened when you felt grateful to someone. You can take as long as you want to remember.
- P: Let me look at my calendar to see what I did this month, maybe it'll jog my mind. I can't think of anything specific in here. All I do is go to the doctor's and do my gigs.
- A: So any time that you felt grateful toward a doctor or you felt grateful toward someone you . . .
- P: I never feel grateful toward a doctor because he's always prescribing more pills.
- A: Any time during a gig that you felt grateful toward someone?
- P: Well, it's always nice when I finish the gigs, when I finish doing the hour show, when somebody . . . when I get the people in the audience to stand up and applaud. And that happens quite a bit.
- A: So that happened in the past month?
- P: Yeah.
- A: And you feel grateful about that.
- P: But as I say, I think that I mentioned this earlier, my speech is deteriorating. It's slower. My voice is softer. I have to use a microphone more extensively. So that's kind of nice when I finish a program, you know in my own mind I think I was slurring my words and not saying what I wanted to say, and they still applaud. And seem to mean it. So that makes me feel good.
- A: Right. So you're grateful about that.
- P: Yeah, I would say so.
- A: OK. Now do you think that something else could easily have happened? Like do you think that maybe they wouldn't have applauded, do you ever think about that?
- P: Well, that's possible. There's no reason why they should have to stand up and give me a standing ovation. But it's happened on several occasions.
- A: And that would be pretty unpleasant.

P: That would bother me, that I had put my best out and maybe somebody didn't like it. But I haven't come across that.

A: Good, but do you ever think that way? Do you ever think when you go into a show, "Uh oh, they might not applaud for me tonight."

P: Oh sure, but lots of times it's only in my own mind.

GRATITUDE AND THE DOCTOR'S OFFICE

There is a ritual exchange that takes place every day in doctors' offices and hospitals throughout Hungary. Patients slip their physician an envelope containing payments known as "gratitude money." After some ceremonial dismissive protests, the doctor eventually accepts the envelope and discreetly deposits it in a desk drawer. Is this legal? No. Is it common? Yes. Is it ethical? Depends on whom you ask. Patients receive free medical care in Hungary but feel obliged to contribute money under the table in exchange for certain favors: to receive a hospital bed with a better view, to move up in the queue for a procedure, to be referred to a specialist, or just to get a little extra attention. Despite obvious moral difficulties (should the poor have to pay as much gratitude money as the well-off for similar services?), over 80 percent of physicians surveyed contend that so long as the state does not pay them accordingly, they have a right to accept gratitude money. Various medical procedures appear to merit different sums of gratitude money, from heart surgery (92 percent say they give money for this) to 50 percent for a pediatrician making a house call to a low of 8 percent for a routine x-ray. This system of gratitude money is not limited to Hungary, but occurs in other post-Socialist countries, including Romania, Bulgaria, Poland, and Russia. The payments are not always monetary; the same operation might cost a bar of chocolate, a bottle of vodka, or, for patients from rural areas, produce from their farm.

The accounts given by both physicians and patients are fascinat-

ing and provide a new, cross-cultural perspective on the dynamics of giving, receiving, and repaying and the link between status and gratitude. A patient replied, "It is a tradition to pay respect to a physician [with a gift] because he is looking after the most precious thing — health." A physician commented, "Among my patients there are prominent people, academics, but they would not consider [a gift]. . . . The ordinary people are more grateful usually. A driver will leave a much nicer present, respect your work, while the others will only say 'thanks.'" Several others surveyed also indicated that the most well-to-do people happened to be the most ungrateful.

This phenomenon of under-the-table payments for services illustrates that cross-cultural trafficking in gratitude can be risky business. Most people in the United States would be appalled by such a system. We would never think of inviting the surgical team over for dinner the night before a major operation or providing our surgeon with \$27,000 worth of instruments as did one Russian cardiac patient.

Fortunately, gratitude money is unnecessary in the United States, where most physicians are compensated in a manner commensurate with their skills. Terms of exchange between patient and physician are not the same as they are in Hungary or Bulgaria. Gratitude is not the price paid by patients for the humanitarian services of a physician. But gratitude is still relevant to the practice of medicine. There is evidence that when people are encouraged to think about their health as a gift, they take fewer risks and engage in more health-promoting practices. Whether or not gratitude payments in the form of these highly ritualized gestures lead patients to adopt a grateful stance toward their health, though, is debatable.

Educating for Gratitude: The Role of Gratitude in Medical Training

A fascinating study, published in the journal *Academic Medicine* in 2003, assessed the full range of day-to-day emotions and the expe-

periences that triggered them for medical trainees in hospital settings. Each emotion expressed by internal medicine and pediatric medical students and residents was coded from interviews and a weeklong observation period while they performed a variety of duties at the University of Washington Medical Center in Seattle. Gratitude, happiness, and pride were common positive emotions that were triggered by the joy of learning, the opportunity to practice medicine, emotional support from mentors, and recognition from patients. Resident "Sam" explained, "When all is said and done, I really do find it an honor to go and do this work . . . You're walking in the footsteps and tradition of service that goes back." Jane, a first-year resident in internal medicine confided:

I was clearly struggling, and my senior resident basically just took me aside and kind of said, "How are you doing?" At which point I just went to pieces . . . We were on call that day, she said, don't think about us; don't worry about us, just go to sleep . . . I have been, and continue to be, very grateful for. Because when I really, really needed it, someone made it clear . . . what I needed to do for myself was just get the hell out of there . . . She made it clear that was not a problem for her.

Why is this study significant? Grateful physicians are better physicians. Physicians who are trained to recognize their own emotions and emotions in others are going to be more effective healers. Studies have shown that emotionally intelligent physicians facilitate patient satisfaction and they themselves have higher satisfaction. A recent experiment found that grateful emotions lead to better clinical problem solving in doctors. After having been given a small gift (a common procedure in mood induction research), internists made a more accurate diagnosis of liver disease in a hypothetical case than did doctors in a control group, who received no gift. Positive emotions such as gratitude lead to more efficient organization and integration of information, important cognitive tools in clinical assessment and diag-

nosis. Studies have also shown that these emotions improve decision making and creative problem solving in medical students and in physicians. Thus there are evidence-based reasons for educators to incorporate emotional competencies into medical training. Quite apart from the effect of gratitude and other positive emotions on clinical skills involved in patient care, there is the realm of personal development and physician well-being. Gratitude journaling can be an effective strategy that can be adopted as an element of self-care or stress management. Physicians may also be more likely to develop brief interventions such as gratitude journaling to help their patients if they themselves have benefited from the practice.

Illness Prevention: The Grateful Head

I live in Davis, California, a city that is purported to have the highest per capita bicycle ownership rate anywhere in the United States. When I cross campus between classes I am often struck by the small number of students that wear bicycle helmets, particularly in comparison to a community-dwelling sample. Every day on my campus there are accidents, sometimes serious. An informal observational survey on my part revealed that on an average day, fewer than one in ten riders wear helmets. This is despite evidence that helmets cannot only reduce head injuries (by as much as 85 percent) but also save lives. The Bicycle Helmet Safety Institute maintains a Web site replete with life-saving testimonies by helmet wearers. The pastor of my church sustained major injuries when his bike hit a patch of gravel and slid off the shoulder of a rural road during a race. Following the incident, he became a strong advocate for wearing helmets. Researchers at Appalachian State University in North Carolina investigated a social marketing intervention to increase the use of bicycle helmets on their campus. Focus groups of students developed a bicycle helmet program slogan and logo entitled "The Grateful Head." The authors trained student bicyclists who already used helmets as peer agents. These agents provided bicycle helmet information and

asked fellow bicyclists to sign a pledge card to wear a helmet. They gave a coupon for a free helmet to those who pledged to wear a helmet. The authors received a total of 379 pledge cards and distributed 259 helmets. Bicycle helmet use nearly doubled: it rose from a baseline mean of 27.6 percent to a mean of 49.3 percent by the last week of the intervention. A comparison group at a comparable university showed no such increase.

An emphasis on gratitude can motivate us to take better care of our bodies. In public health situations, the mobilization of peer influences, safety information, pledge cards, and campaigns around catchy slogans can be noticeably effective in prompting healthy actions. A gratitude-based framing contains an implicit message that bodies, health, and even life itself is a gift and this gift-based construal can transform consciousness by increasing a sense of personal responsibility for these gifts. We tend to take better care of something if we see it as a gift, as opposed to believing we are entitled to it.

Do Physicians Yearn for Gratitude from Their Patients?

When I have given presentations on the science of gratitude to physician groups, I am pushed to think about how my work might be clinically useful. If it's an audience I feel particularly safe with, I'll daringly raise the question of whether doctors expect gratitude from their patients and the degree to which this desire motivates their practice. Psychoanalysts have held that a longing for something in return from patients is perfectly understandable and may be related to unconscious motivations for choosing a career as an analyst. Altruistic intentions may not account for everything. Whether this generalizes to other medical specialties is debatable, yet in the context of educating for emotional intelligence that I discussed above, it is an issue well worth pursuing in medical training. It is a rare doctor who is immune to patients' feelings of gratitude.

Several years ago, I presented my own primary care physician with a copy of a small inspirational book on gratitude that I had writ-

ten. This was an appropriate and heartfelt gesture, not a bribe for a reduced fee or for a complimentary prescription refill. Though not being given to emotional displays — and wishing to maintain a professional doctor-patient relationship — he clearly found the gesture touching, which in turn I appreciated. I would not want a physician who was indifferent to my affirmation of his competence. Establishing and strengthening the bond between patient and physician is good medicine. Despite advances in medical technology, the patient-physician bond remains essential to quality health care. Appropriate displays of gratitude are an important element in any healing relationship and become increasingly so as medicine becomes more and more fragmented and techno-centered.

BEING ON THE RECEIVING END

"You know, it's an amazing feeling too — usually, as the pod's up front, we don't see the people as they're coming up on the hoist until they enter right there in the door, and to look around over your right shoulder and you see their face and the relief on their face, and the gratitude, that they just want to reach up and almost — some of them do — reach up and grab your shoulder and squeeze it and just tell you, 'Thank you.' There's not a better — probably not a better feeling in the world."

These words were spoken by Coast Guard lieutenant Jason Smith, whose team rescued nearly two hundred victims of Hurricane Katrina from their rooftops and out of floodwaters in the days following the storm's devastation. Smith's testimony reveals that being on the receiving end of gratitude — being the one to whom thanks is given — is itself a powerful experience. It feels good when our efforts are gratefully acknowledged and hurtful when our efforts are met with indifference, grudgingly offered thanks, or ingratitude. The effect of receiving gratitude goes beyond an emotional or cognitive satisfaction in knowing that we have contributed something useful,

however. Modern research in the emerging field of neurocardiology suggests an intriguing physiological basis for why receiving heartfelt gratefulness is itself physiologically beneficial *for the receiver*.

Recall that researchers have shown that gratitude and the related positive emotions of love and appreciation are associated with a smooth, ordered, coherent pattern in the heart's rhythmic activity (see Figure 3.1). What was left unsaid earlier was that the heart itself generates an electromagnetic field. In fact, the heart is the most powerful generator of electromagnetic energy in the human body, producing the largest rhythmic electromagnetic field of any of the body's organs. The heart's electrical field is about sixty times greater in amplitude than the electrical activity generated by the brain. Furthermore, the magnetic field produced by the heart is more than five thousand times greater in strength than the field generated by the brain and can be detected a number of feet away from the body, in all directions, using a device known as a magnetometer. Prompted by findings that a person's cardiac field is modulated by his or her different emotional states, several studies have now documented that the electromagnetic field generated by the heart may actually transmit information that can be received by others.

For example, when two people are at a conversational distance, the electromagnetic signal generated by one person's heart can influence the other person's brain rhythms. When an individual is generating a coherent heart rhythm, synchronization between that individual's brainwaves and another person's heartbeat is more likely to occur. In other words, one person's brain waves harmonize with the other person's heart waves, an effect that has been measured between individuals up to five feet apart. This deep form of communication establishes a heartfelt connection between people, resulting in perceptions of, among other things, really being understood and appreciated by the other. So when a person expresses heartfelt gratitude toward us, there is the potential for us to experience all sorts of benefits, driven by this exchange of electromagnetic energy. What kicks this

energy exchange system into gear is the coherent heart rhythm produced by grateful feelings. The flip side is that a force this strong may also repel, possibly explaining why we feel an immediate dislike for someone whom we barely know, as well as providing a physiological explanation for why perceptions of ingratitude are so profoundly aversive. This work is preliminary and has yet to see the light of day in rigorously peer-reviewed scientific journals, but it is intriguing to consider and does dovetail with common experience.

For millennia, the heart has been viewed as the primary source of the spirit, the seat of the emotions, and the window to the soul. Virtually all cultures around the world use the word *heart* to describe anything that is core, central, or foundational. Whoever gave us the French proverb "gratitude is the memory of the heart" may have known something that experimental research is now able to verify: gratitude is the way the heart remembers.