

HEALING THE REASON-EMOTION SPLIT

Scarecrows, Tin Woodmen,
and the Wizard

DANIEL S. LEVINE



“This book offers a delightful and light read, as well as one that provides clarifying discussions of mental processes and core aspects of the human condition that are deadly serious. How individuals do, or do not, balance their cognitive and emotional processes will determine whether or not they focus attention on predictively relevant events in the world, and carry out decisions and actions to realize valued goals. Levine illustrates these general themes with examples from such varied topics as recent presidential politics, avian and primate intelligence, cognitive dissonance, climate change, what makes different jobs interesting or boring, and ... last but not least ... baseball! His lively text drew me into each chapter right away, and held my attention in admiration.”

— **Stephen Grossberg, Wang Professor of Cognitive and Neural Systems,
Boston University, USA**

“Levine’s very timely book reveals an extreme originality of thought applied to interdisciplinary research, where his scientific expertise dialogues with social and human sciences, art and spirituality. It exemplifies how an imaginative mix of tradition and innovation constitutes a meaningful contribution to the necessary changing of the world, reactivating true comprehensive intellectual potency to decisively help the universal human quest for wisdom and compassion.”

— **Ana Maria Coutinho Aleksandrowicz, Psychoanalyst and Co-founder of
4F – Freud’s Forwarders Foundation and Formation, Brazil**

“In *Healing the Reason-Emotion Split* Levine gives readers a rare gift: science with a heart. He more than explains, he exemplifies, his thesis. The seeming chasm between reason and emotion is an illusion. Only by appealing to both, he argues persuasively, do we have a fighting chance of improving our society and world.”

— **Ralph Mecklenburger, Rabbi Emeritus at Beth El Congregation,
Fort Worth, USA**

“*Healing the Reason-Emotion Split* is an important contribution to the most urgent enterprise of our time: building a more caring and connected partnership-oriented world. It provides a holistic understanding of human behaviors and societies – and how to change them in positive ways. Reminding us that we humans need, and yearn for, meaning and community, and that reason and emotion are actually partners rather than opposites, this fascinating, highly accessible book shows that we *can* create a more equitable and sustainable world.”

— **Riane Eisler, President, Center for Partnership Studies, USA**



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HEALING THE REASON–EMOTION SPLIT

Healing the Reason-Emotion Split draws on research from experimental psychology and neuroscience to dispel the myth that reason should be heralded above emotion.

Arguing that reason and emotion mutually benefit our decision-making abilities, the book explores the idea that understanding this relationship could have long-term advantages for our management of society's biggest problems. Levine reviews how reason and emotion operated in historical movements such as the Enlightenment, Romanticism, and 1960s' counterculture, to conclude that a successful society would restore human connection and foster compassion in economics and politics by equally utilizing reason and emotion.

Integrating discussion on classic and contemporary neurological studies and using allegory, the book lays out the potential for societal change through compassion, and would be of interest to psychologists concerned with social implications of their fields, philosophy students, social activists, and religious leaders.

Daniel S. Levine is Professor of Psychology at the University of Texas at Arlington, USA, and a Fellow and former President of the International Neural Network Society.



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PREFACE

The brain and mind constitute one of the most exciting frontiers of science. The questions of how we think, feel, and decide have fascinated humans for centuries, and neuroscientists and psychologists are coming ever closer to some answers. Many of us have gone into this field hoping we could apply the answers we found to solving our global social problems.

This book is a contribution to the effort to make science part of the solution. It brings science into the “beloved community” of people in many disciplines and many different pursuits, activists, and artists as well as scholars, who seek new and better ways of living from the opportunities that current crises provide us. Over several centuries, the rise of science and the philosophy of the Enlightenment had promised that this better way would come to humanity through technological advancement and rational management. Yet the upheavals of the last century, including two world wars, mass murders, and threats of both nuclear and ecological destruction, showed that technology and rational understanding were not enough.

As we learned more about human nature through neuroscience and psychology, we discovered that humans were *both* rational and emotional beings. This means that the best societal arrangements are those that respect and encourage both our rational and emotional faculties. As a student in the 1960s and 1970s, I was part of the countercultural movement that felt unchecked technological growth and unchecked managerial expertise were alienating us from our communities, each other, and direct intuitive experience. Over the next several decades, advances in neuroscience, psychology, and my own field of neural network theory all pointed to the close cooperation in our brain between emotion and cognition. Emotion, relegated in past theories to the dirty backrooms of our minds, emerged and took its place within the main hall.

Yet the counterculture, like the Romantic movement before it, had its excesses, like the bad drug trips of some of my fellow students. Rational facilities

and effective problem-solving still need to be encouraged as well as intuition. So I set out to write a book about cultural myths that have harmed society, by dividing us from each other and from our full selves, and how we can overcome these myths with the help of science. The combination of globalism, income inequality, climate change, and now a pandemic makes this book's optimism seem out of place, even quaint, to some readers. Yet these very conditions call for bold use of our minds and hearts. We must strive not only to give the Tin Woodman a heart and the Scarecrow a brain but to give the Cowardly Lion courage to believe we can have both.

Daniel S. Levine, Arlington, Texas, USA, July 2020

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Many people have contributed to the final version of this book. Rabbi Ralph Mecklenburger and psychoanalyst Ana Maria Coutinho Aleksandrowicz read through all the chapters and suggested additions in both style and substance that have strengthened the book's message. My doctoral students Amandeep Dhaliwal and Aaron Bradetich commented on some of the manuscript and helped with technical aspects of the production.

The ideas for the book took shape several years ahead of production from several speaking opportunities in the Dallas-Fort Worth area. The notion that reason and emotion are best treated as partners rather than opposites was the subject of a sermon at First Jefferson Unitarian Universalist Church in Fort Worth (Craig Roshaven, then-minister) and a talk to the Dallas Philosophers Forum (Rob Olson, president). After the book was under contract, I previewed the book for the Center for Theory at the University of Texas at Arlington (UTA), an interdisciplinary humanities organization headed by sociologist David Arditi. The book's subsequent writing was helped along by feedback from the last talk, notably from literary scholar Kenneth Roemer and philosopher Kenneth Williford.

In addition, I enrolled in a class at UTA for professors with book proposals, organized by administrator Maria Martinez-Cosio and convened by historian John Garrigus. The feedback obtained from the other professors in that class encouraged me to go ahead with marketing the book and spawned several improvements including the final version of the book's title.

Cultural historian Riane Eisler and an anonymous reviewer read through and made helpful comments on the book proposal and the first three chapters before publication. In addition, both Eisler and David Loye through their Center for Partnership Studies provided over the years the inspiration that supported my belief that the science of brain and mind supports societal arrangements centered around partnership and cooperation. More inspiration came from the lasting influence of

graduate school mentors: Stephen Grossberg, my doctoral dissertation adviser who includes cognitive-emotional interactions in computational models of the brain and mind; the late neuroscientists Paul MacLean and Walle Nauta; and the late population ecologist John Calhoun. The book also incorporates many ideas from informal discussions with colleagues who are also friends, notably Sam Leven, Leonid Perlovsky, Paul Prueitt, and Valerie Reyna, discussions that have flowed effortlessly between science and daily life. Sam was particularly instrumental in broadening my perspective from the sciences and mathematics to the social sciences and humanities.

The editors at Routledge were most helpful, friendly, and efficient at all stages of the book review and production process. The editors, at different stages, included Alex Howard and his assistant Cloe Holland from Informa, Ceri McLardy, and April Peake.

The book reflects a mixed grounding in the hard sciences and helping professions from my late parents, Anne Levine (a social worker) and Rachmiel Levine (a doctor and biochemist). My sister, psychiatrist Judith Feldman, helps me integrate the early experiences of our home into the present.

My wife, Lorraine Levine, was supportive of the project and instrumental in keeping me focused on the current world and our community when I started to veer into abstraction. Conversations with her have made the book feel like a reality.



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MINDS TO MATCH OUR CHALLENGES

In 2004, many people felt that President George W. Bush of the United States was vulnerable to losing his bid for reelection. The national unity Bush had achieved three years earlier by bringing us together in the face of terrorist attacks had dissipated with the war in Iraq that divided the nation in spite of our early victory. His tax cuts that mainly benefited the rich were unpopular. So were his and Congress' efforts to cut social programs. Americans were ambivalent about "handouts" such as welfare programs and food stamps but tended to support strengthening Social Security and federal programs to provide jobs and job training.¹

The Democratic candidate who opposed Bush was Senator John Kerry of Massachusetts, who had been a hero in the Vietnam War but lately come to oppose our involvement in Iraq. His party thought that his military record would make him a formidable candidate against the war President. Yet Kerry's campaign made a number of mistakes that kept him from winning, mistakes of overreliance on reason in an arena that thrives on emotional appeals.²

First of all, after polls showed voters disliked negative campaigning, the Kerry campaign largely avoided direct attacks on Bush. This was later turned against Kerry by Bush's campaign who attacked Kerry's war record and criticized him for being weak when he did not fight back. So many voters were more susceptible to negative ads than they thought they were. Second, Kerry highlighted his desire to give something back to his country after being given privileges like going to Yale. This enabled Bush to paint him as an Ivy League liberal who was out of touch with the common people. Kerry was closer to voters on many policy issues but Bush's greater personal appeal enabled him to get reelected.

Does this election story mean we should try to encourage voters to be more rational and less emotional in their choices? Surprisingly to some readers, I don't

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believe so! More rational, yes, but not less emotional. Emotional connection with our leaders and with the democratic process is part of what holds civil society together, so we don't want to lose that connection. Rather we should encourage voters, and people in general, to channel their positive emotions as much as possible toward people and policies and events that will really help them and be beneficial to society. In other words, reason and emotion should be in harmony rather than one defeating the other.

This book will argue that the social myth that emotion and reason are opposites, with reason being superior to emotion, is harmful. Furthermore, it's a myth that recent results in the relevant areas of science—neuroscience and experimental psychology—do not support. And science can also suggest ways of thinking that can substitute for that myth.

Can Science Help Us?

Our understanding of the human brain has taken off explosively in the Twenty-First Century. Results of recently developed techniques enable us to see what areas of the brain are active during the performance of particular mental tasks. Now the fund of knowledge about human mental function is larger than it has ever been in history.

Because the human brain is arguably the most complex organism in existence, the study of brain and mind is often called the last frontier of science.³ As we learn more about our brains, can we direct our reasoning, emotions, and attitudes for the benefit of society and the planet?

Advances in science and technology in the last 400 years have made more people on Earth lead longer, healthier, and better lives than in most, if not all, previous history. Yet the benefits of science have not gone to everyone. Moreover, global communications and technological advances have created some problems of their own. It's now well established that human activity has led to increased greenhouse gas emissions that have raised average temperatures.⁴ The result will increasingly be more variable weather conditions including flooding in some places and drought in others, both of which threaten the settled ways of life of millions of people. Also, rapid growth and encroachment of human populations and their artificial products threaten species that are vital to our ecosystem, like the bees that pollinate agricultural crops and other plants.⁵

Technological growth has also created cultural challenges due to the linking of distant countries via advanced communication and transportation. Inhabitants of poorer and developing countries have become more aware of the economic growth in other places and increasingly strive to get a share of the action, which further adds to the worldwide strain on natural resources and energy. Richer nations are also under more strain due to increased immigration from those in poorer nations seeking either asylum or a better life.⁶

During the period of writing this book, a global pandemic has been added to the challenges humanity needs to face, making it more important than ever to seek solutions that benefit people as a whole. All these societal challenges are technically difficult but not impossible (yet, anyway) to meet. Yet even when technical solutions are available, human attitudes often get in the way of applying those solutions. This book focuses on some of our attitude barriers. And it focuses on what the sciences of the mind, neuroscience and experimental psychology, say about how to break those barriers.

For example, biologist Mary Clark⁷ identified several common attitudes in European and American culture that interfere with preserving our environment. These are the belief in the dark side of human nature; the belief in the inevitable scarcity of resources; and the belief in cumulative progress over time, which tends to disparage the accomplishments of earlier and “primitive” societies. Clark suggested replacing these with their opposites: beliefs in the “bright side” of human nature, in abundance of resources, and in adaptation to changing circumstances.

Belief in the dark side of human nature feeds a perceived need for social control; that is, a belief that social stability requires rank orderings in which some individuals or groups dominate others. Several books by feminist historian Riane Eisler⁸ document that while societies throughout much of history have been based on rank orderings, both within families and in the larger society, an alternative model based on roughly equal partnerships often emerges and creates better social health. Moreover, partnership or domination in intimate relations tends to mirror partnership or domination in social and political relations. So it is important to remember that the partnership model is just as much part of the human evolutionary makeup as the dominator model. In Eisler’s words, “what we think of as natural and inevitable—destructive personal and social patterns such as domestic violence, chronic warfare, racial and religious prejudice, the domination of women by men—are not natural or inevitable at all.”⁹

We need to explore what neuroscience and experimental psychology can tell us about the roots of human attitudes and how best to encourage the kinds of attitudes that will meet the challenges of our current world. The title of this chapter, *Minds to Match our Challenges*, is borrowed from a motto used in the past by one of the scientific enterprises in the scenic university city of Boulder, Colorado: Minds to Match our Mountains.

Some people are pessimistic about the earth’s current population and believe we need genetic engineering to make people “smarter.” Or else, some believe, we need to accept the fact that artificial intelligence devices will soon be smarter than humans and gradually hand over control of vital decisions to machines. On the contrary, I believe that most of us carry within ourselves the potential for either constructive or destructive attitudes. So we have less need for genetic engineering than for *social* engineering. That is, we need to structure society to increase the incentives for constructive attitudes – incentives that are sometimes called *nudges*.¹⁰

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To make sense of the different aspects of our mental function and how they relate to one another, it helps to understand the brain processes involved in all those functions and the anatomy and physiology of the relevant brain regions.¹¹ When I mention the connections between brain and behavior, people occasionally get uncomfortable with the idea that biological processes in the brain “cause” behavior, because they think it denies human responsibility. But this book avoids the philosophical controversies over whether mental events can cause physical events or whether all the causation is in the other direction, from physical to mental events.¹² Without knowing the exact chain of causes, we can still confidently say that certain brain processes accompany, or correlate with, the mental processes of interest to us.¹³

The opening statement of the United States’ brain research initiative launched in 2014¹⁴ is: “President Obama is making new investments in the ‘BRAIN’ Initiative—a bold new research effort to revolutionize our understanding of the human mind and uncover new ways to treat, prevent, and cure brain disorders like Alzheimer’s, schizophrenia, autism, epilepsy, and traumatic brain injury.” More recently, there has also been wide interest in what neuroscience tells us about how people learn, leading to “brain exercising” software such as Lumosity and “brain-friendly” curricula in many schools.

Applying neuroscience to mental illness treatment and to education is vitally needed and welcome. Yet equally important, and the focus of this book, is applying neuroscience to structuring society. We need to consider social structures both at the formal level of social and economic policies and the informal level of social customs and mores, in so far as we can try to direct them. In 2015, President Obama also issued an executive order asking federal agencies to incorporate behavioral science in making their decisions. In response, several experimental psychologists wrote a proposal for a “council of psychological science advisors” to the president.¹⁵

Attitudes cut across different human pursuits. If a mental outlook emerges in politics or the family, it is likely to emerge in different forms in religion, language, literature, psychotherapy, economics, and a variety of other endeavors. In an online book,¹⁶ I mapped out some relationships between attitudes in these different walks of life and tied them to sciences of the brain and mind. This book focuses more specifically on attitudes about reason, emotion, and decision-making.

As our technology and standard of living have increased, we have looked more and more to reason for solving our challenging problems. Our pursuit of reason often leads us to put down emotion as something that is always present but needs to be overcome. This book argues instead that emotion and reason should be treated as partners. Moreover, it argues that recent advances in neuroscience, experimental psychology, and computational modeling of neural systems support the existence of, and the need to encourage, partnership between emotion and reason.

The Tin Woodman and the Scarecrow

The relationship between behavioral brain activity patterns and social organization may seem remote to some readers. Yet this book argues that the ability of societies to address social, political, economic, and environmental challenges is tied closely to beliefs and attitudes about human interactions, and that neuroscience and psychology have lessons about which attitudes are helpful or harmful.

Specifically, the belief in domination rather than partnership and the perceived need for tight social controls blind us to the possibilities for human cooperation that will help to address our challenges. As Riane Eisler points out,¹⁷ partnership between different people is enhanced by partnership within each of ourselves. That is, the different aspects of each of our psychic makeup, all of those products of human evolution, need to be working together as much as possible, rather than in conflict. In particular, we are rational beings with the instinct to learn as much and as accurately as possible about ourselves and our environments, which some authors describe as either a drive to comprehend or a knowledge instinct.¹⁸ Yet we are just as much emotional beings who try to find pleasure, avoid pain, and bond with others.¹⁹ The interactions between reason and emotion in the brain can be a source of internal tension and conflict, but can also be a source of great power for good.

The beliefs that reason and emotion are separate and opposite, and that reason is superior to emotion,²⁰ were tied to the rise of science and the human ability to control nature for our own benefit. Neuroscientist Antonio Damasio traces these beliefs to the Seventeenth Century philosophy of René Descartes.²¹ Descartes believed in a “dualism” between the will (or soul) and the instincts (or body), and advocated living so that the will controlled the instincts. Yet aspects of his theory can be traced further back to ancient Greece in Aristotle’s mention of the need to control our animal passions,²² and the rise of science in the Renaissance and Enlightenment periods was partly a revival of ancient Greek and Roman outlooks.²³

The trends in human thought that led to ranking reason over emotion were initially progressive. The control of our animal instincts helped humanity to be less at the mercy of the weather, diseases, and scarcities of natural resources, and to build technology that increased the general standard of living. It also was tied to the growth of the scientific method and the ability to replace superstitions about angry gods with an accurate understanding of nature.

Yet the idea of reason being superior to emotion ultimately feeds the ethic of domination. It allows us to label some groups of people as more “rational” and others as more “emotional,” and thereby justify rank orderings between these groups. Women are often considered more emotional and less rational than men, because bearing children makes them seem “closer to nature.” This professed difference has been used to justify male domination of women as necessary for the

continuation of advanced civilization.²⁴ Likewise, because rapid technological progress came first to white Europeans, people of color are often regarded as more “emotional” (or even, in the case of those of African descent, more “primitive”) than Caucasians. This belief has been used to justify racial discrimination and white supremacy.²⁵ Finally, homosexuals (male ones at least) are often considered more emotional than heterosexuals, because many are in the arts and because they are thought to be evading parenting responsibilities. This belief has been used to justify discrimination on the basis of sexual orientation.

Just as importantly, humans are widely thought to be the only creature that has reason and are thereby given a right to subdue the rest of nature which is irrational. This is used to justify the wanton exploitation of other animals and plants as well as inanimate objects for our own benefit. Our disrespect for non-human living things is widely regarded as a prime contributor to our environmental crises. It is closely tied to the mystique of “progress” which Mary Clark identified as one of the three main attitudes inhibiting Western cultures’ ability to solve our environmental problems, climate-related and otherwise.²⁶ In contrast to this attitude, growing respect has emerged among behavioral biologists for cognition and reasoning capacities in other animals as diverse as chimpanzees and parrots.²⁷

While privileging reason over emotion has brought us a material standard of living higher than humans have enjoyed through most of history, it has had a severe psychic cost.²⁸ Many of us have come to believe unconsciously that in order to think you must not feel, and in order to feel you must not think. Being rational is equated with following one’s own self-interest, regardless of family, sentiment, and tradition—indeed, treating those things as appendages to one’s advancement, using them or discarding them as it is needed for material goals. Being emotional is equated with acting quickly and on impulse, setting aside long-term welfare and following one’s passions of the moment. Too many of us on different occasions are described accurately by one or another of the metaphors from *The Wizard of Oz*: the Tin Woodman who has no heart or the Scarecrow who has no brains.²⁹ Those metaphors are not perfect, because in fact neither one of those literary characters was well equipped with the other organ. But some other psychologists have used the same literary metaphors in the same way I do, to represent the perceived disconnect between emotion and reason.³⁰

The Wizard

In L. Frank Baum’s novel, the Wizard of Oz was a self-described “humbug,” an ordinary man from Nebraska who had wandered into a city of people who needed someone to believe in. The mighty powers attributed to him arose from the pomp surrounding his person and the beliefs of the people of the Emerald City. Yet he managed to give the Tin Woodman a heart and the Scarecrow a brain, by convincing them they already had what they wanted. Recent advances in neuroscience and experimental psychology can play for us the role of the

Wizard, by telling us that reason (the “brains”) and emotion (the “heart,” even though there are of course emotion-related regions in the actual brain) are as much partners as they are opponents.

In neuroscience, since the 1960s and 1970s, the frontal lobes have been identified as a link between regions of the brain devoted to processing complex information and other regions devoted to processing emotional states related to functions of other bodily organs.³¹ This is the very part of the brain that is generally considered to be the most important region involved in planning behaviors and making decisions, what is often called executive function.³² Later results localized most of this function of linking emotion with cognition to a part of the frontal lobes called the *orbitofrontal cortex* (or a slightly larger area called the *ventromedial prefrontal cortex*). Clinical neuroscientist Antonio Damasio discussed the executive and decision-making deficits that occurred in many patients with damage to the orbitofrontal cortex, patients whose intelligence and cognitive abilities remained intact.³³ The most celebrated of these patients was the Nineteenth Century Vermonter Phineas Gage, who as a result of a railroad accident, which damaged that brain region, changed from being sober and responsible to being impulsive, unreliable, and prone to profanity. Many patients with orbitofrontal damage have been impulsive such as Gage, but others, including EVR whom Damasio described in depth, have been just the opposite: impassive and prone to deliberate endlessly over minor decisions such as which restaurant to eat at. Because of their detachment from emotion, none of the options stood out or grabbed the decision maker’s attention. Damasio noted that EVR’s decision-making violates the conventional wisdom³⁴ that decisions detached from emotion should be characterized by superior reasoning, as epitomized by the Star Trek character Mr. Spock.

The idea of emotion and cognition being separate dies hard, in the neuroscience community as in society at large. Some recent reviews of the functions of the frontal lobes and related areas give the impression that emotion is confined to the orbitofrontal area and there are other parts of the frontal lobes, like the *dorsolateral prefrontal cortex*, whose primary function is processing cognitive information.³⁵ Yet in fact no brain region has a unique function, nor is any mental function confined to a unique brain region. Neuroscientist Luiz Pessoa notes that the cognitive and emotional areas of the brain are deeply interconnected; for example, the dorsolateral prefrontal cortex which other authors regard as uniquely cognitive responds in specific ways to emotional inputs.³⁶ Evidence for neural integration between emotion and cognition is discussed more fully in the next chapter.

The close connection, rather than separation, between cognitive information processing and emotion should not be surprising, because part of what a human or animal processes about an event is its emotional content. We want to know whether a stimulus in the environment, or a word someone says, is likely to be beneficial, harmful, or neither. And we want to know whether an experience is

likely to be pleasant, unpleasant, or neutral. But over the last several hundred years, the scientific community has been steeped in, and also contributed to, the cultural myths that reason is good and emotion is bad.³⁷ During this century, a welcome reversal is taking place: emotions are now “cool” in the neural and cognitive sciences. A recent article in the prestigious journal *Science* discussed brain imaging of players in a two-person economic game, and found that unfair proposals activated brain regions related to both emotion and cognition.³⁸ And in the artificial intelligence community, there is a growing interest in the possibility of emotional robots.³⁹

In experimental psychology, there is increasing evidence that emotional processes include a cognitive element. For example, psychologists Sara Hodges and Daniel Wegner have distinguished an automatic and a controlled form of empathy toward others.⁴⁰ Automatic empathy is more likely to occur when the person we are trying to understand is a friend or is similar to us. The similarity could be, for example, either in race or gender, some character trait, or some situational variable. Controlled empathy takes a great deal of effort (“walking a mile in their moccasins” as the Native American saying goes) and is more likely to occur when the person is dissimilar to us.

Social psychologists since the 1960s have studied attribution: how we make inferences about the causes of both our own and other people’s actions. One common error people make in attributions is the *actor-observer error*.⁴¹ The actor-observer error means that when we are analyzing why someone else did something (e.g., why he or she performed well or badly on a job, or acted pleasantly or unpleasantly toward us) we tend to attribute their actions to their own inclinations or stable personality characteristics. But when we are analyzing our own actions, we are more likely to attribute the same actions to the situations we found ourselves in.

The reason for the actor-observer error is that when we are remembering our own actions, we have information at our disposal about what stresses we were under, say, or what contingencies we had to deal with. But we don’t have as much information available about another person’s stresses and contingencies. This is more true if the person is a stranger than a friend, and more true if the person is unlike us than like us.

Yet the actor-observer error can be reduced by controlled effort. Psychologist Michael Storms asked subjects to engage in a short, unstructured conversation; later he videotaped the conversation from two different points of view and asked the subjects to explain their own actions.⁴² The subjects who saw a videotape from the viewpoint of someone else observing them were more likely to attribute their own behavior to their own stable traits than those who saw themselves from their own viewpoint. In other words, the actors could see themselves from the viewpoint of the observer if nudged to do so by the way they saw the videotape.

The cognitive side of empathy for another person consists of an ability, and effort, to take the other person’s perspective, as in the Storms studies. This is of

course more effortful if the person being empathized with is different from the person doing the empathizing in ways that seem important to that person. The emotional side of empathy consists of feelings of concern for the other person's welfare.

In short, the clinical neuroscience results in patients with frontal lobe damage tell us that to think effectively we need to feel. The experimental psychology results on empathy tell us that to feel effectively, we need to think.

In addition to helping the Tin Woodman and Scarecrow, the wizard gave the Cowardly Lion courage by telling him he had it already. The Cowardly Lion is a metaphor for those of us who fear that we can never solve the world's problems – or more specifically, that we can never bridge the gulf between human emotion and reason.

A Warning and a Hope

Why should we care about abstract things such as our societies' constructs of emotion and reason? We should care about abstract beliefs because they shape our decisions and our actions in ways of which we're not always consciously aware. To the extent that we see two important (and closely interrelated) mental functions as irreconcilable opposites, one or both of those functions are bound to suffer.

Detachment between emotion and reason has contributed to the alienation in modern society. Many social commentators, such as Michael Lerner, Theodore Roszak, and John Saul, have discussed how the last few centuries in the West have been characterized by an ascent of rational, technical values (in Saul's words, a *dictatorship of reason*).⁴³ This resulted from a sense that we have triumphed over superstition and learned to manipulate nature for our benefit. This has led, these authors argue, to devaluing everything spiritual or emotional, which has created the industrialized West's current widespread feeling of meaninglessness while continuing to oppress the Third World.

The warning is about what will happen if we do not learn to believe in the integration of reason and emotion in our own decisions, individually and socially. Too many of us carry around an unconscious bias that the same person cannot both feel deeply and think sensibly at the same time. In my country at least, there is a strain of anti-intellectualism that regards anyone dealing with issues thoughtfully as a snob or not down to earth. Too many political candidates who have made sensible policy statements have been thought of as "not someone you would feel comfortable drinking a beer with" – or, even worse, as Tin Woodmen without a heart. At the same time, there is a strain of belief that anybody who is sympathetic and caring, and actively committed to living by that caring, is a "bleeding heart" and unrealistic about the dangers of the real world. At worst, we regard such a person as a Scarecrow without a brain.

What we know about experimental psychology tells us that these unconscious biases are wrong. Not only is it possible to both think and feel, but the functions of feeling and thinking complement each other, and each makes the other more effective. If we cling to the cultural belief that thinking and feeling are opposites, people adversely affected by the results of thought (technological and economic progress) will react emotionally to their misfortunes in ways that may take harmful forms.

The conflict between parts of the Western and Arab worlds, and its fruits in the 2001 Al-Qaeda attacks on New York and Washington and the American invasion of Iraq, bring home these points dramatically. In the Western–Arab conflict as in any other, when the dictatorship of reason thwarts the emotional needs of people in both rich and poor countries, people are susceptible to emotional manipulation by unscrupulous leaders who promise to meet those needs. This spawns terrorism in some countries and a purely military, and socially reactionary, response to terrorism in other countries. Both the terrorists and the counter-terrorists often suspend their critical thinking in destructive ways. The ensuing mentality is depicted, for example, in this description by journalist Arundhati Roy of the outlook of some American soldiers:

On March 21, the day after American and British troops began their ... invasion and occupation of Iraq, an “embedded” CNN correspondent interviewed an American soldier. “I wanna get in there and get my nose dirty,” Private AJ said. “I wanna take revenge for 9/11.”

To be fair to the correspondent, even though he was “embedded” he did sort of weakly suggest that so far there was no real evidence that linked the Iraqi government to the September 11 attacks. Private AJ stuck his teenage tongue out all the way down to the end of his chin. “Yeah, well that stuff’s way over my head,” he said.⁴⁴

The statement by this American soldier is not too different from those of some young Palestinian men who become suicide bombers and say they are doing it to defend their land against Israeli aggressors. The two cultures are very different, of course: some of the suicide bombers are highly educated, and some become heroes in their culture because of its strain of religiously inspired martyrdom. An exploration of these cultural motivations is beyond the scope of this book. What is important here is that in both cultures, and all others, some people are drawn to commit violent acts that may be directed at the wrong targets. And even when the people they attack are those that really did them harm, they lose their ability to empathize with an “enemy” whose motivation may be just as defensive as their own (as in the Israeli–Palestinian case). Such a loss of either critical judgment or empathy is ultimately rooted in the conventional wisdom that disconnects emotion and reason.

As Nazi leader Hermann Goering said when interrogated at the postwar Nuremberg trials, this mentality can take hold easily in either a dictatorship or a democracy:

Of course the people don't want war. But after all, it's the leaders of the country who determine the policy, and it's always a simple matter to drag the people along whether it's a democracy, a fascist dictatorship, or a parliament, or a communist dictatorship. Voice or no voice, the people can always be brought to the bidding of the leaders. That is easy. All you have to do is tell them they are being attacked, and denounce the pacifists for lack of patriotism, and exposing the country to greater danger⁴⁵.

Now for the hope: the common sense that reason and emotion are partners can help us find alternatives to these anti-democratic appeals. Psychology and neuroscience can, to invoke a catchphrase of the 1960s and 1970s, become part of the solution instead of part of the problem. It took many decades for the brain to be well enough understood that the findings of neuroscience could be useful in promoting a broad understanding of human social behavior. But in the Twenty-first Century, enough results in cognitive and behavioral neuroscience have emerged that the field, along with experimental and clinical psychology, can start to inform social policies.

In particular, how can psychology and neuroscience help guide us in reaching people who would otherwise fall to the lure of violent, divisive, or authoritarian movements?

There is no simple answer to this, and if successful it will be a slow process. But what we know about emotion and reason tells us that a successful socially progressive movement has to say more than "It's the Economy, Stupid!"⁴⁶ It must appeal to the pocketbook but not to the pocketbook alone. It must also appeal to people's emotional needs for meaning, for the community, and even for spirituality, without imposing a narrow theocratic understanding based on one particular faith.

When we encounter bigots, attacking them directly is likely to make them dig in their heels and reinforce their bigotry. Rather we should try, if possible, to redefine the issues, to meet the bigots on their own terms, to see what they are trying to accomplish and whether their complaints are partially valid. Sometimes, in fact, "bigot" or "racist" or "sexist" is unfairly used to describe someone who really is not prejudiced but has an agenda of his or her own that's not directly related to the object of prejudice. People interested in social change hurt their own cause by being too quick to use insulting words for such a person.

For instance, several recent off-year elections for the United States Congress and the 2016 election for President were distinguished by the mass movement of white male voters toward the Republican Party, whose candidates were mainly opposed to government social programs designed to help the poor and minorities

and women. Many liberals labeled this voter revolt as “racist” and “sexist,” thereby writing off future support from a large part of the electorate. But the revolt was not really anti-black or anti-woman or anti-gay as much as pro-white-straight-male. As a white heterosexual male who is also a social progressive, I was uncomfortable with parts of the prevailing progressive rhetoric and could empathize with the revolt, though I was not part of it. The liberal rhetoric, in focusing on the needs of blacks, women, and gays, neglected the fact that the majority of straight white men were struggling with economic and spiritual insecurity like everyone else. Because the majority of the rich and powerful are white heterosexual males, some liberals unconsciously acted as if the reverse is true and the majority of white heterosexual males are rich and powerful (an error anyone versed in logic should catch immediately!) Because many white male voters believed that progressives had nothing to offer them, the reactionaries could step into a vacuum that should never have been created in the first place.⁴⁷

These examples come primarily from the politics of the United States, the country I live in and know the best. Yet they illustrate universal themes about human nature and the different aspects of the human psyche and mental functions. They argue, as do the scientific data discussed in the next two chapters, that we need to work with, not against, different cultures, different species, and different tendencies in our own brains and minds. In order to have lasting democracy in society, we need “democracy” within each of our minds. What this means is that our minds include various elements such as emotion, reason, intuition, and instinct, and at our best none of those elements fully rules over the others.

The next chapter looks at what we have learned since the 1960s about brain regions involved in reason, emotion, and instinct and their interrelationships. The chapter after the next looks at laboratory results since the 1950s in human decision-making, human and animal behavior, and other areas of experimental psychology.

Notes

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2

WHAT CAN NEUROSCIENCE TELL US?

Ever since the 1930s, “birdbrain” has been an insult, a word for a stupid person. The general cultural belief is that birds are not terribly intelligent. Neuroscientists in the last century, by and large, supported this belief, noting the absence in birds of the structures of our *cerebral cortex*, the brain’s outer surface, that is responsible for our planning and problem-solving abilities.¹ Non-human mammals, by contrast, have a cerebral cortex even if it’s proportionately smaller than ours.

Yet more recent observations in the natural world and the laboratory have forced greater respect for birds’ intelligence.² Studies of chemical transmission between nerve cells have found that bird brains indeed have an area called the *pallium* that is functionally analogous to mammals’ cerebral cortex, even though it looks very different. This functional similarity eluded earlier scientists because the pallium is not arranged in six layers like our cortex; in the words of psychologist Nicola Clayton, who studies cognition in crows and related birds, “Mammals’ brains are layered like a club sandwich, while birds’ brains are more like a pizza.”³ Also, neurons in bird brains are more densely connected than in mammal brains.

As a consequence, an impressive array of mental capacities has been found in different species of birds, especially in corvids (crows, jays, magpies, and ravens) and in parrots. Caledonian crows make tools out of leaves to retrieve food and pass that skill on to other crows through social learning. African gray parrots learn English-language sounds at a level of knowledge comparable to human grade-school children. And notably for the emotion themes of this book, mother chickens show empathy by a raised heart rate when air is blown on the feathers of their young ones, which the birds find unpleasant.

This excursion into birdlife may seem off the subject of reason versus emotion. But the cultural belief in the superiority of reason over emotion is partly rooted in human chauvinism, or as Carl Sagan once called it, speciesism. We want to

believe that humans are vastly more advanced and better mentally than non-humans (whether animals or machines). The emerging knowledge about bird intelligence is a challenge to our sense of being the uniquely superior species. So is the impressive knowledge that has emerged about the mental capabilities of great apes and monkeys.⁴

Are we humans really a lot smarter than other animals? And in the light of modern advances in neuroscience, was Aristotle right when he said that we can use our rational will to control the emotions we share with other animals?

Humans clearly do have mental capabilities that are unique among animals. Most of our complex cultural organization, our language, our belief systems, and our artistic and scientific achievements are the result of a great expansion of the cerebral cortex compared with any other species.⁵

One clue to what is uniquely human comes from studying which brain regions are proportionately larger in humans than in our closest relatives, the great apes (chimpanzees, bonobos, gorillas, and orangutans). Our brains as a whole are about five times larger than those of apes, and the percentage of brain tissue devoted to the cerebral cortex is about the same in apes and humans. Yet a few specific parts of the cortex are outsized in humans.⁶ Which brain areas are “more human” and what functions do those areas perform?

A cautionary note should be added that the brain’s connections are extremely intricate and hard to unravel. This means that behavioral and cognitive functions are generally not restricted to single brain regions but involve networks of connected regions. Still, there are enough differences in connection patterns between regions that speaking of functions of specific areas is a useful simplification that helps enlighten the brain’s enormous complexity.

One large region that is proportionately larger in humans is the *prefrontal cortex*, the forward part of the frontal lobes (see Figure 2.1(a)). The prefrontal cortex is the part of the brain most involved in planning, decision-making, and complex behavioral control. So it is sometimes regarded as a “rational” area. Yet one large prefrontal subdivision, called the *orbitofrontal cortex* (see Figure 2.1(b)), specializes in processing social and emotional inputs. The messages orbitofrontal cortex receives are not only from the outside world, about whether it is friendly or hostile to us, but also from our own internal organs (“gut feelings”).⁷

Another area that has increased in relative size from apes to humans is the *posterior parietal cortex* (parietal being toward the top of the head; see Figure 2.2). Posterior parietal is involved in space perception and in making and using tools. Yet another is the *insula*, which is one of the evolutionarily oldest parts of the cortex and far removed from the brain surface (see Figure 2.3). The insula has attracted much interest in recent years for its involvement in empathy and in deep feelings.⁸

The take-home message from this anatomy is that compared with other primates, and even more with other mammals, we have expanded mental ability *both*

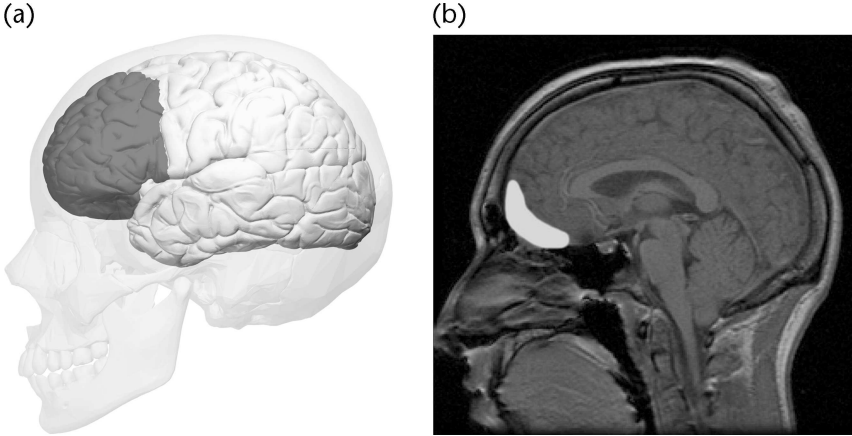


FIGURE 2.1 (a) Location of the prefrontal cortex, in the darker area in front. Credit: “BodyParts3D, © The Database Center for Life Science licensed under CC Attribution-Share Alike 2.1 Japan.” (b) Location of the orbitofrontal cortex, at the base of the prefrontal cortex, in the lighter crescent shaped area. From https://commons.wikimedia.org/wiki/File:MRI_of_orbitofrontal_cortex.jpg

Lobes of the brain

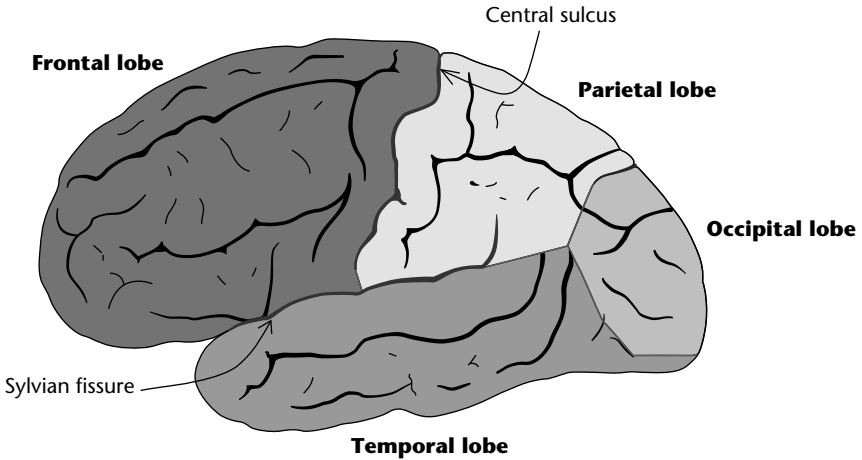


FIGURE 2.2 Location of the parietal cortex (parietal lobe), in grey. Credit: RobinH (https://commons.wikimedia.org/wiki/File:Main_brain_lobes.gif) under GNU Free Documentation License

in reasoning and in emotion. In other words, we are “more rational” than other animals but also “more emotional” than other animals! How is our brain organized to reconcile these two aspects of our mental states? And how do both reason and emotion relate to our instincts?

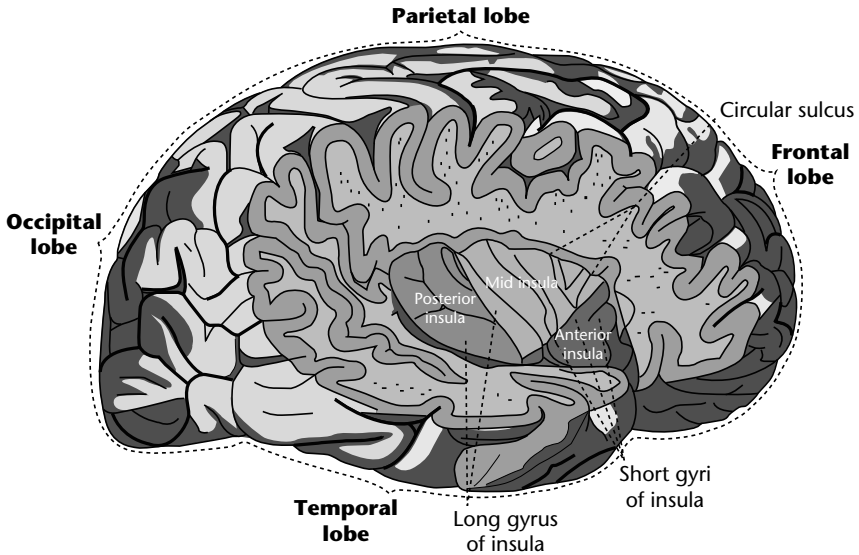


FIGURE 2.3 Location of the insula. From https://en.wikipedia.org/wiki/File:Insula_structure.png

Thoughts, Emotions, and Instincts in the Brain

All animals, including humans, have patterns of behavior that are genetic and hard-wired at birth, although some of them can be modified by learning; we call those genetic behavior patterns instincts. Instincts tend to be unconscious and automatic responses to particular stimuli in the environment.

In the late Nineteenth Century, some scientists influenced by the Enlightenment believed that humans have no need for instincts. William James, one of the scholars who made psychology a true discipline, disagreed.⁹ James took after Charles Darwin, who had published *The Origin of Species* in 1858 and *The Descent of Man* in 1871; both books emphasized our similarities with other animals as much as our differences. In fact, James made instincts one of his three prime categories of mental function along with thoughts and emotions.¹⁰ Instincts, emotions, and thoughts are closely interrelated: for example, he noted that insights on intellectual problems are among the strongest generators of emotions (p. 1090) and that instincts carry with them appropriate emotional reactions.¹¹

James did not have enough known neuroscience at his disposal to tie thoughts, emotions, and instincts into an overall theory of the mind and brain. The task of building such a theory was taken up later by the neuroscientist Paul MacLean, who published between the 1960s and 1990s.¹² Like James—and, of course, Darwin—MacLean emphasized that in evolution the human mind/brain retained a great many processes from other animals but built on top of those processes. Yet he noted some fundamental changes as one ascends the

evolutionary ladder. At the start of this chapter, we saw differences between human brains and those of other mammals. Equally striking are differences in the brain, and in behavior, between mammals and reptiles.

Reptiles do not share with mammals much of the cerebral cortex, the brain's outer surface and the most complex part. Yet they do share many of the brain structures we have at deeper levels. These structures enable reptiles to engage in many of the common behavior patterns also found in mammals, including humans. Lizards, for example, have been documented to establish and defend territory; to assume ritual postures of domination and surrender; to forage, hunt, and hoard food; to form social groups and social hierarchies; to greet and groom one another; and to engage in courtship, mating, and breeding.¹³

Yet some aspects of behavior common in mammals are noticeably absent from that list of lizard behaviors. One of these is parental care. While reptiles typically spend efforts to tend and hatch their eggs before the birth of their young, many species of reptiles leave their young largely on their own after birth. Crocodiles take good care of their young, but they are an exception. More typical are Komodo dragons, the largest known lizards, who abandon their young and occasionally even cannibalize them.¹⁴

Caring parenting and other forms of bonding are the product of brain changes from reptiles to mammals. Bonding depends on two brain areas called the *thalamus* and the *cingulate cortex* which are part of the neural pathways for expression of

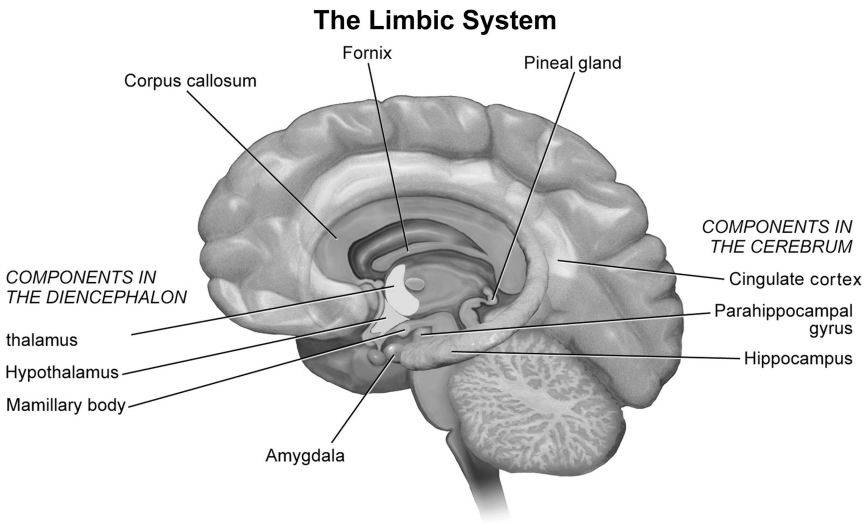


FIGURE 2.4 The limbic system, including many of the regions involved in emotional expression. Adapted from Blausen.com staff (2014). “Medical gallery of Blausen Medical 2014.” *WikiJournal of Medicine*1 (2). DOI: 10.15347/wjm/2014.010. ISSN 2002–4436

emotions (see Figure 2.4). These brain areas exist in reptiles but are less fully developed than in mammals, and some of their connections exist only in mammals.¹⁵

MacLean's observations led him to a theory that he called the *triune brain*. Triune ("three-in-one") means that the human brain consists of three "layers" that arrived at different stages of evolution. At the deepest levels are the brain stem, midbrain, and basal ganglia forming the "reptilian brain," which has changed little from reptiles to other mammals to humans. The reptilian brain is responsible for automatic, instinctive, often routine behavior. Just above the reptilian brain, in MacLean's theory, is the *limbic system*, which is the center of the "old mammalian brain," responsible for emotions such as fear, love, and anger. Finally, at the very top is the cerebral cortex, also called the "new mammalian brain," responsible for our rational strategies and our verbal and intellectual abilities. Figure 2.5 shows a very crude representation of the three layers of MacLean's brain theory.

Since MacLean wrote 30–60 years ago, the reader may ask if his theory still holds up in the light of rapid advances in neuroscience since then. Some details about particular brain regions have changed. For example, the basal ganglia, a major part of MacLean's reptilian brain, includes an area involved in processing emotional rewards (see Figure 2.6 for the location of the basal ganglia). Yet in

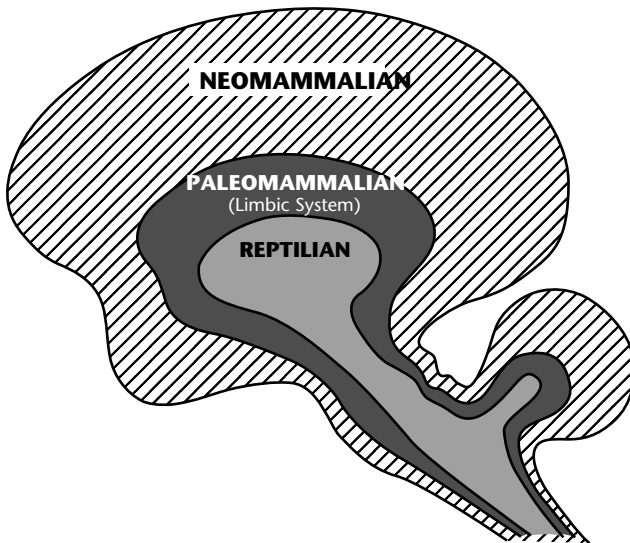


FIGURE 2.5 Three layers of the brain in MacLean's theory. "Paleomammalian and neomammalian" are the same as "old mammalian and new mammalian." Adapted from MacLean, *The Triune Brain in Evolution: Role in Paleocerebral Function*, Plenum, New York, 1990

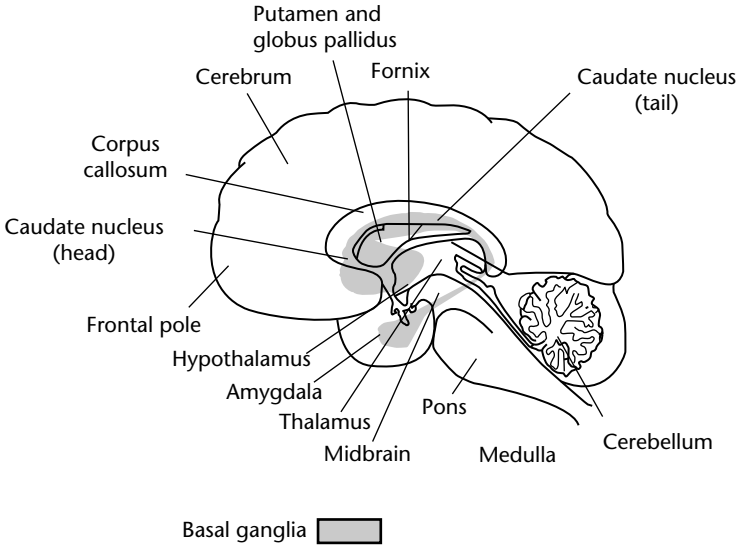


FIGURE 2.6 View of the brain from its mid-section, showing the location of the basal ganglia. (Adapted from Thompson, *Foundations of Physiological Psychology*, Harper & Row, 1967)

support of his earlier insights about the basal ganglia and instincts, that part of the brain is still regarded as important for motor and cognitive habits. Also, the hippocampus, a part of his old mammalian brain, is more involved in memory than in emotion. Yet the hippocampus has many neural connections with a part of the limbic system called the *amygdala* which attaches emotional value to events (see Figure 2.4 for locations of the hippocampus and amygdala).

So the triune brain theory, with some fine-tuning, remains valid as a functional description of the interplay between evolutionarily older and younger processes in the human mind.¹⁶ The triune brain theory yields a picture where emotion and reason are not opposites but more like partners.

In some mental illnesses, there is a disconnect between the parts of the brain responsible for instinct, emotion, and thought.¹⁷ Yet in humans that are not brain-damaged, the development of the prefrontal cortex (see Figure 2.1) and its neural connections with the two lower brain levels enable those three parts to communicate with each other, not perfectly but remarkably well.

The more we know about neuroscience, the less we can cleanly separate brain areas for different functions. So any statement about “the brain region for such and such” has to be taken with a grain of salt. Yet, by and large, recent results have borne out the triune brain theory’s separation of instinct and emotion into different primary brain regions. Automatic, routine, instinctive behavior sometimes carries feelings with it but not always.

Yes, emotion is indeed connected to instinct, but emotion is also connected to cognitive functions, such as attention. The connection between emotion and attention, like other mental functions, has been investigated since the mid-1990s using *functional magnetic resonance imaging*, usually called by its acronym *fMRI*. fMRI uses blood flow to measure electrical activity in specific brain regions while a person inside a scanner is performing some cognitive task or reacting to some stimulus. Early fMRI results showed that the amygdala, the prime brain region for emotional labeling, can become active without conscious attention. For example, amygdala activation can occur in response to fearful faces even when those faces are quickly followed by other visual stimuli, so quickly that the subjects do not consciously remember the fearful faces.¹⁸

But does this mean our amygdala is a wild beast with a life of its own that our conscious mind cannot control at all? No! Luiz Pessoa and his colleagues ran an fMRI study of subjects looking at visual displays with faces in the center.¹⁹ The faces were either fearful, happy, or emotionally neutral, and there were also pairs of colored oriented bars above the faces. The subjects were sometimes cued to attend to the face by being asked whether the face was male or female. At other times, they were cued to attend to the bars by being asked whether the bars were of the same or different orientations. Pessoa and his colleagues found that the amygdala responded more to emotional faces than to neutral faces, as befits an emotional processing region. Yet more surprisingly, for each type of face, amygdala activation was much larger when subjects were attending to the face than when they were attending to the bar.

Pessoa and others found more evidence that the amygdala does not run purely on automatic pilot. Attentional distraction from a complex task can reduce the amygdala's responses to stimuli that have previously been paired with an electric shock. Also, amygdala responses to a fearful face are weaker when the subject thinks of the face as less fearful. People can sometimes consciously control how much fear they feel about a face, and conscious control quiets the amygdala's response.²⁰

The difference between automatic habits and conscious memories is most dramatic in patients with amnesia. In the middle of the last century, many experimental and clinical neuroscientists believed, erroneously, that no single part of the brain was essential because different parts could substitute for one that was damaged. As a consequence, neurosurgeons did not hesitate to cut out whole brain regions if it prevented the spread of an otherwise untreatable epilepsy. The most famous such case was Henry Molaison, better known as H. M., who had his hippocampus and amygdala removed on both sides of the brain.²¹

As a result of H. M.'s operation, his memory was damaged much more severely than his surgeon anticipated. He had essentially perfect memory for events that had happened before the surgery but could not learn about new events after the surgery. The doctor who treated H. M. over several decades was a stranger whenever he entered the room, and H. M. had a repeated emotional reaction to hearing about the death of a favorite uncle.

Yet paradoxically, H. M. could learn unconscious motor skills.²² He was trained for three days on a task where he was asked to draw a line between two stars on a sheet of paper that he only saw through a mirror. Though H. M. did not remember his first training sessions, his accuracy and speed gradually improved over the three days and then stayed at the same levels for almost a year.

Monkeys also show distinctions between habits and memories. Like humans, monkeys learn some things consciously and other things automatically, with different brain areas mainly responsible for the two kinds of learning.²³ Neuroscientist Mortimer Mishkin ran a study of monkeys who were first shown an object (a shoe, plastic gun, toy clock, etc.) and then had to move that object to get food. Then they were shown the object they had seen and a new object, and the food was always placed under the new object. Normal monkeys learned easily to go to whatever object was newer, but monkeys with damage to the hippocampus and amygdala could not learn that task. The same brain-damaged monkeys could, however, learn to get food if the same object was repeatedly associated with food. Mishkin and his colleagues proposed that learning that novelty was rewarding was conscious and required the hippocampus and amygdala, both parts of the old mammalian brain. Learning that the same object was repeatedly rewarded was an unconscious habit, like H. M.'s motor learning, and based in the reptilian brain.

Integration of Emotion and Cognition

The “three brains” responsible for instinct, emotion, and thought are distinguishable systems but interact closely. In humans, the successful function of any of these three subsystems depends on its extensive neural connections with the other two. Now that we have distinguished emotion from instinct, how does the brain integrate emotion and thought?

In the early 1970s, neuroanatomist Walle Nauta discovered that synchronizing emotion and thought depends on the prefrontal cortex (see Figure 2.1(a)). Nauta found that prefrontal is the only region of the cortex with connections to and from the amygdala and hypothalamus, two parts of MacLean's “old mammalian brain.”²⁴ The hypothalamus and amygdala receive signals from internal organs such as the heart, endocrine glands, and digestive system. These connections led Nauta to propose that the frontal lobes integrate information from the traditional five senses with information from the viscera. Later Nauta and other neuroscientists localized these prefrontal visceral connections to the orbitofrontal cortex (see Figure 2.1(b), often known by its acronym *OFC*).

Nauta's work anticipated the more widely known *somatic marker* hypothesis of Antonio Damasio.²⁵ Somatic markers are the feelings we get in our body that precede our decisions and move us to choose one course of action over another. Damasio noted that patients with damage to the amygdala or the *OFC* lack normal somatic markers. Yet there are different deficiencies depending on which

brain region is damaged. Patients with amygdala damage lack these visceral guidelines entirely. Patients with OFC damage, on the other hand, can react viscerally to significant events such as pain after they happened but cannot have, or act on, “gut feelings” about possible events before they occur. People with damage to that brain area have trouble planning: they tend either to become impulsive such as Nineteenth-Century Vermonter Phineas Gage using profanity in public, or else overly deliberate such as Damasio’s patient E. V. R. obsessing endlessly about which restaurant to eat at. Without emotional meaning linked to the body, it’s hard to prefer one course of action over another.

Why do these patients have problems with planning? It is because the OFC provides the link between emotion and thought that enables us to act appropriately in the real world. Part of this link is via the neural connections between OFC and amygdala.²⁶ The OFC connects via the amygdala to the hypothalamus and autonomic nervous system, which are the brain’s gateways to the heart, stomach, intestines, skin, and endocrine glands.²⁷ Since the OFC is also connected to brain representations of sensory events and concepts, the links between OFC and amygdala enable events and concepts to take on emotional meaning.

In the mid-1990s, Damasio and his colleague Antoine Bechara invented a game called the *Iowa Gambling Task* in order to simulate human decision-making in their laboratory.²⁸ In this task, the subject undergoes a sequence of trials whereby he or she must draw a card from one of four decks of cards shown on a computer screen, and each deck yields different gains and losses of play money. Two of these decks look good at the start but turn out to be high-risk. Those decks yield higher short-term payoffs than the other two, but also lead on the average to long-term losses. The other two decks start out with lower short-term payoffs but lead on the average to long-term gains.

The Iowa Gambling Task has been used to compare the decision processes in patients with damage to either the OFC or amygdala and in subjects without brain damage. Bechara, Damasio, and their colleagues found that undamaged subjects begin with selections from one of the risky decks, but gradually begin to shift toward safe decks as the task progresses. On the other hand, patients with damage to either the OFC or amygdala never learn the safe strategy and stick with the risky decks.

All these data show that processing emotionally and socially important events, and using them in making decisions, depends on the interplay between a region on the outer surface of the brain (the OFC) and another region below the surface (the amygdala). The roles of these two regions are subtly different, with the region on the outer surface performing more complex and flexible information processing.²⁹ Yet both “advanced” and “primitive” parts of the brain are required to make good decisions—or to make decisions at all.

These results on OFC–amygdala interactions dramatize the dense interconnection between emotional and cognitive processes. Yet the cultural predilection (dating back to Descartes and arguably to Aristotle) regarding cognition and emotion as separate and opposed to one another has persisted and influenced

the inquiries of some neuroscientists. Some researchers on the frontal lobes in this century still focus on the purely cognitive side of their function, emphasizing a different region than OFC called the *dorsolateral prefrontal cortex* (DLPFC).³⁰ These authors seem to have “exiled” emotional functions to the orbital area and downplayed the role of emotions in our decision-making.

Yet cognition and emotion are ultimately inseparable because cognitive processes include attributing positive or negative emotional values to events, stimuli, and potential actions. Neuroscientist Luiz Pessoa gave considerable evidence against classifying any part of the brain as exclusively “cognitive” or exclusively “emotional.”³¹ For example, he reviewed results showing that not only the “emotional” OFC but also the “cognitive” DLPFC is involved in processing related to emotion. Single neurons in the DLPFC of monkeys are active in response to visual cues that predict the monkey will get a food or drink reward.³² Moreover, some of these neurons react more strongly to a preferred food than to a less preferred food, or more strongly to a larger than a smaller reward.

Likewise, the “emotional” amygdala is important for effective performance of a range of cognitive functions. For a long time, the amygdala was thought of as becoming active in the presence of negative emotions, particularly fear.³³ A behavioral study by Adam Anderson and Elizabeth Phelps showed that the amygdala plays a strong role in selective attention to emotionally negative words.³⁴ Anderson and Phelps studied a phenomenon *attentional blink*, whereby if subjects are asked to respond to one specific stimulus (in this case, a word) and then given a second target stimulus less than a second later, their response to the first target interferes with response to the second target. For normal subjects, this decrease in response to the second target stimulus is small if the second stimulus is an emotionally negative word such as “rape.” However, patients with damage to the amygdala on both sides or just the left-hand side of the brain (the left being the dominant side for language-related functions) did not show this enhanced attention (reduced attentional blink) to negative words.

Yet the amygdala is also involved in positive emotions, for instance, in learning conditioned responses related to feeding.³⁵ Brain imaging studies show the amygdala responds to happy faces, with the response being greatest in the most outgoing people, those who score high on the personality trait of extraversion.³⁶ Also, the amygdala is selectively responsive to inputs that are relevant for current goals, such as processing the social relevance of an emotionally neutral face.³⁷

The somatic marker hypothesis has driven extensive research on interactions between decision-making regions of brain and other bodily organs.³⁸ There is much recent evidence that emotional events expressed in the body can influence decision-making via feedback to the brain. In addition to the amygdala, other emotion-sensitive brain regions such as the insula and anterior cingulate cortex (ACC) respond to differences between actual and desired states of the body and generate behavior that might correct those differences.

System 1 and System 2?

The belief that humans are uniquely ruled by reason over emotion and instinct remained dominant among intellectuals from the Enlightenment to the Victorian era, despite some romantic rebellions. But faith in the ultimate triumph of reason took a gradual beating over the next century. The notion of ultimate rationality partly survived Nineteenth-Century challenges from Darwin, James, and Freud, only to encounter mid-Twentieth Century data by Amos Tversky and Daniel Kahneman on the illogical nature of characteristic human decisions and numerical judgments.³⁹ In 2002, Kahneman won the Nobel Prize in economics, the field in which belief in ultimate human rationality has survived the longest. Tversky would have shared that prize if he had been alive when it was awarded.

We like to think our preferences are solid and do not depend on how our choices are worded. Yet Tversky and Kahneman found that different ways of framing choices can make us change our preferences. In one study, they asked their subjects to imagine an infectious disease expected that would come soon to the United States and was projected to kill 600 people.⁴⁰ One group of subjects was asked to decide between two public health programs: Program A which would save 200 people for sure and Program B which had a 1/3 probability of saving 600 people and a 2/3 probability of saving nobody. A large majority of subjects chose A over B. A different group of subjects was asked to decide between program C where 400 people would die for sure and program D where there was a 2/3 probability than 600 would die and a 1/3 probability that nobody would die. In that case, a large majority of subjects chose D over C. Yet the consequences of C are identical to those of A, and the consequences of D are identical to those of B, so the choices across subjects were logically inconsistent.⁴¹ This result illustrates the importance of whether the choices are framed in terms of gains (people being saved) or losses (people dying).

We also like to think of ourselves as independent beings who are not overly influenced by suggestions. Yet Tversky and Kahneman asked some of their subjects to estimate the percentage of countries in the United Nations that are in Africa.⁴² The subjects were given a number between 0 and 100 determined by the experimenter spinning a wheel of fortune in the subjects' presence, then asked to estimate the percentage by moving the wheel upward or downward from the given number. Subjects who began at 10 percent tended correctly to adjust upward from that value, whereas subjects who began at 65 percent tended correctly to adjust downward. Yet on average, the subjects who started at 65 percent came up with a much higher value than those who started at 10 percent. This result illustrates the power of suggestion by a number brought to mind (an "anchor value") even if that number is logically irrelevant to the quantity being estimated.

Are we humans really that easily swayed by how things are superficially presented? Findings like these led Kahneman to describe human mental processes as consisting of two separate but interacting systems.⁴³ In Kahneman's theory, System 1 is fast, intuitive, and relies on heuristics, which are rules of thumb that do not follow the rules of logic but come easily to mind. System 2 is slow, deliberate, rational, and logically self-consistent. The default in most cases is to use System 1 which is automatic, unless one is somehow cued to invoke System 2 which is effortful. It's System 1 that makes us sensitive to wording and suggestions.

Some writers treat System 1 versus System 2 like the culturally entrenched "emotion versus reason" all over again. Yet the reality of the two systems is more nuanced and subtler than that. First of all, it is unclear how much the heuristics of System 1 are based on emotion and how much on instinct: the theory does not make that distinction. Some heuristics even originate in System 2 as one is learning a new process and deliberating how to perform it, but became automatic after one is experienced at that process.

Also, intuition is not always fast: decisions about whom to marry or where to get an education can be slow and agonizing and yet end up irrationally based. For example, as a college senior, I had to decide among offers of scholarships in mathematics at several graduate schools, all comparable in prestige and in the money they offered. After several months, I had narrowed the choice down to Columbia University or the University of Chicago. Columbia seemed like the rational option because it had more professors working in what was then my field of mathematics. But having lived in the neighborhood of the University of Chicago during childhood and early adolescence, I was intuitively driven there by a "homing instinct" and went to Chicago instead. And logical processes are not always slow: correct simple arithmetic is quick for those who are experienced at it.⁴⁴

The psychologist Wim DeNeys and his colleagues set out to test how illogical humans really are. These researchers asked the question: when we're on automatic and make wrong judgments or inconsistent choices, is our logical system really shut down? Or instead, do we at some semi-conscious level know we're being illogical?⁴⁵ DeNeys along with Oshin Vartanian and Vinod Goel did an fMRI study of subjects who were given a description of a person and asked to estimate the probability of that person being in one or another profession. The description of the person's personality matched a stereotype of one of the professions, but the subjects were also told that the person was drawn from a group that had a certain distribution of people in the two professions. In one example, the subjects were given the following description that matches an engineer stereotype:

Jack is 45 and has four children. He shows no interest in political and social issues and is generally conservative. He likes sailing and mathematical puzzles.

Different groups of subjects were given different distributions of the group Jack was in: 5 engineers and 995 lawyers; 500 engineers and 500 lawyers; or 995 engineers and 5 lawyers. In each case, they were asked whether it was more likely Jack was an engineer or a lawyer. If the group was evenly divided or overwhelmingly engineers, the logical answer was “engineer.” But since a few atypical lawyers do fit the description, in the case where the group was overwhelmingly lawyers, the logical answer was “lawyer.” The heuristic answer, based on the stereotype, was “engineer” in all three cases. DeNeys and his colleagues looked at brain scans of people making that decision and found that making heuristic decisions in the conflict case—engineer stereotype combined with 5 engineers and 995 lawyers—particularly activated the brain area called the ACC (part of the cingulate cortex shown in Figure 2.4). The ACC is part of the emotional pathway, but also is activated by situations where two conflicting behaviors (e.g., heuristic or logical choice) are possible.⁴⁶ In other words, although the response was controlled by System 1, *the brain somehow knew that the answer was not logical!* Even when we are not using much thought, our brains are aware of what does or does not follow logical rules.

DeNeys’ findings of the brain’s secret knowledge should make us more hopeful about human thinking processes. The results suggest that sometimes intellectuals may be too quick to label other people—especially people without a college education—as stupid or intellectually lazy. Often, people who are making a choice that is logically inconsistent or not well thought out have a latent alternative choice that is more reasonable in some sense. In those cases, the right “nudge” from a supportive person or a changed context might bring out the alternative choice.

Dopamine, Wanting, and Liking

Now let us return to the difference between emotion and instinct. Instinct motivates animals to act, whereas emotion is related to animals’ subjective feelings of pleasure or pain. How are the two related? Humans and other animals are motivated to seek pleasure and avoid pain. Yet the pleasure system and the action system are not in perfect sync with each other.

The chemical neurotransmitter substance called dopamine has gained some attention in the popular press for being associated with rewards. Cocaine, amphetamine, caffeine, and many other addictive drugs act by increasing the amount of circulating dopamine in reward-related regions of the basal ganglia. Also, dopamine-producing neurons in the midbrain of monkeys become electrically active when the monkeys unexpectedly receive a food reward like fruit juice.⁴⁷

Yet neuroscientists Kent Berridge and Terry Robinson found evidence that dopamine’s role has little to do with emotional pleasure and more to do with automatically generating reward-seeking behavior.⁴⁸ Berridge and Robinson gave rats chemicals that reduce dopamine levels, including the antipsychotic

haloperidol which is sometimes given to human patients, and examined resulting changes in the rats' behavior. They found that lowering dopamine levels did not reduce the species-typical pleasure reactions from sweet-tasting food. Of course, the rats cannot tell people about their feelings, but neuroscientists have found reliable motor reactions in those animals to sweet-tasting foods such as table sugar—paw linking and tongue protrusions—as well as other reactions to bitter-tasting foods like quinine—gaping, chin rubbing, and rapid headshaking. But the chemicals that lowered dopamine levels did reduce approach both to food and to objects that had been paired with food. These researchers concluded that dopaminergic reward signals are not related to enjoyment, which they called “liking.” Rather, dopamine strengthens what they called “wanting” of a reward, that is, motivation to work for the reward, regardless of any feelings about it.

So where does the brain actually feel pleasure? Further results led to the hypothesis that actual pleasure involves the amygdala and the brain's opioid systems. The disconnect between wanting and liking explains why a drug addict can continue to crave the drug even after his or her pleasure from the drug high is much less than it was when first taken. More generally, it explains compulsions many people have to do things that they do not enjoy. Yet this disconnect also could be a mechanism for persisting in risky projects with deferred or uncertain gratification—which the last chapter of this book argues is a necessary part of positive social change.

Berridge and Robinson's results, like DeNeys', suggest a pro-social message. They suggest that if people are engaged in a behavior that is not helpful for themselves or for society, it does not necessarily mean that they derive pleasure from that behavior. It means that even people who engage in criminal behavior may be better than their worst actions, and able to be useful members of society if relieved of whatever is compelling them to commit crimes. What we and other animals are driven to do is influenced by what we feel but is not the same as what we feel. Berridge and Robinson's work lends further support to replacing the traditional emotion–reason duality by the three-way distinction of reason, emotion, and instinct.

Mirror Neurons, Emotional Empathy, and Cognitive Empathy

An astounding result in the 1990s neuroscience was the discovery by Giacomo Rizzolatti, Vittorio Gallese, and their colleagues of *mirror neurons* in the cerebral cortex of macaque monkeys. These are brain cells that become electrically active *either* when the monkey performs goal-related hand movements or when the monkey observes someone else (either another monkey or a human) performing those same movements.⁴⁹

Naturally, both neuroscientists and social psychologists seized on mirror neurons as a possible mechanism for human empathy toward other people.⁵⁰

Some brain areas have been found that provide “mirrors” not just for motor movements but for specific emotions such as fear and anger—that is, they become active when one feels an emotion or when one notices someone else who seems to be showing that same emotion. And emotional regions of the brain such as the insula are strongly connected to “mirror” areas for movements.

Yet empathy is both emotional and cognitive. Neuroscientists have not yet reached a consensus about which aspect of empathy the mirror neuron system is most involved in. The strongest part of emotional empathy is what is called *contagion*: internally taking on someone else’s feelings, being sad, angry, fearful, disgusted, or happy when another person is. Clearly, contagion is more likely to happen when we are dealing with someone close to us (a family member or close friend) or someone who is similar to us. Cognitive empathy consists of what is called *perspective-taking*: understanding another person’s outlook or situation, and looking at their actions from their point of view. In between contagion and perspective-taking is understanding what another person is feeling, which is a key part of social competence. Some experimental data suggest that the mirror neuron system is more involved in the emotional rather than the cognitive aspects of empathy.⁵¹ Yet other data suggest a “left brain/right brain” difference, with the mirror neurons on the right-hand side relating to emotional empathy and those on the left-hand side relating to cognitive empathy.⁵²

Many other brain regions besides the mirror neuron system are involved in empathy. Cognitive and emotional aspects of empathy seem to involve different brain regions, with a possible overlap in the insula (see Figure 2.3).⁵³ Different mental conditions are likely to involve deficiencies in either cognitive or emotional empathy. For example, it has been suggested (though not shown conclusively) that autism includes a deficit in cognitive but not emotional empathy.⁵⁴ That is, autistic people, especially children, may be emotionally concerned with other people’s feelings but have trouble assessing others’ emotional states accurately. Conversely, sociopaths have been suggested to have a deficit in emotional but not cognitive empathy. Sociopaths tend to be good at understanding others’ emotional states but lack concern for others’ welfare and use their understanding to manipulate others.

The effects of autism and sociopathy remind us that *both* emotional and cognitive empathy are needed for cooperative human relations. Emotional contagion is the most basic form of empathy, and seems to be present in other mammals. The neural systems involved are not well understood but suggest that in evolution we built on emotional contagion to develop the more complex forms of empathy such as understanding others’ emotions and taking others’ perspectives.⁵⁵

Emotional contagion is a useful mechanism for bonding in social groups. Yet it is always easier for each of us to feel with someone who is similar to us than with someone who is different from us, whether in ethnicity, race, religion, political beliefs, profession, or gender. So contagion carries with it the danger of

sharp boundaries between in-groups and out-groups, even in young children.⁵⁶ The hormone oxytocin, originally associated with maternal milk secretion, has long been identified as a key biochemical substance involved in caring emotions and prosocial behavior; it has been called “the cuddle hormone.”⁵⁷ Yet in a study on Dutch subjects in the Netherlands, administration of oxytocin was found to increase trust and empathy toward other Dutch people but increase distrust of foreign Muslims and other non-Dutch groups.⁵⁸

How can we overcome the tendency to distrust those who are unlike us, which is clearly the root of so much prejudice and violence between groups? In this age of increasing contact between diverse groups, the Dutch studies show that we cannot rely solely on easy contagion or oxytocin-induced feel-good states to live together peaceably. We also need cognitive empathy for the more effortful task of taking the perspective of people who are unlike us. If someone else superficially seems to be “other” or “one of Them,” it takes cognitive effort to find what that person has in common with us. An example is an employed middle-class woman who provides for her family and makes the effort to see a homeless man as also providing for his family.⁵⁹

What parts of the brain might be involved in a search for common ground with a person who seems strange or different? That aspect of cognitive empathy requires more nuanced and abstract thinking than we use when we stay within our comfort zone. Recent fMRI studies show that cognitive processing gets more abstract as one moves further forward in the prefrontal cortex.⁶⁰

So I suggest that the furthest forward prefrontal area, sometimes called *frontopolar* cortex, is necessary for cognitive empathy toward other people who are enough unlike us. With those who are more like us, emotional contagion via brain areas such as the insula, ACC, and amygdala can be effective. If we are to live effectively and cooperatively with diverse individuals, each of us needs both our “emotional” and “cognitive” brain systems functioning at peak capacity.

Conclusions: What Do Our Brains Tell Us?

Neuroscience tells us that our brains have evolved to make us both think and feel in more sophisticated ways than other animals. We need social arrangements that fit as well as possible with our biological makeup—that is, arrangements that encourage both reasoning and emotional expression in all of us.

Of course, *excessive* or *inappropriate* emotion can interfere with rational decision-making.⁶¹ When we are deliriously happy, we can be blind to difficulties in our situations. Conversely, when we are depressed we can be blind to the possibility of taking actions that could help us. Yet this is far from saying that emotion is intrinsically anti-reason. In fact, emotion and reason are indispensable partners to each other. The results on patients with OFC damage tell us that to be effectively rational, we must be emotional. And what we

know about the different components of empathy tell us that to be effectively emotional we must be rational.

When we see reason, emotion, and instinct as all playing essential roles, and none of them fully dominating the others, it promotes respect for the whole person. More evidence for partnership between these three parts of our minds comes from behavioral studies discussed in the next chapter.

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3

WHAT CAN PSYCHOLOGY TELL US?

How do you feel when you know you are not telling the truth about what you like and dislike? Clearly, most of us feel guilty when we lie to someone else, knowingly or unknowingly, and it influences them in a harmful way. But would you still feel bad about lying even if it had no effect on anyone else?

In an article published in 1996, a team of experimental psychologists led by Eddie Harmon-Jones set out to answer that question.¹ Harmon-Jones and his colleagues had their subjects drink a liquid that was harmless but tasted bad. They asked these subjects to write on a piece of paper that they had liked the taste of the drink. Inducing people to write something contrary to their own attitudes is a standard technique and had been used in many previous experiments.² But in a new twist, the subjects were asked to throw away the paper on which they had written so that nobody else would be influenced to drink the foul-tasting beverage. Surreptitiously, the experimenters in another room recorded their skin conductance responses and found that the subjects showed signs of negative emotional arousal. Also, a sizable number of subjects changed their mind and decided they had liked the drink in order to be consistent with what they had written.

What these drink tasters experienced was an example of *cognitive dissonance*, a term introduced in the mid-Twentieth Century by Leon Festinger.³ Cognitive dissonance means that a person simultaneously holds at least two opinions or beliefs that are logically or psychologically inconsistent. Festinger said that we find cognitive dissonance uncomfortable and we look for ways to reduce the dissonance. For example, a person may have become a heavy cigarette smoker because they like the taste of a particular brand of cigarettes or finds that smoking reduces tension. If the same person receives new information that smoking is likely to have worse effects on health than they previously thought, they could react in many possible ways. They could change their behavior, by quitting smoking. They could

change their cognition, by denying the health risks of smoking. Or they could accept the new information but still decide that the benefits of smoking outweigh the risks.

Festinger's theory was popular when introduced but later fell out of fashion. The traditional belief in cognition and emotion as separate made it hard for some other psychologists to believe that *cognitive* inconsistency could be *emotionally* uncomfortable. So those psychologists explained away Festinger's findings with a competing theory that cognitive dissonance is only uncomfortable when a person feels guilty about doing things with bad consequences for another person. Examples include telling someone else that a foul drink tasted good or a boring task was interesting.⁴ The Harmon–Jones study and other data refuted that competing theory by showing that inconsistent cognition is emotionally unpleasant even when no harm is done to anyone.

If we take off the blinders of the reason-versus-emotion dogma, distress from cognitive dissonance makes perfect sense. How do you feel when you are lost in an unfamiliar city and what you see with your own eyes does not match what the device you use for directions (whether it's a GPS, Google map, or old-fashioned paper map) says you should be seeing? One of our instincts is to understand and make sense of the world, an instinct which has been given various names by different researchers (drive to comprehend, seeking system, or knowledge instinct).⁵ It is important to understand the world around us in order both to seek the things we need for survival, such as food, and avoid threats to our continued existence. So it figures that inconsistent inputs which make it hard to understand the world should be emotionally unpleasant.

Cognitive dissonance is one of many connections between cognition and emotion. This chapter looks at a few more cognitive-emotional connections found in experimental psychology laboratories.

The Rise and Fall of Drive Reduction Theory

The story is told that as a child, Albert Einstein was late to talk and his parents were worried about his development. Then one day at the dinner table, little Albert burst out: "The soup is too hot!" His parents were greatly relieved and asked him why he hadn't spoken until then. He answered: "Because up to now everything was in order."⁶

Whether or not the Einstein soup story is true, it illustrates a mindset common among intellectuals in the late Nineteenth and early Twentieth Centuries. It was a mindset that "everything should be in order," that the optimal state of being is a calm equilibrium with no strong feelings and nothing to express.

Experimental psychologists at that time favored the idea that behavior was motivated by a search for a calm, emotionless state. They believed that we have basic drives such as hunger, thirst, and sex (as well as acquired drives such as the drive for money) and that we are motivated to reduce our drives by satisfying our needs.⁷

Clark Hull and other psychologists developed the theory that all reward is *drive reduction*. This theory suggests that the most desirable state of being is the absence of drive.

Yet in the 1950s, Fred Sheffield and his colleagues found that rats could be motivated to obtain sweet-tasting substances such as saccharin that had no nutritional value.⁸ This result meant that the animals derived reward from eating something that did not reduce their hunger drive but simply tasted good to them. Sheffield and other colleagues found that male rats were motivated to climb a hurdle to a female in heat in order to engage in brief sexual intercourse without ejaculation; in other words, without reducing their sex drives.⁹

Meanwhile, neuroscientists were finding that “everything wasn’t in order” in the brain. In 1953, James Olds discovered “pleasure centers” in the hypothalamus at the base of the rat brain (see Figure 2.4 from the last chapter).¹⁰ Olds found that if rats could press a lever to electrically stimulate certain parts of the hypothalamus, they preferred this brain stimulation to eating food or having sex. Moreover, the drive for brain stimulation didn’t satiate in the manner of the hunger or sex drives; the rats kept pressing the lever off and on for hours.

Further discoveries suggested that strong drive can sometimes be associated with pleasure rather than pain. While Olds found that one area whose stimulation is pleasurable is the lateral hypothalamus,¹¹ Jose Delgado and Bal Krishnan. Anand found that stimulation of the same area can lead to increased eating.¹² Remember the times you have been on the verge of eating a delicious meal or making love with a desirable partner. The experience was one of high drive combined not with pain but with pleasurable anticipation.

Some pleasure does come from drive reduction but other pleasures come from positive stimulation. Between the 1950s and 1970s, both psychologists and neuroscientists discovered that people and animals need continual stimulation to develop normally.

The Need for Emotional and Cognitive Stimulation

Psychologist Harry Harlow asked why young monkeys needed their mothers.¹³ Was it only because the mothers gave them food and shelter, as the majority of other scientists then believed? Or did the monkeys also need the physical contact their mothers provided? Harlow noted that the attachment of monkeys, like many other animals, to their mothers is lifelong, outlasting their dependence on the mother for food. To investigate their needs, he and his colleagues separated baby monkeys from their mothers at birth and put them in individual cages. Each cage was attached to a separate cage containing two surrogate mothers, one of wire and the other of soft terrycloth (see Figure 3.1). Half of the monkeys received their nourishment (a bottle of milk) from the wire mother and half from the cloth mother. Regardless of which “mother” gave them milk, the monkeys spent much more time with the cloth mother. Also, the monkeys would go to

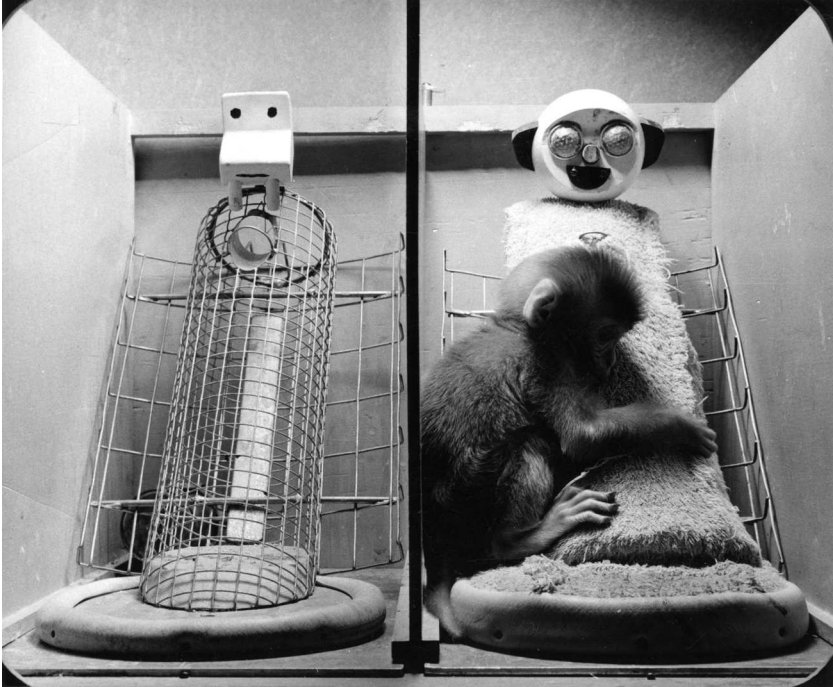


FIGURE 3.1 Wire mother on left, cloth mother on right. From https://commons.wikimedia.org/wiki/File:Natural_of_Love_Wire_and_cloth_mother_surrogates.jpg

the cloth mother whenever they were anxious: the soft contact gave them security. This result showed that in developing animals, the mother's role of providing physical comfort and bodily stimulation is at least as important as her role of providing food and shelter.

Despite the security that the cloth mother gave Harlow's infant monkeys, it did not substitute for a real mother in the long run. Monkeys removed from their mothers did not develop normally into adult life; neither did monkeys deprived of contact with other monkeys in their own age group.¹⁴ Monkeys isolated after birth for six months or more tended to stare fixedly into space, be excessively afraid of other monkeys, and not develop social interactions as adults. Nor did they have normal sexual relationships. Female monkeys who had been isolated had to be artificially inseminated and did not take care of the young that insemination produced.

The same deprivation of contact comfort that was bad for developing monkeys is bad for human children brought up without loving care. For children, adequate food and shelter is no substitute for personal attention (physical, emotional, and cognitive).

42 What Can Psychology Tell Us?

What about children whose parents have died, or else cannot raise them due to circumstances? Before the last half of the last century, it was commonly believed that all children needed to grow up normally was enough nutritious food, clothing, and shelter. Yet at the same time as Harlow was discovering contact and stimulation needs in monkeys, researchers like René Spitz and John Bowlby were proclaiming the same needs in humans,¹⁵ and the reality of children in orphanages supported their claims.

In the latter part of the Twentieth Century, orphans in poor countries were often adopted by parents in affluent areas such as the United States, Canada, and Western Europe. One source of orphan children was Rumania under the Ceausescu dictatorship of the 1980s. As a result of economic problems and harsh social policies, Rumanian orphans had been warehoused in mass facilities that gave them adequate food and shelter but deprived them of sensory stimulation and human contact. In one example:

The environment was characterised by a room of 20–30 silent children ... who spent 20 out of 24 hours in their cribs, often rocking back and forth on their hands and knees, or shifting from foot to foot while standing holding on to their crib railings. ... The walls were not decorated and the children did not have toys of their own. ... The caretaker-to-child ratio for infants and toddlers ranged from 1:10 to 1:20 and the routine was rigid and set to the caretakers' schedule. ... Little interaction took place between caretaker and children at any time. For example, children up to 1½ to 2 years of age received all their food from a propped or self-held bottle.¹⁶

Many adoptive parents were unpleasantly surprised at how far these adopted Rumanian children lagged behind their peers both in cognitive and language skills and in social adjustment. Orphanage children tended to score lower than home-reared children on IQ and other intellectual tests, particularly if they had stayed in the orphanage for more than a year.¹⁷ These children also were more likely to develop behavioral problems such as distractibility, acting out, and indiscriminate friendliness.

The intellectual and behavioral deficits of orphanage children were accompanied by brain abnormalities.¹⁸ As a result of childhood stress, reduced metabolism was found in many key brain regions such as parts of the prefrontal cortex, amygdala, and hippocampus (see Chapter 2).

It is common in institutionally raised children, or children raised at home by neglectful parents, to see emotional problems accompanied by physical ones—including malnutrition even if the children are fed a diet with all the essential nutrients. In particular, the intimate connection between our brains and our endocrine glands often leads in such children to abnormally low height and weight, a condition that scientists Robert Patton and Lytt Gardner called *deprivation dwarfism*.¹⁹ Deprivation dwarfism seems to be explained by abnormal

sleep patterns that inhibit the secretion of growth hormone by the pituitary gland, the gland that is closest and most connected to the brain. Patton and Gardner speculated that this could be a cause of the unusually high death rates of children in orphanages and foundling homes over the last three centuries. In 1915, 90 percent of the infants in Baltimore orphanages died within a year of when they were admitted, despite receiving adequate nourishment and health care.

Arguably, if “everything had been in order” Einstein’s brain would not have developed its immense power! Rather, his brain development like everyone else’s depended on outside stimulation, which is not always orderly. Through the first half of the Twentieth Century, neuroscientists tended to believe that the human brain was hard-wired at birth and that early experience did not affect the responses of specific brain cells. Instead, scientists gradually discovered that deprivation of normal sensory stimulation in the early development of people and animals damaged sensory capacities in the adult brain. In a study published in 1970, Colin Blakemore and Grahame Cooper reared kittens who for several hours a day were restricted to seeing stripes of one orientation, either horizontal or vertical.²⁰ As adult cats, these animals bumped into walls covered by stripes that were of the opposite orientation to what they had seen for several hours as kittens. Those who had looked at horizontal stripes as kittens became blind to vertical stripes, and the other way around. How did this happen? In these cats, the wiring between the retina and the visual part of the cortex had been altered by experience, so that cells in the visual cortex that would normally have coded the missing orientation were rewired to code other orientations instead.

Now it is widely accepted that animals and people need stimulation to develop a normal, let alone a genius, level of intelligence. Stimuli often carry emotions with them. Can experimental psychology tell us how valuable these emotions are for us?

The Value of Positive and Negative Emotions

There is a common belief in Western culture that being “emotional” disrupts reasoning and information processing. This belief has a grain of truth; emotions *can* be strong enough to interfere with solving challenging problems. People who are in the grip of a terrible depression often do not think things out carefully. Neither do people who are madly in love or ecstatic about having just won the lottery.

Yet several psychologists, starting with Alice Isen in the 1970s through the 1990s, have found that milder forms of happy emotions are good for creativity on a range of problems. Isen and her associates induced positive emotions in several ways – showing five minutes of a comedy film, passing out a small bag of candy, and mentioning words that have pleasant meanings.²¹ They found that people in

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a positive mood were better than those in a neutral mood at tasks that required unconventional solutions. One of these tasks asked the subjects how to attach a lighted candle to a wall using only the candle, matches, and a box of tacks. The solution required noticing that the box was not just a container for the tacks but could also be used to hold the candle, and then the box itself could be tacked to the wall. Another task provided the subjects with three unrelated words and asked them to find a fourth word that is somehow related to all three of them. In one example, the three words were “mower,” “atomic,” and “foreign,” and the answer was “power.”

Isen also found that people with induced positive emotions could make more flexible categorizations than people in other moods. If a category was a favorable one, happier people were more likely than others to identify atypical members as part of the category. For example, subjects in a positive mood who were asked to identify which people were nurturers were more likely to include bartenders.

Inducing negative emotions did not have the same effect on creativity. Yet negative emotions have other beneficial effects on our cognitive functions. When we are feeling sad, for example, we are motivated to improve our situation, and this can make us process information from the outside world with more care than we would otherwise.²² For example, a field study of Australian shoppers showed that they remembered more details about the interiors of the shops they went to on cold, rainy days (which tend to induce sad moods) than on warm, sunny days (which tend to induce happy moods). Also, experimental subjects witnessed a staged confrontation and then a week later were asked questions containing misleading information about that confrontation while in either a happy or sad mood. The subjects' memories of the incident were more accurate and less likely to be influenced by the false information if they received the information in a sad mood.

Behavioral scientists regard emotions as evolutionary adaptations that provide us (and other mammals) with some advantages for survival or reproduction or both. Psychologist Robert Plutchik has traced functional roles for each of what he regarded as the basic emotions.²³ Different theorists have different lists of which emotions are basic, but there are six that practically all theorists agree on: joy (or happiness), sadness, fear, anger, disgust, and surprise. The functions Plutchik attributes to these emotions are: for joy, preserving successful behavior patterns and relationships; for sadness, promoting reattachment after losses; for fear, protection against threat; for anger, destruction of obstacles toward attaining goals; for disgust, rejection of potentially harmful objects; and for surprise, orientation to novel situations.

Both positive and negative emotions not only enhance our survival value but make life richer. William Blake captured the value of both happiness and sadness in poetry:

It is right it should be so,
 We were made for joy and woe,
 And when this we rightly know,
 Safely through the world we go
 Joy and woe are woven fine,
 Clothing for the soul divine.
 Under every grief and pine
 Runs a joy with silken twine.²⁴

Optimal Living?

Can the observations of experimental psychologists give any clues on how a person can attain the best possible life and the most happiness? The quest for a definition of the optimal life goes back to antiquity, at least to Aristotle and other ancient Greek philosophers. Among the late Twentieth Century, psychologists who took up the challenge of defining how to live well are Carl Rogers, Abraham Maslow, and Mihaly Csikszentmihalyi.²⁵ Despite differences in details, common threads run through the works of these three authors. All of them stress the ability to cope with unfavorable circumstances and use adversity to create opportunities for themselves. Fittingly for this book, all their depictions of the optimal life include both cognitive engagement and emotional satisfaction.

Rogers and Maslow both talked about the ability to use one's full potential, which Rogers called *the actualizing tendency* and Maslow called *self-actualization*. Their books tend to be long on theory and short on descriptions of actual people. Maslow, in addition, believed that only a small minority of people, about 1 percent, reached full self-actualization, although most people had transient episodes of self-actualization called *peak experiences*. By contrast, Csikszentmihalyi's book is based on direct observation of a large number of people over decades who have reached the state of spontaneity and self-transcending involvement in life that he called *flow*. He regarded flow as a state that is attainable for the average person and observed it in a range of activities including work, sports, hobbies, and personal relationships. His examples of people who had achieved flow in their day-to-day lives include a farm woman in northern Italy and a welder in Chicago.

Csikszentmihalyi said that flow comes from control of one's own consciousness, that is, control of how one interprets and reacts to events in the external world. He described such control as a hard task that engages all of one's mental resources, rational and irrational:

Control over consciousness is not simply a cognitive skill. At least as much as intelligence, it requires the commitment of emotions and will. It is not enough to *know* how to do it; one must *do* it, consistently, in the same way as athletes or musicians who must keep practicing what they know in theory.²⁶

He went on, late in his book, to note that such control requires combatting the mental chaos that is too often our natural state:

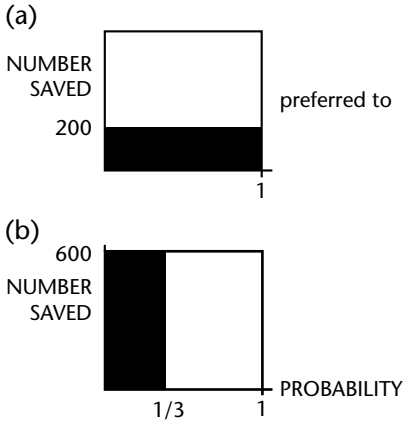
To achieve this control ... requires determination and discipline. Optimal experience is not the result of a hedonistic, lotus-eating approach to life. A relaxed, laissez-faire attitude is not a sufficient defense against chaos. As we have seen from the very beginning, to be able to transform random events into flow, one must develop skills that stretch capacities, that make one become more than what one is.²⁷

There have not been many experimental studies of cognitive aspects of the flow state. Yet from Csikszentmihalyi's description, control of consciousness seems to involve looking at life situations and seeing in them possibilities that are not immediately apparent. On the emotional plane, stretching of capacities includes reinventing adverse events as opportunities for growth. On the cognitive plane, stretching capacities include looking beyond the way information is superficially presented and acting on its broader implications. It means cultivating an expansive attitude that I described elsewhere as "what you get is more than what you see."²⁸

An example of "what you get is more than what you see" comes from the decision-making experiment discussed in Chapter 2. That is the experiment where subjects were asked to decide between two public health programs for combatting a disease expected to kill 600 people.²⁹ Most of one group of subjects preferred saving 200 people for sure to a 1/3 probability of saving 600 people with a 2/3 probability of saving nobody. Most of a different group of subjects preferred 600 dying with a 1/3 probability that nobody would die to 400 people dying for sure. Yet because 200 saved is identical to 400 dying, 600 saved is identical to none dying, and none saved is identical to 600 dying, the choices of the two groups contradicted each other (see Figure 3.2). Amos Tversky and Daniel Kahneman described this result as an effect of framing: the same information is treated differently when framed in terms of gains (which engenders risk avoidance) or losses (which engenders risk-seeking). Yet the person with a high level of conscious control should be better able than the average person to make the transitions between frames and act in a manner that is consistent across frames.

Some computational models of human decision processes include a quantity, varying across decision makers, representing the ability to look beyond the way choices are presented and see unrepresented implications of those choices.³⁰ Computer engineer David Broniatowski and psychologist Valerie Reyna suggested that this type of cognitive expansiveness is related to some variables measured in psychology laboratories.³¹ One of these variables is called *need for cognition* (NFC).³² NFC is defined as the motivation to engage in, and enjoy, activities or problems that require thinking. It correlates positively with traditional intelligence measures but is not identical to IQ, because some high-IQ

Save 200 for sure or 600 with probability 1/3?



400 die for sure or 600 with probability 2/3?

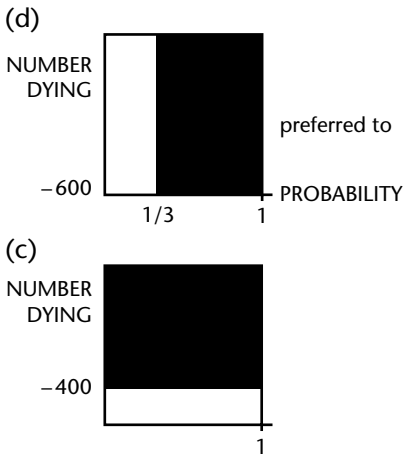


FIGURE 3.2 Schematic of contradictory preferences in the “Asian disease problem” studied by Tversky and Kahneman (*Science*, 1974). Over 70 percent of subjects prefer alternative (a) to alternative (b) and prefer (d) to (c). But (a) and (c) are identical in their consequences, just framed differently, and the same is true for (b) and (d)

individuals lack delight in learning. High-NFC individuals also tend to examine arguments thoroughly for logical validity, whereas low-NFC individuals rely more on superficial criteria such as who made the argument.

NFC promotes a healthy curiosity about real-world as well as artificial problems. If Broniatowski and Reyna are right, NFC also promotes an ability to take a long-term view of rewards and punishments and keep current emotions in perspective.

People with high NFC are more likely than others to follow Rudyard Kipling's poetic exhortation to "deal with triumph and disaster and treat these two impostors just the same."³³

The ability to keep one's own emotions in perspective is part of the facility of *emotional intelligence* studied by psychologists John Mayer, David Caruso, and Peter Salovey.³⁴ Emotional intelligence also encompasses an ability to assess and reason about other people's emotions. These capacities are detailed in the next section.

Emotional Intelligence

Educators increasingly recognize that teaching intellectual subjects in schools is not enough to prepare students for adult responsibilities. Learning subject material needs to be supplemented by learning intelligent responses to social situations as well as to one's own feelings. Mayer, Caruso, and Salovey defined emotional intelligence as comprising the ability to make such constructive responses. As these psychologists described it, emotional intelligence combines sophistication about one's own and others' emotions with problem-solving ability:

Emotional intelligence refers to an ability to recognize the meanings of emotions and their relationships, and to reason and problem-solve on the basis of them. Emotional intelligence is involved in the capacity to perceive emotions, assimilate emotion-related feelings, understand the information of those emotions, and manage them.³⁵

In the mid-1990s, emotional intelligence became a buzzword thanks to popularization by the scientific journalist Daniel Goleman.³⁶ Yet the psychologists who had defined the term criticized Goleman for expanding the concept of emotional intelligence far beyond the original definition.³⁷ Revealingly, Goleman's account also deemphasized the reasoning part of emotional intelligence, reinforcing the myth of emotion and reason as separate. Part of his capsule description of the concept was:

Emotional intelligence is a broad description of an individual's functioning or character that includes abilities such as being able: (i) to motivate oneself, (ii) to persist in the face of frustrations, (iii) to control impulses, (vi) to delay gratifications, (vii) to regulate moods, (viii) to keep distress from swamping the ability to think, (ix) to empathize, and (x) to hope.³⁸

Goleman further elaborated that emotional intelligence is vastly different from IQ and is a greater predictor of success in day-to-day life and work. His formulation led to the development of emotional intelligence test banks which included

qualities such as persistence, political savvy, optimism, and self-control – qualities which, as Mayer documented, do not always come together in the same person!³⁹

Mayer, Caruso, and Salovey developed their own test of emotional intelligence which is more internally consistent than Goleman's. Their test consists of questions that fall into four main categories: "perceiving emotions accurately in oneself; using emotions to facilitate thinking; understanding emotions, emotional language, and the signals conveyed by emotions; managing emotions so as to attain specific goals."⁴⁰ People with high emotional intelligence are not overly caught up in what they are feeling at the moment. They are more accurate than other people in predicting how they would feel in response to a future event (such as the outcome of a presidential election in the United States). People with high emotional intelligence also show better social adjustment than those with low emotional intelligence and are less likely to engage in inappropriate aggressive behavior or abuse drugs and alcohol.⁴¹

Passion for Knowledge

The flip side of being intelligent about emotions is being passionate about ideas. This is a passion that should be familiar to anyone who has been involved in a political movement, a book discussion group, or an amateur philosophers' club.

A few psychologists have looked at the curiosity drive and the emotions that come from acquiring new knowledge. These studies have found that different subjects either experienced positive pleasure from the knowledge, or relief from an unpleasant state of intellectual incoherence. The positive pleasure seems to be an example of the "liking" described in the last chapter, and the relief from an unpleasant state to be an example of "wanting."⁴² Leonid Perlovsky, Marie-Claude Bonniot-Cabanac, and Michel Cabanac had their experimental subjects learn answers to general knowledge questions, such as how to bake bread and the meaning of the word "Huguenot." These researchers found that the amount of self-reported pleasure their subjects experienced when reading about factual information was not related to the newness of the information to them, but was closely related to the curiosity they expressed to learn that information.⁴³

Felix Schoeller and Perlovsky found evidence that intellectual knowledge influences *aesthetic emotions*, the type of emotions that result from reactions to literature, art, or music.⁴⁴ Aesthetic emotions from compelling scenes in novels, plays, and movies often find a physiological expression in chills or goosebumps. If a presentation of a dramatic movie scene was preceded by a presentation of information that was intellectually coherent, such as a memorable quote from a philosopher, aesthetic chills were more likely than if no information had been presented. If the scene was preceded by incoherent information, such as a nonsensical sentence, chills were less likely.

Elsewhere I outlined a neural network theory for which brain regions are involved in the pleasure (“liking”) obtained from acquiring new knowledge.⁴⁵ The experience generates aesthetic emotions which are positive feelings like those obtained from primary rewards such as food or sex, but which also engage regions of the cerebral cortex involved in conceptual processing, such as the dorsolateral region of the prefrontal cortex (DLPFC; see Chapter 2). The network theory notes that liking typically involves opiate receptors in the brain, and those opiate receptors are plentiful in the DLPFC.

Advantage of Emotional Events in Attention and Memory

Not all things that we see, hear, touch, taste, and smell are equally memorable to us. We tend, quite naturally, to pay more attention to outside stimuli that have emotional significance for us than stimuli for which our feelings are neutral. If you have witnessed a severely injured person it will stay in your mind more than a random encounter with an average person. A breathtakingly beautiful mountain vista will stay in your mind more than an average walk through your neighborhood.

Consequently, emotional stimuli have an advantage over non-emotional stimuli in the competition for storage in working memory. The advantage of emotional over neutral stimuli has been studied by psychologists through research tools such as the *International Affective Picture System (IAPS)*, a database of images developed at the University of Florida in 1997. IAPS, for example, includes pictures of faces with happy, sad, disgusted, angry, fearful, surprised, and neutral expressions, and pictures of people and animals in exciting, threatening, or neutral situations.⁴⁶ However, the memory advantage is more clear cut for stimuli or events with negative emotional importance, because those events threaten the achievement of our goals, if not our survival.⁴⁷ Results on the memory advantage for events with positive emotional importance are more ambiguous.

Interestingly, the memory bias for positive events is more prominent in older adults (those over 60 years of age) than in younger adults.⁴⁸ Researchers explain this result by noting that older people are aware of the relative shortness of life ahead of them and semi-consciously strive to interpret events in a positive light. In line with the integrative approach of this book, the emotional “positivity bias” is strongest in those older people with the best cognitive control.

Conclusions: Cognition and Emotion Are Part of Each Other

The behavioral findings discussed in this chapter, like the neuroscientific findings from the last chapter, tell us that cognition and emotion are not opposite nor separate but deeply intertwined and dependent on each other. Indeed, one of the most celebrated back-and-forth controversies from the journal *American*

Psychologist points to cognition being embedded in the very fabric of emotion itself, at least in humans.

To lay the groundwork for this controversy, I now review a little history of scientific theories of emotion. Several psychologists in the Nineteenth and Twentieth Centuries sought purely physiological explanations for the basic emotions (happiness, sadness, anger, fear, disgust, and surprise). Yet this search proved frustrating because no tight relationship was found between specific bodily states and specific emotions. Beginning in the 1960s, several cognitive psychologists found results suggesting that for the full experience of emotion, bodily arousal needs to be accompanied by a cognitive label or cognitive appraisal.⁴⁹ For example, Richard Lazarus showed the same gruesome film to different groups of subjects but with different accompanying soundtracks.⁵⁰ One group of subjects was constantly reminded of the harmful consequences of events in the film, while another group was induced to feel an intellectual detachment toward those events. The two groups ended up differing in their emotional reactions to the film, with the subjects who heard the soundtrack about harmful consequences reacting more strongly.

Lazarus' results led him to argue in subsequent articles that cognition was a necessary part of emotion.⁵¹ Yet not all research psychologists accepted Lazarus' view. Robert Zajonc argued instead that humans share basic emotions with other animals and, like other animals, react too quickly to emotional stimuli for cognitive processes to be involved: an example being a rabbit reacting to fear of a snake.⁵² Zajonc argued further that emotions must come before cognition because emotions are inescapable; that is, one can control the expression of emotion but cannot control the feeling itself. Moreover, he noted that emotions are hard to put into words. This led to a spirited exchange in *American Psychologist* over several years between Zajonc and Lazarus which has shaped recent psychologists' views on emotion. Lazarus later argued that even if emotions are outside the control of the conscious mind, they carry within them a meaning; that is, "emotion also includes within it the thoughts and goals that aroused it in the first place."⁵³

Current psychologists have found a middle ground between the positions of Zajonc and Lazarus, viewing emotions as primary and universal evolutionary adaptations but also strongly influenced by cognitive appraisal.⁵⁴ In other words, our feelings are based on our understanding, of our environments, other people, and ourselves.

But it also goes the other way: our understanding is based on our feelings! Recall from Chapter 1 of this book Antonio Damasio's discovery, based in part on his work with frontal lobe-damaged patients, that emotional connections were necessary for effective decision-making.⁵⁵ Stephen Grossberg, a pioneer in computational modeling of behavior using neural networks, introduced a thought experiment outlining the theoretical steps necessary to understand classical conditioning, like Ivan Pavlov's dog learning to salivate to a bell sound that has been

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repeatedly paired with food.⁵⁶ Grossberg noted that “every sensory event has two quite different effects: its *cue* function and its *arousal* or *vigilance* function. The cue function represents the information in the event that selectively guides behavior. The arousal function energizes the behavior ... learning without arousal is not possible.”⁵⁷ Specifically, if a bell has been paired with food that activates an emotional region of the brain, the animal comes to selectively attend to the bell and attach a positive value to it. Emotion and reason are both parts of this simulated animal’s learning process. Emotion tells the animal what it wants (food) and drives it to focus its attention on watching or listening for signals of future food. Reason, combined with memory, tells it *which* of the things it sees or hears are signals of future food.

Grossberg’s discussion supports this book’s contention that treating reason and emotion as opposites is harmful to society:

Actually, the distinction between information, or reason, and energy, or passion, is a very old one that was already embraced by the rationalists ... in their efforts to construct a comprehensive philosophical framework by which to understand human behavior. This distinction has even been a force guiding social policy as in Vienna during the time of Wittgenstein ... where men were supposed to embody the principle of reason, and women the principle of passion that was considered to be destructive of reason. This belief was used to justify various unpleasant social policies. By contrast with the Viennese notion, the thought experiment [of Grossberg’s theory] requires both principles to compute the simplest memories, reasonable or not.⁵⁸

Once again, psychological science supports the notion that emotion and reason are not opposites but partners. The next chapter turns away from science to the history of ideas. The chapter looks at the consequences of treating reason as superior to emotion in various historical eras. It also looks at times of rebellion that sought to reverse this trend by privileging emotion over reason.

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4

THE RULING TIN WOODMAN AND THE SCARECROW REBELLION

We associate human-caused climate change with the current century. But the idea that our activity influences the climate is older than most of us realize. It was argued over a hundred years ago by the Nobel Prize-winning chemist Svante Arrhenius¹ who lived from 1859 to 1927. Scientists' concern for global warming took off in the middle-to-late Twentieth Century. The concern gradually increased and led to increasingly urgent warnings into this century, the best known being the warning by climate scientist James Hansen about the likely dire effects of drilling for oil from the Canadian tar sands.²

The public and politicians found the results on climate change to be emotionally inconvenient,³ leading many to rationalize that there was controversy rather than consensus among scientists studying climate change. Yet this rationalization was not founded in fact. In a 2016 journal article, 16 leading climatologists, environmental scientists, chemists, and psychologists reviewed over 10,000 published research articles on the subject and found that 97 percent supported human-generated global warming.⁴ Moreover, the National Academies of Science in 20 countries have endorsed the same idea.

Yet in the United States, the journalist Joel Achenbach found in 2015 that "LESS THAN HALF (emphasis Achenbach's) of all Americans believe the Earth is warming because humans are burning fossil fuels."⁵ By 2019, the fraction of believers had increased, according to one poll, to 62 percent. This increase over four years could be due to a greater number of people (low-income and minority people especially) having been affected by hurricanes, floods, droughts, or heat waves. It could also be a reaction against the extreme anti-science positions taken by the administration of the then-current President. Either way, the public's skepticism about global warming has decreased but is still too large for comfort. It is disturbing that after decades of

environmental degradation attributable to fossil fuel consumption, almost 40 percent of Americans still do not believe that is happening.

Achenbach found this disbelief in climate change to be part of a pattern of widespread distrust of the pronouncements of scientists. The mistrust of scientists also affects the public's belief in evolution; he cited another poll showing that "A THIRD of Americans believe humans have existed in their present form since time began."⁶ It also contributes to doubts about the efficacy and safety of vaccines.⁷

Achenbach attributed the widespread skepticism about climate change to tribalism. He noted that people tend to line up with the beliefs that are prevalent in their own social circles, in order to continue to have the benefits of group support and membership. In many segments of American society, the prevalent belief is that global warming either doesn't exist or is the result of natural cycles. Yet the same author noted that tribalism also exists among those who *do* believe in human-made climate change. People who are ecologically minded and/or highly educated believe in human causes of global warming less out of reasoned argument than because it is the prevailing, and often passionate, belief in *their* social circles.

The boundary lines between belief groups are more complex for the vaccination issue. The anti-vaxxers include some religious fundamentalists but also include some ecologically minded people who want to keep their lives "natural" and reject invasion of their bodies, or their children's bodies, by foreign substances. Many of these people also reject eating genetically modified foods, despite assurances from scientists that those foods are harmless. Indeed, throughout history, the environmental movement has sometimes been on the side of reason and at other times on the side of emotional reaction against reason.

The lifestyle in the United States and other affluent countries is, of course, heavily dependent on science. The technology which powers our prosperity and the medicine which enables us to live longer than previous generations have their roots in the slow, deliberate, rational processes of gathering scientific evidence. But that does not mean we live in an "age of reason" where rational understanding dominates day-to-day living and decision-making. Instead, the polls about public sentiment show that the current era is subject to the same uneasy interplay between reason and emotion that has characterized eras from the past.

This chapter explores both sides of the counterproductive cultural argument between reason and emotion at various stages of our history.

The Tension between Reason and Sentiment

Average people in most of the world seem to be caught in a continual tense conflict between the Tin Woodman—reason without a heart—and the Scarecrow—feeling without a brain. On a global scale, political scientist Benjamin Barber called these two tendencies *McWorld* and *Jihad*.⁸

McWorld is described as:

... onrushing economic, technological, and ecological forces that demand integration and uniformity and that mesmerize peoples everywhere with fast music, fast computers, and fast food—MTV, Macintosh, and McDonald’s—pressing nations into one homogeneous global theme park, one McWorld tied together by information, entertainment, and commerce.⁹

Overall it is clearly the dominant force in the world, now even more than when Barber first wrote in 1995 or when he added an introduction to his book after the terrorist attacks of 2001. The author notes the roots of McWorld in the Enlightenment of the Eighteenth Century: “its trust in reason, its passion for liberty, and (not unrelated to that passion), its fascination with control, its image of the human mind as a tabula rasa to be written on and thus encoded by governing technical and educational elites, its confidence in the market, its skepticism about faith and habit, and its cosmopolitan disdain for parochial culture.”¹⁰ Yet even though McWorld is the product of rational economic actors, it does not promote the use of reason by the general public. Rather, the “manic logic of global capitalism¹¹” works hard to shape people’s tastes, encourage us all to buy things we may or may not need, and makes us into consumers rather than citizens.

Yet most people feel that something is missing on an emotional level from a world that is homogeneous and tramples on local traditions. This feeling powers a Scarecrow rebellion against the prevailing Tin Woodman, a rebellion that Barber called Jihad. The word “jihad” is Arabic for “struggle” and is associated in the public mind with Islam. Yet Barber intended the word to denote a force that is not specific to the Islamic world but can arise in any culture and takes the form of local or national pride. For example, he discussed the American jihad which tends to be tied to the Christian right wing, to the National Rifle Association, and often to hate groups.¹² The Make America Great Again movement that surfaced in the 2016 election is a clear example of American jihad.

The main concern of Barber’s book was to foster democratic governance and active citizenship by the general public. He noted that both McWorld and Jihad are ultimately hostile to democracy: McWorld because it makes people into passive consumers, Jihad because it reinforces parochial prejudices and inter-group conflicts.¹³ He also noted that McWorld and Jihad, though in constant opposition, depend and feed on each other.

The novelist and historian John Ralston Saul described the prevailing tendencies in the West over the last 300 years as a “dictatorship of reason.”¹⁴ He meant that our political and economic leaders, influenced by Enlightenment thinkers such as Bacon, Descartes, and Voltaire, have elevated reason and efficiency to virtues that govern their action. Yet reason is treated as an

administrative method that is detached from the ends to which it is used. Hence, to our ruling classes, reason is considered good whether it is applied, for example, to advancing human welfare or to killing people. As Saul described the development:

Reason began, abruptly, to separate itself from and to outdistance the other more or less recognized human characteristics—spirit, appetite, faith and emotion, but also intuition, will, and most important, experience.¹⁵

Saul reviewed the work of thinkers in the Seventeenth and Eighteenth Centuries who tried to moderate the growing philosophical trend toward reason—thinkers that included Pascal, Swift, Vico, and Montesquieu.¹⁶ In different ways, these writers warned that in a social context that discouraged normal human emotional needs, those needs would degenerate into sentiment. What Saul meant by sentiment is something close to Barber's Jihad. It has often led to what Saul called "the cult of the Hero," meaning people following authoritarian and harmful charismatic leadership.

The consequences of valuing reason over emotion and common sense, rather than using reason as a partner to emotion and common sense, include over-reliance on experts and reluctance to buck conventional wisdom. Also, like Barber, Saul noted that efficiency is more conducive to an authoritarian outlook than to democracy. Since both of these authors wrote, a prominent example of authoritarian efficiency has been the increasing power of China.¹⁷

Saul closes his book with a recognition that current trends in society have a disruptive effect on our minds. He laments "the narrowing effect of a civilization which seeks automatically to divide through answers when our desperate need is to unify the individual through questions."¹⁸

Hence, working for democracy in our increasingly complex and technologically globalized world is also working for better integrated individuals. The scientific findings reviewed in Chapters 1–3 of this book can help to guide us. Democracy is a societal phenomenon but it requires democratically inclined individuals. Democratically inclined people are neither Tin Woodmen nor Scarecrows but rationally emotional: passionate about ideas (including the idea of democracy itself) and rational in the long-term pursuit of their desires. If we want to promote democracy, we need to recognize that people have needs *both* for material well-being and for community and meaning in their lives.

Reason by itself cannot lead us to a democratic and egalitarian society, because reason is ethically neutral. My original academic training is in mathematics, which is based on the distinction between theorems and axioms. Theorems tell you how to get from Point A to Point B. They are the product of reason. But reason cannot tell you what Point A to start from. In mathematics, the starting points are axioms. In society, the analog of axioms is the set of values by which we want to organize our lives, and those values are mainly derived from emotion and intuition.

How do we reconcile the multiple and paradoxical needs of our mental lives? The consumer and the communitarian in each of us are both the products of subsystems of our minds and brains. Each of our subsystems has a “voice,” and frequently some of the subsystems “argue” with one another. The brain can often arbitrate between different subsystems’ claims. Based on the results discussed in the first three chapters of this book, the frontal lobes, which are sometimes called *the executive of the brain*,¹⁹ seem to be the main “arbitrator.” Because the frontal lobes can communicate with all three parts of the triune brain (the instinctive, emotional, and rational brains), we can (unfortunately we do not always!) make thoughtful decisions that integrate the knowledge of both current rewards *and* preexisting beliefs.

Confusing Emotion with Automaticity

The Tin Woodman mindset that Saul, Barber, and others describe²⁰ regards the emotional part of our nature as “animal” and primitive. Emotions are regarded as arbitrary and capricious feelings that obey no rules and that interfere with an effective solution of real-world problems. That outlook was described in the Seventeenth Century by the Enlightenment French statesman, Cardinal Richelieu:

... man, having been endowed with reason, should do nothing except that which is reasonable, since otherwise he would be acting contrary to his nature ... there is nothing in nature less compatible with reason than emotion.²¹

Richelieu’s statement echoes a tendency in much of Western culture to distrust statements by people who are clearly emotionally upset. When we hear people acting angry or hysterical, we often tell them to “calm down” and not try to process the content of what they say until they are less angry. On the contrary, I have often heard people close to me get emotionally wrought up and make perfect sense at the same time. They want to be listened to, as do I when in the same state.

Moreover, such statements as Richelieu’s equate what is emotional with what is automatic. In Chapter 2, it was noted that neuroscience refutes this equation: emotion and instinct in the brain are interconnected but separate²² and emotional areas of the brain are subject to attentional control.²³

Is this confusion between the emotional and the automatic merely semantic? Is this just a matter of different people having different definitions of the boundaries of what is “emotional”? On the contrary, it is a conceptual confusion with dangerous consequences. If we blur the distinction between what is emotional and what is automatic or instinctual, we can easily fall into demonizing those people we see as more primitive than ourselves. For if someone behaves in a

certain way automatically, almost unthinkingly, in response to difficult life circumstances, we can conclude wrongly that this behavior represents that person's emotional preferences, that they really "wish" to act that way.

Poor people are particularly vulnerable to this kind of putdowns from the more fortunate, sometimes even being told they are happy being poor. As Saul noted about modern American society, "never has such a magnificent elite failed so miserably and done so with such little grace, insisting as it does on blaming the lowest end of the social scale for much of what is wrong."²⁴

When poor people do things that jeopardize their long-term economic prospects, such as relying on predatory payday lenders or missing appointments with social welfare agencies, it is easy to conclude that these people are by nature primitive, uneducable, or lacking in self-reliance. A group of psychologists and experimental economists led by Sendhil Mullainathan and Eldar Shafir has shown that on the contrary, the very fact of scarcity distorts the human decision-making process.²⁵

The picture of poor people's minds that emerges from the work of Mullainathan, Shafir, and their colleagues is not one of people who act on impulse. In some contexts, these researchers found that poor people are *more* deliberate in their economic decisions than better-off people, just because they have fewer resources and must make careful trade-offs between different needs. For example, poor people are more likely than affluent people to remember how much money they spent in a supermarket. And poorer commuters in the Boston area were found to have a more accurate memory than affluent commuters for the fare at which the taximeter in a cab starts to operate – despite the fact that affluent people use cabs more!²⁶

So why do poor people often make decisions that keep them poor? Part of the answer has to do with the lack of availability of resources that could help them, such as public transportation and subsidized child care. Yet just as important is that the poor suffer from cognitive overload, because routine financial decisions for them are fraught with more serious consequences than they are for the better off.²⁷

Amandi Mani, Mullainathan, Shafir, and Jiaying Shao showed the effects of cognitive overload by having both more and less affluent shoppers at a New Jersey mall perform challenging cognitive tasks after viewing scenarios describing financial problems they might face. The scenarios could involve either high or low costs for something necessary, such as fixing their car. One of the cognitive tasks was the Raven's Progressive Matrices, commonly used in IQ tests, which involves filling in a missing slot in a sequence of shapes. Another task involved viewing figures on a screen and needing to press keys on the same side of the screen for some figures but on the opposite side for other figures. The more affluent shoppers showed no difference in performing the cognitive tasks after either high-cost or low-cost scenarios. However, the less affluent shoppers performed significantly worse after a high-cost scenario, though they did as well as the more affluent after a low-cost scenario.

Mani and his colleagues interpreted these results as showing that the scenarios involving large amounts of money taxed the poorer people's cognitive resources, so they had fewer resources left over for the conceptual tasks. These researchers repeated a variant of this experiment with sugar cane farmers in India either before a harvest when the farmers were poorer or after the harvest when they were better off. Consistently with the shopping mall response, the farmers performed worse on the cognitive tasks before the harvest than after.

The work of this team of psychologists and economists makes one see the decisions of poor people as consequences of poverty itself, not of the poor people's deficient character. It leads to a nuanced understanding of the psychology of people at all income levels, not as Tin Woodmen or Scarecrows but as a mixture of the two. Nuanced understanding promotes empathy toward the poor, unlike the rationalist Tin Woodman's understanding which often stigmatizes the poor.

Scarecrow rebellions have not always made the world kinder and gentler either. Two of the best-known rebellions, the Romantic movement starting in the early Nineteenth Century and the counterculture movement starting in the 1960s, had mixed good and bad effects on society. Both of these movements had a great many branches and cross-currents, which this book cannot fully capture without losing its main points. Hence, the next two sections will emphasize selectively those elements of Romanticism and the counterculture that bear on the main theme of the book, the age-old struggle between reason and emotion.

Romanticism

The Romantic Movement started as a reaction by various artists and intellectuals against the extreme rationalism of the Eighteenth Century Enlightenment. The Enlightenment's basic tenets were that all important questions have answers, these answers are in principle knowable, and that answers to different questions must be compatible with one another.²⁸ Furthermore, the way to obtain such answers was the use of both deductive and inductive reasoning, that is, what we now call the scientific method. Yet the thinkers of that day had the confidence that their outlook could be applied to areas of human concern other than science, tending to believe that:

There is no reason why such answers, which after all have produced triumphant results in the worlds of physics and chemistry, should not equally apply to the much more troubled fields of politics, ethics, and aesthetics.²⁹

The Enlightenment in Europe, centered in France, was in large part a reaction to centuries-old restrictions imposed on thought by orthodox Christianity. Ideally, the Enlightenment freed the human mind to pursue truth unfettered by dogma.

Yet if taken to extremes—extremes avoided, in fact, by many of the Eighteenth Century intellectuals—the Enlightenment could be seen as imposing restrictions of its own. With its belief that human nature was everywhere basically the same, and so was the truth, its outlook was often seen as stifling the individual will. The Romantic Movement, starting in Germany, reacted by exalting the indomitable will and heroism. Passion in the service of any ideal, even if the ideal was flawed or morally dubious, was deemed the most praiseworthy of human traits.

Historian Isaiah Berlin traces part of the rise of Romanticism to the revolt of German intellectuals, many of them from humble backgrounds, against the French aristocrats who were key figures in the Enlightenment.³⁰ The German literary movement called *Sturm und Drang*,³¹ which means “storm and stress,” explicitly celebrated subjectivity and raw emotion. Beethoven in music, Goethe in literature, and Fichte in philosophy were some of the major Germanic proponents of Romanticism in their fields. Yet on the negative side, Romanticism also played a part in the rise of German nationalism which culminated in the Nazi rule of the 1930s and 1940s.

The Romantic Movement spread to many other countries besides Germany, based on a distaste for modernizing conformity and a yearning for intense experience and individual heroism. The movement included major English poets such as Wordsworth, Blake, Shelley, and Byron. Some of these poets were reacting to the changes caused by the rapid industrialization of the late 1700s and early 1800s – a parallel to the changes caused by the rapid automation of our own age! They decried the influence of machines that they feared would replace individual creativity by mass homogenization:

This impulse remained alive among artists throughout the nineteenth century, as one after another attempted to substitute for current social attitudes an attitude based on aesthetic, or individual, values rather than on the mass values produced by the machine.³²

Some artists went so far as to express in their works an admiration for earlier ages, such as the medieval, which valued individual heroism and honor. One of the best known was Sir Walter Scott who based *Ivanhoe* in medieval England and several other novels in various eras of Scotland.³³ Scott is often considered the first artist of a genre we now take for granted: the historical novel.

Scott was skeptical about the Enlightenment-spawned myth of progress, the notion that industrialization had made society better, globally, than it had been earlier. Yet paradoxically, he had progressive social attitudes that were advanced not only for the times he wrote about but for his own time. In both *Ivanhoe* and *Rob Roy*, he depicted female characters who were strong, courageous, caring, and independent of male direction – and the strong female character in *Ivanhoe* was Jewish.

The English poets and many other Romantic writers embodied that same paradox, being social egalitarians at heart and despising industrialists for creating a new class of paupers. In England and Germany as well as France, they were caught up in the enthusiastic promises of the French Revolution—a revolution that ironically had been partly inspired by the works of French Enlightenment philosophers. The spirit of that age was captured by the immortal lines of William Wordsworth, reminiscing about the time he had spent in France during the heart of the Revolution:

Bliss was it in that dawn to be alive,
But to be young was very heaven.³⁴

Yet the Romantic exaltation of individual expression was used by other thinkers, artists, and political organizers to foster repression, which was one of the roots of Twentieth Century fascism. Poets like Blake and Shelley believed that the flowering of the individual will was open to everyone—at least to all men, and they had among them feminist writers such as Mary Wollstonecraft who extended it to women. Yet there was also a current within the Romantic Movement that exalted the individual will only of some men who they considered heroic. One of the best-known advocates of this outlook was the ill-tempered Scottish philosopher Thomas Carlyle, who in 1840 wrote:

Worship of a hero is transcendent admiration of a Great Man. I say great men are still admirable; I say there is, at bottom, nothing else admirable!³⁵

Carlyle was influenced by German Romantic writers from earlier in that century, and may in turn have had some influence on Friedrich Nietzsche later in the century and his “Superman” idea.³⁶ These two philosophers are sometimes blamed for spawning fascism by suggesting that it was best for the society that “great men” should dominate everyone else. Yet this suggestion is based on later readers’ interpretation of these authors’ rhetoric that focused on the hero or superman; neither Carlyle nor Nietzsche was clear about the proper role for everyone else. In fact, Carlyle suggested that some of the social revolutions of his time would lead to “the blessedest result preparing itself, not abolition of Hero-Worship, but rather what I would call a whole World of Heroes.”³⁷

Fascism was influenced at least as much by other authors such as the earlier German Romantics who promoted nationalism, the exaltation of the “soul” of their people. The German nationalist spirit was first manifested in the works of the late Eighteenth Century philosopher Johann Herder. Herder said that the expression of the individual self could not be detached from the society and the people in which the individual was embedded so that German ideas and sensibilities were of necessity different from those of any other nation, historical or current.³⁸

This was a sharp contrast to the emphasis on universal laws, both of ethics and of art, by Enlightenment philosophers earlier in that century. Fichte, in the early Nineteenth Century, in addressing the German nation, carried Herder's thought further by glorifying the creativity of the active self and associating that self with the connection to the German *Urvolk* or primal people.³⁹ From the work of these two philosophers, it was a plausible step for other, lesser authors over a century to identify the will of the people with that of a single leader.⁴⁰

Hence, the lasting effects of Romanticism on society have been mixed: different branches of the movement ended up promoting both liberal democracy and fascism. On the plus side, Romanticism provided a needed corrective to the rational, mechanistic emphasis of the Eighteenth Century. In particular, Romantics tied the strength of human will to their glorification of emotion, a contrast with Descartes' idea that will power entails overcoming emotion. In this way, Romanticism captured the way the human brain and mind function more accurately than the rationalism that preceded it.

The rationalists had hoped that the ordered, empirical approach that was starting to be successful in the natural sciences, privileging reason over emotion, would ultimately apply to the arts as well as to social organization and politics. Romantics argued forcefully that the objectivity that was driving the sciences could not be found in the realm of human affairs. As Berlin put it:

This division between where objective truth obtains—in mathematics, physics, in certain regions of common sense—and where objective truth has been compromised—in ethics, aesthetics, and the rest—is new, and has created a new attitude to life ...⁴¹

Hence, ultimately the Romantic Scarecrow rebellion contributed to the reason-emotion split which this book decries.

What did Romantic writers say about science? Some of these writers were actively hostile toward science, and to the technological advancement it enabled. Yet others were hostile only toward science's depersonalization and saw science as beneficial if it is treated as yet another flowering of the human spirit. William Blake, due to the bizarreness of some of his mystical visions, is sometimes thought of as anti-science. Yet it is more accurate to say that he was opposed to the extremes of rationalist philosophy and wished to ground a scientific understanding of the world in experience instead of idle theorizing.⁴² Blake's combination of art, mysticism, and love of nature was found again later in the works of Ralph Waldo Emerson and other mid-Nineteenth Century American Transcendentalists, who had a great influence on liberal religion.⁴³ So the Romantic rebellion also contained the seeds of healing synthesis between emotion and reason.

Counterculture

In the late 1960s and early 1970s, there was a movement in both the United States and Europe that in many ways paralleled the earlier Romantic Movement. Such authors as Theodore Roszak called this movement the *counterculture*,⁴⁴ in that it was an effort to create an alternative culture to that prevailing in the affluent countries. Like Romanticism, the counterculture inveighed against technocracy and depersonalization and celebrated subjective emotional experience. Unlike Romanticism, it was not primarily a movement of artists and intellectuals, although it borrowed inspiration from several published sources including the poetry of Allen Ginsberg, the religious writing of Alan Watts, various sources on Eastern mysticism, the sociology of C. Wright Mills, the neo-Marxism of Herbert Marcuse, the wry commentary of Paul Goodman, and (for the European branch) Existentialist works such as those of Jean-Paul Sartre. Rather, it was a movement of the young, many of them economically privileged but alienated from the ordered society that had made their privilege.

Many of us who were students in the 1960s have fond memories of the political struggles we engaged in then: most notably opposition to American involvement in the Vietnam War, for racial justice at home, and the beginnings of an environmental movement. Yet as Roszak noted, these were inseparable from a larger global struggle at the cultural and personal levels:

... the paramount struggle of our day is against a far more formidable, because far less obvious, opponent, to which I will give the name “the technocracy” – a social form more highly developed in America than in any other society.⁴⁵

In other words, the youth counterculture can be seen as similar to Barber’s jihad and to the Romantic poets’ struggle against mechanization.

The youth revolt embodied in the hippie movement and political protests challenged the cult of the expert. The growth of technocracy argued that basic life decisions were complex and incomprehensible to the average person. Hence, mainstream society felt that major decisions should be entrusted to experts and managers, as argued by the likes of Robert McNamara, Secretary of Defense in the United States during the Vietnam War.⁴⁶ The young did not want to submit to the experts or to the neat, prosperous, cookie-cutter jobs, and suburban family life their parents’ generation had mapped out for them.⁴⁷ They also rebelled, as the Romantics had a century and a half earlier, against the devaluation and denigration of subjective emotional experience, and against the denigration of the arts as not part of the serious business of life.⁴⁸

In reality, the relationship between the counterculture and leftist politics in that period was a complex one. Sometimes the lifestyle revolution accompanied

antiwar or civil rights organizing, but at other times unconventional lifestyles were an escape from the difficulties of organizing.⁴⁹ In fact, as sociologist Todd Gitlin and other authors have described, by the 1970s much of the hippie movement had essentially been co-opted by consumer capitalism.

Still, the 1960s' (and 1970s) combination of personal with political change gave progressive social and political movements a distinct flavor which set them apart from movements of preceding periods such as the 1930s. For better or for worse, they spawned the identity politics, still vibrant today, which promotes pride and self-assertion in marginalized groups including African-Americans, women, and homosexuals. In particular, the women's movement that gained strength during that period interweaves personal conscious raising and critique of the patriarchal family with agitation for gender equality and reproductive justice; notably, one of the slogans of the 1960s' wave of feminism was "the personal is political."⁵⁰

One of the slogans of the political aspect of the 1960s was "participatory democracy." This idea was described in the 1962 manifesto of the Students for a Democratic Society known as the Port Huron Statement.⁵¹ Participatory democracy means "the individual [should] share in those social decisions determining the quality and direction of his (*sic*) life" and "society should be organized to encourage independence in men (*sic*) and provide the media for their common participation."⁵² (Note that these words were written before the dramatic rise of the women's movement and the general trend toward non-sexist language.) Yet if it is made gender-inclusive, the idea captures the sense that people should participate in the decisions that affect their jobs and their communities, and not rely on distant experts or bureaucrats, no matter how benevolent those experts are and how "rational" their analyses.

On a more personal level, the youth counterculture's desire for greater and more authentic emotional expression led naturally to a sexual revolution. This was a period when birth control pills were just becoming widely available. Also, while there were sexually transmitted diseases, the deadly scourge of AIDS had not yet emerged or at least not yet entered the public consciousness. So young people, and more liberated adults, no longer felt constrained by social mores that regarded sex outside marriage as sinful. Many people could not cope with the new sexual freedom, but many others managed to get in and out of romantic relationships with little or no lasting pain.⁵³

The sexual revolution was one part of the 1960s' revolt that drew and continues to draw media attention. The media also give much attention to young hippies' use of illegal drugs: mainly marijuana and psychedelics. Psychedelics are particularly important to the revolt against rationality, as an attempt to transcend normal consciousness and experience the world more deeply and intuitively.⁵⁴ The way had been paved by earlier experiments with mind-expanding drugs by psychologists such as William James and writers such as Aldous Huxley. Yet in the hands of naïve youth, the psychedelic experience too often turned into a

search for cheap thrills, sometimes with serious consequences for their physical or mental health. Moreover, it enriched the coffers of some illicit drug suppliers who, except for their criminality, mirrored the very capitalist establishment the youth hoped to topple.

The flavor of this period has been kept alive too in the songs of iconic artists such as the Beatles, Simon and Garfunkel, Bob Dylan, and many others. So if the Sixties are not remembered for antiwar protests they are remembered for sex, drugs, and rock 'n roll. Yet there was another, more reflective side to the youth movement. There were a substantial number of young people that did not drop out; instead, they prepared to enter professions such as law, medicine, clergy, or academia with the aim of using their professions in support of progressive social goals. For these young people and their radical adult supporters within those professions, the buzzword was *relevance*. This word meant that rather than simply trying to advance their own careers within a competitive framework, it was a high priority for them to make their skills and expertise “relevant” to advancing peace and social justice.

This book, in fact, is a product of my own wish to make science relevant. My father was a research biochemist and I showed early mathematical talent, so I trained to be an academic scientist. But the ethos of the 1960s led me to ask both why politicians often made decisions that were harmful to society and why ordinary citizens often voted in ways that were harmful to their self-interest. The search for answers to those questions led me as a graduate student to connect mathematics to psychology, via the barely (then) emerging field of neural networks, and ultimately to build computational models of human decision-making.⁵⁵

My quest for relevance was fairly typical of a large group of research psychologists and neuroscientists who were seeking in their inquiry to incorporate the whole person, including both rational and emotional elements. As psychology has progressed since the 1960s, it has become more inclusive of the real experience of being human. In the 1960s, behaviorism, with its focus on observable movements and exclusion of unobservable internal states, was just losing its dominance within the psychological research community. Behaviorism was partly supplanted by cognitive psychology, which considered such internal states as memories and beliefs worthy of serious study. In its early stages, the cognitive revolution was closely tied to information processing metaphors from computer science. Yet gradually, the countercultural revolt humanized the field and led cognitive psychologists to include the effect of emotion in their inquiries, as seen in the work discussed in Chapters 2 and 3. Now emotion is a major topic not only in cognitive psychology but also in artificial intelligence and robotics.⁵⁶

Many lawyers, doctors, and clergy people as well as academics have remained true to the “relevance” doctrine throughout their professional lives. Their impact on government policy, particularly in the United States, has been disappointingly small up to now. In the United States, the revolutionary spirit of the 1960s was

followed soon after by a reenergized right-wing, built in part on the fear that the counterculture would lead to a breakdown of morals and family values.⁵⁷ One of the founding documents of this right-wing resurgence was a 1971 memorandum by Supreme Court Justice Lewis Powell, lamenting that too much of the youth were losing faith in the capitalist free enterprise system and if unchecked this tendency could lead us to socialism.⁵⁸ Three Presidents of the United States came from the baby boom generation that were students in the 1960s. Only one of those three, Bill Clinton, can be said to have partially incorporated the countercultural spirit into governance. Yet Clinton combined 1960s' language ("I feel your pain") with some policies that were less than empathetic, such as his tough anti-crime bill that increased the rate of incarceration in the United States.⁵⁹ Other industrialized countries have preserved their progressive social programs better than the United States has but have not moved closer to the revolution that fervent 1960s' activists believed would happen.

Indeed, the technocracy that Barber, Saul, and Roszak lamented has if anything gotten worse since the 1960s. In my younger days, many writers hoped that our understanding of human beings would catch up to the rapid growth of technology. So far the reverse has happened; technology has been on steroids while our understanding of human beings has grown sluggishly. Some authors have even argued that high technology is the true lasting legacy of that period because technological innovators such as Steve Jobs got their start in a hippie environment; in fact, Jobs named the company he founded "Apple" after a period he had spent on a communal farm with an apple orchard.⁶⁰

Yet a few things have lasted from the countercultural rebellion. While the peace, civil rights, and labor movements of the 1960s were holdovers from previous periods, the women's, environmental, and gay rights (or LGBTQ rights as it is now known) movements were largely new at that time and continue to exert influence to the present day. Now large segments of another younger generation, the Millennials, are taking up the cudgel of progressivism. The ethos and language of my current idealistic students give me hope and remind me of us Baby Boomers who were young in the 1960s.

Anyway, the legacy of the counterculture and its attendant social movements supports this book's contention that social change for the benefit of average people comes not from reason triumphing over emotion, but from a partnership between reason and emotion. This lesson has not always been applied in real-world politics. Cognitive linguist George Lakoff and psychologist Drew Westen have both given examples of well-meaning progressive politicians who have tried and failed to win by using logical, factual demonstrations of why people should vote for them. Instead, Lakoff and Westen both argue, and I agree, candidates for high office need to appeal to people's emotional values.⁶¹ Once the appeal to values is made, facts can be invoked to win support for specific policies that bring those values to bear in the public arena.

Lessons of History

Romantic poets seeking deeper experience, affluent youth dropping out of the rat race, and farmers from Kansas to Kurdistan preserving their traditions may not seem to have much in common. Yet all these people teach us similar lessons about human nature. They all tell us that the Scarecrow needs to be nurtured as well as the Tin Woodman. In other words, neither the universe nor human nature is a well-ordered clockwork-like machine. This means that people know instinctively that technological progress, physical health, and availability of material goods are not enough for a rewarding life or for making people content. The saying that “man does not live by bread alone⁶²” (in the old sense of “man” as humanity of both sexes) captures the universal need for at least emotional, if not spiritual, satisfaction beyond material needs.

One overriding lesson from this history is that attempts to improve society by purely rational and technological means will ultimately fail and will provoke a counter-reaction, both from artists and intellectuals and from people as a whole. Desires for meaning, community, emotional pleasure, and depth of experience are just as much built into our brains as are material needs. The counter-reaction can be constructive, bringing people together and making life richer and fuller. Yet the counter-reaction can also be destructive. At the societal level, it can lead to fascism, subservience to manipulative leaders, or ethnocentric tribalism. At the individual level, it can lead to unhealthy sensation-seeking, as in the case of 1960s’ youth on bad drug trips.

Can scientific understanding help us channel the romantic impulse in ways that maximize human welfare? I believe it can, but that will require changing some mindsets that are common in the sciences. It will involve the sciences and humanities and social sciences overcoming their separateness⁶³ and being active and equal partners in the quest for knowledge. This would move us toward what behavioral biologist Edward Wilson called *consilience*⁶⁴ (from the Latin meaning “jumping together”), the unification of different disciplines in a common quest for knowledge. Yet Wilson saw behavioral biology, and its offshoot sociobiology, as the core of this unified quest, giving the human sciences a subsidiary position to the natural sciences. A preferable approach to consilience is that of social scientist Gerald Cory, in which the natural and social sciences and humanities equally influence one another and no discipline is subordinate to any of the others.⁶⁵

Yet there are differences between the humanities and the sciences in their methods of inquiry. Henri Atlan, who is both a biophysicist and a philosopher, identifies two distinct types of rationality: “scientific rationality” that deals with logical conclusions and “mythic rationality” that deals with intuitive meanings.⁶⁶ He notes that the humanities (literature, music, art, and some important philosophical questions) primarily rely on mythic rationality, as opposed to human and

social sciences (including measurable aspects of psychology and sociology) which are closer to the natural sciences and rely on scientific rationality. Insight into difficult problems of human well-being requires an inquiry that moves back and forth between the two ways of thinking, part of the process Atlan calls *inter-criticality* (a rough translation of “intercritique” from his French book title).

The societal problem we are dealing with, which inspired both the Nineteenth Century Romantics and the 1960s counterculture, is lack of meaning and purpose, as Roszak has described:

... this devouring sense of alienation from nature and one’s fellow man—and from one’s own essential self—becomes the endemic anguish of advanced industrial society. The experience of being ... without purpose, continuity, or kinship, is the psychic price we pay for scientific “enlightenment” and technological prowess.⁶⁷

Lack of meaning is one of the main reasons for people often being attracted to, and voting for, leaders who promise them a sense of community but once elected exert tyrannical authority and sow racial, ethnic, and national divisiveness.⁶⁸ Attacking such voters as racists or bigots usually backfires because it does not address these people’s need for meaning. Rather it exacerbates their feeling of alienation, because the people doing the attacking are unconsciously seen as part of the problem.

A fictional example of successful negotiation with a bigot is found in a modern American political novel, *The Wanting of Levine* by Michael Halberstam.⁶⁹ The title character of this novel was a Jew running for President of the United States. A passage in that book recalls an incident long before the campaign when he coveted a piece of land in Vermont that was for sale but was told the owner was anti-Semitic and would never sell to a Jew. After he got there, Levine sized up the situation and realized that the owner was a traditional New England Protestant who valued keeping up the land and house. The owner held a stereotype of Jews as aggressive city people who do not value rural tradition. Levine deliberately violated the stereotype by promising to restore certain nice old parts of the property that had fallen into disrepair. He won the “anti-Semite’s” confidence and the sale was his.

An interesting sidelight of appealing to bigots is: can we appeal to people who are potential dictators, or in other ways potential exploiters of people desperate for meaning, and get them to change their ways? One writer who dealt with this issue was Aldous Huxley in his utopian novel *Island*, where the society as a whole identified such people in childhood and found ways to exploit their talents for the benefit of society.⁷⁰ Yet experimental psychology has begun to study people who exhibit what they call the *Dark Triad*: Machiavellianism, narcissism, and psychopathy.⁷¹ Psychologists have found that these three undesirable traits tend to occur together and that people exhibiting those traits have a fragile self-concept

that requires validation from other people. When we know more about the brain pathways involved in the Dark Triad, it could help us design interventions which can help these people find personal validation in ways that are less socially harmful than their current actions.

But what exactly does “meaning” mean? Is there a scientifically accurate definition of what constitutes a meaningful life, and why some people seem to have such a life in spite of the ills of the larger society and other people do not? Computational neural networks have increasingly been a tool for such systematic understanding of the brain and mind.⁷² These are theoretical networks whose behavior is quantified using the mathematics of *dynamical systems*, which is the study of how interacting variables change over time.⁷³ In particular, there are already many theoretical networks that partially explain how interactions among brain areas engender the types of interactions between cognition and emotion described in the previous two chapters of this book.⁷⁴

Yet none of us working in the field of neural networks has yet characterized what sometimes makes these cognitive–emotional interactions healthy and what sometimes makes them lead to alienation, depression, or dysfunction. This is an inquiry that must be pursued *both* through reasoning and through experience. Increasingly, neuroscientists, experimental psychologists, and theoretical neuropsychologists like me are collaborating with psychoanalysts and other psychotherapists in this inquiry. I am in the early stages of a joint inquiry about the meaning issue with a psychoanalyst in Rio de Janeiro, Ana Maria Aleksandrowicz.⁷⁵ In line with the reason–emotion synthesis, this book advocates, Aleksandrowicz and I speculate that the ideal, meaningful state of the brain–mind system is some combination we cannot yet describe of order and disorder in different parts of the system. It is a state that meets most of our needs: the needs for excitement, delight, and adventure as well as the needs for emotional security, food, shelter, and love.⁷⁶

How do we translate this ideal combination from the level of the individual to that of society? I believe that neither personal nor social change “comes first” but they interact with each other as part of a dynamic system. At the societal level, this state would combine the best of the rationalizing tendency of the Enlightenment with the best of the expressive tendency of Romanticism. John Ralston Saul noted that Voltaire, Diderot, and other Enlightenment philosophers sincerely hoped their passion for reason would bring us to that state. But some of their followers were obsessed with the desire to declare a new age and overthrow everything from the past, leading them to denigrate emotionality and spirituality.⁷⁷ Instead, if this book has an influence on our culture, I hope that it will serve not to break with the past but to synthesize the best elements of both the past and present.

The next two chapters will describe this synthetic approach to society in more detail, and how neuroscience and psychology can contribute to it. That is the “Wizard” who gives the Scarecrow a brain, the Tin Woodman a heart, and the Cowardly Lion courage.

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5

WHERE IS THE WIZARD?

Washing dishes is a stereotypical example of a job that most of us consider mundane and not terribly exalted. The stereotype is dramatized by the American English phrase “dull as dishwater.” In restaurants, the dishwashing jobs are at the low end of the totem pole in an already underpaid profession, and often occupied by undocumented immigrants who cannot obtain better employment.

Yet a study out of Florida State University by Adam Hanley and his colleagues showed that washing dishes can serve as a vehicle for mindfulness meditation.¹ Mindfulness can be defined as “the capacity to purposefully sustain attention on an object ... without attachment to, or pursuit of, transitory cognitive or emotional experiences.”² Hanley and his colleagues assigned to two groups of subjects the tasks of washing dishes in a laboratory, the task duration being equal across both groups. For one group, the experimenters preceded the task with a speech urging them to be mindful of the washing activity; that is, to experience washing dishes as part of the miracle of life and not be thinking about other things they would rather be doing. To the other group, the experimenters simply described the mechanical details of dishwashing and urged them to be thorough in the task.

As a result, the dishwashing experience was different for the two groups of Florida State subjects. The ones who had received a preface focusing on mindfulness scored higher on a questionnaire designed to test the mindful state, showing that the experimental manipulation worked. The mindfulness group also experienced their dishwashing as taking a longer time than did the other group, indicating greater attention to aspects of the dishes and the soap and towels they used. Finally, the mindful subjects came out of the dishwashing episode with slightly higher, although not statistically significant, levels of positive emotion.

The connection between a “mundane” activity such as dishwashing and an “exalted” state such as mindfulness will be surprising to some readers. Yet it fits

with creative efforts from the 1960s/1970s counterculture to apply Zen techniques to other mundane activities, such as taking care of a motorcycle.³

Even more surprisingly, mindfulness itself can be used both for good and for ill. Meditation centered on mindfulness is frequently an effective therapy with benefits for both mental and physical health.⁴ Specifically, mindfulness can help people deal more effectively with their life situations, including any illnesses they might have. As a consequence, mindfulness meditation and related practices can be helpful as well to people trying to better their situation in life and to summon the courage needed to confront oppressors or significant others. Yet mindfulness and similar techniques can also be used by oppressors to control the people they employ or rule.

The journalist Barbara Ehrenreich discussed motivational techniques in the hands of corporations and employers.⁵ In particular, employers use motivational interventions at times of layoffs to distract both the employees who have lost their jobs and those who have to work harder to compensate for a reduced workforce. These techniques are designed to manipulate the employees into feeling personally responsible for their situations instead of criticizing the company. Ehrenreich did not specifically mention mindfulness, but later management researchers reviewed how corporations use mindfulness in the same way that she had described for other motivational interventions.⁶ As one of these researchers described it:

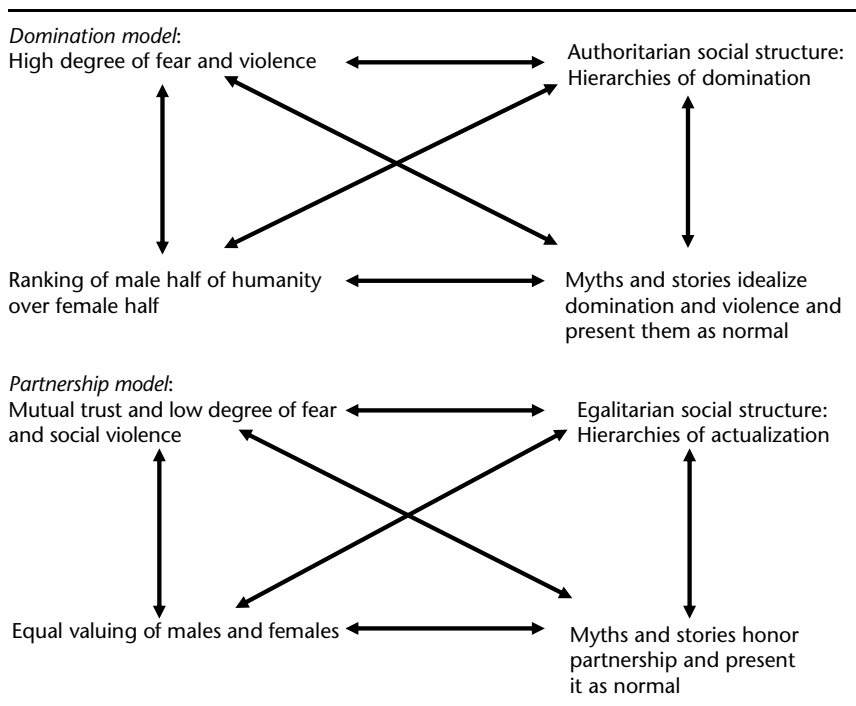
Corporate mindfulness has become the new brand of capitalist spirituality, a disciplined but myopic self-help doctrine, that transfers the risk and responsibility for well-being onto the individual.⁷

Yet another researcher suggests that the same technique could be used more humanely: “one might alternatively conceive and practice mindfulness not only to resist neoliberal governmentality, but also to affirm the lives that it subjugates.”⁸

Dishwashing, too, can be a part of either egalitarian or oppressive social relationships. Washing dishes after a dinner party with friends or a mass meal in a supportive community is far different, emotionally, from working ten hours a day at sub-minimum wages in a restaurant that serves strangers. The take-home message about *both* mindfulness and dishwashing is that almost any activity can be helpful, harmful, or neutral for human relations depending on the context. Judgment of whether an activity is ethical or unethical cannot be made simply from knowing the behavior that activity involves. Rather, such a judgment also requires knowledge of the spirit in which the behavior is performed.

Riane Eisler, a cultural historian and feminist activist, notes that many behaviors can be performed in the context of either *partnership* or *dominator* interactions.⁹ Partnership interactions are those that are based on mutual trust between equals, reinforced by cooperation. Dominator interactions are those that

TABLE 5.1 Interactive dynamics of the partnership and domination models. From the book *The Power of Partnership*. Copyright © 2002 by Riane Eisler. Reprinted with permission of New World Library, Novato, CA, www.newworldlibrary.com



are based on rank orderings between people, and between groups such as men and women, enforced by fear and violence. Table 5.1 shows some interrelated aspects of both the domination and partnership models.

The partnership-dominator distinction is closely tied to the themes of this book. The last chapter suggests that supremacy of either the emotional Scarecrow or the rational Tin Woodman points toward a dominator outlook. This chapter suggests that *the Wizard who allows us to transcend the emotion–reason split is the partnership outlook within each of our minds as well as between people and between social groups.*

Domination and Partnership in the Brain

It is fashionable these days to be cynical about human possibilities, because so many movements to improve the overall human condition seem to have failed. The Enlightenment did not bring the universal light of reason to everyone. Nor did the Romantic Movement bring respect and dignity to all individuals. Nor did socialism lift everyone out of poverty. The list goes on and on. We often say that

human nature is just too competitive, too selfish, for partnership interactions ever to become the norm. As William Shakespeare put it: “The fault, dear Brutus, lies not in our stars, but in ourselves.”¹⁰

Yet a careful reading of world history tells us that the partnership model is as much a part of our makeup as the dominator model. Each of us experiences cognitive dissonance between the two models: we may act competitively because it seems necessary to accomplish our goals, and at the same time, long for more cooperation and trust. The relative strength of the partnership and dominator models varies enormously between societies and between time periods.¹¹ Advances in neuroscience and experimental psychology should enable us to understand better the forces and situations that tend to move us toward one or another of the models in Table 5.1.

Except maybe for extreme sociopaths at one end and extreme saints at the other, most people are capable of participating in either domination or partnership. This means that the same brain mechanisms are capable of participating in both dominator and partnership interactions. This observation leads to three big questions:

1. Are there “switches” somewhere in the brain that move us from domination to partnership, or the reverse?
2. What kinds of influences (from the outside world, our thoughts and feelings, or our bodies) can trigger those switches and thereby cause us to act competitively or cooperatively?
3. What roles do emotion and reason play in the answers to questions (1) and (2)?

Partnership and domination are different solutions for the problem of how to structure social interactions to enhance survival and, at best, quality of life. It seems reasonable to assume that both sets of interactions involve many of the same brain regions, with differences in connectivity between regions or in amounts of circulating chemical neurotransmitter substances.

Riane Eisler and I, in an article published in 2002, developed a qualitative network theory of some of the neural bases for differences between partnership and domination.¹² Our theory, reviewed here, draws on what is known about three characteristic responses to stress, responses that other behavioral scientists have called *fight-or-flight*, *dissociative*, and *tend-and-befriend*.¹³ The biochemical aspects of our theory also draw on animal studies involving two species of rodents that are closely related to each other but radically different in their bonding patterns. As more knowledge has emerged since then on the brain’s involvement in caring and uncaring behaviors, much of our 2002 theory has remained intact with the addition of more brain regions that we did not include earlier.

The fight-or-flight response, first described in the 1930s by the pioneering physiologist Walter Cannon, is an evolutionary adaption to threats.¹⁴ It is an

interacting set of body and brain changes that prepares animals to fight or flee from a danger. The response includes increases in the heart rate, activation of the sympathetic nervous system (the part of the nervous systems that “pumps up” internal organs), and elevations in stress-related chemical substances such as cortisol and norepinephrine.

In most people, the biochemical changes related to fight-or-flight last only slightly longer than the stressful event that triggered those changes. Yet studies by neuropsychologist Bruce Perry and his colleagues show that people who are physically or sexually abused over a long period of time cannot recover fast enough to keep up with new stresses.¹⁵ In children who are chronically abused, if they survive into adulthood, plastic changes in the brain lead to chronically enhanced responses in the fight-or-flight pathways connecting the brain, heart, and endocrine glands. This means the person becomes more likely to get aggressive or flee in response to stimuli that other people would consider minor irritations.

Perry and his co-workers found that while enhanced fight-or-flight is the most common reaction to chronic abuse in male participants, there is a quite different response common in females that they termed dissociative.¹⁶ Dissociation involves freezing rather than fighting or fleeing. Dissociation is often accompanied by depression, fantasy, or daydreaming. It helps account for the withdrawal of some traumatized individuals into addiction to alcohol or drugs. The key neural transmitter for the expression of that pattern is known to be dopamine, the transmitter mainly involved with an approach both to natural positive reinforcers and addictive drugs. Rather than mobilizing the organism toward fighting or another coping response, the dissociative response mobilizes the organism to withdraw emotionally from the current stressful situation and try to “feel good.”

Yet clearly we do not always respond to stress in ways that either lead to aggression or withdrawal. Just as often, we deal with stress by seeking support from, and offering support to, other people. Psychologist Shelley Taylor and her colleagues identified a response they called *tend-and-befriend*.¹⁷ The tend-and-befriend response, mediated by the brain’s oxytocin system, includes both tending offspring and social bonding between females around mutual protection of selves and offspring. Social bonding is manifested in humans by friendship and in animals by mutual grooming.

What about men and male animals? Males have a large amount of another hormone called *vasopressin* which is biochemically similar to oxytocin and is involved in paternal behavior. While the amount of oxytocin is generally greater in females, males also have enough of that substance to use it for tending and befriending. Studies in both sexes of rodents and monkeys show that the binding properties of both hormones in the brain predict the animal’s social patterns. Differences in these binding patterns exist between pairs of closely related species, one of which species is partnership-oriented in Riane Eisler’s terms, whereas the other is dominator-oriented.

Thomas Insel, James Winslow, and their colleagues studied two species of North American mouse-like rodents that are closely related but have a radically different social organization. These species are the prairie vole, which is monogamous with strong male–female pair-bonding and both parents involved in care of young, and the montane vole, which is sexually promiscuous with fathers uninvolved with young.¹⁸ Insel’s laboratory found that oxytocin attaches to receptor molecules in reward-related areas of the brain in the pair-bonding prairie vole but not in the non-bonding montane vole. Also, in female prairie voles, pair-bonding—with the first male they smell after reaching puberty—can be induced by direct injections of oxytocin and abolished by drugs that reduce the amount of oxytocin.

The Eisler–Levine theory of bonding (see Figure 5.1) assumes that brain regions to which oxytocin and vasopressin bind more in the prairie vole than in the montane vole are regions that play roles in bonding (“tend-and-befriend”) behavior. The key area for oxytocin binding is the *nucleus accumbens*, an area rich in dopamine and associated with reward.¹⁹ The key area for vasopressin bonding is the *diagonal band*, which produces the neurotransmitter acetylcholine, involved in selective attention.²⁰ These data suggest complementary roles for the two peptides in bonding, with oxytocin more related to the part of the process that drives behavior via reward, and vasopressin more related to the part of the process that focuses attention on relevant stimuli—in this case, on the opposite-sex vole with which the animal is forming a pair bond. In line with the theme of this book, the interplay between these two hormones could be seen as analogous to the interplay between emotion and cognition.

Vasopressin is particularly related to male aggression in defense of the mate and young, and to paternal care. This has led some researchers to propose a neat gender difference between “female” oxytocin and “male” vasopressin. Yet against strict gender dichotomy, there is evidence that *both hormones* are required for pair-bonding in *both sexes*. Mary Cho and her colleagues found that drugs that block brain receptor molecules for either hormone can abolish pair bonding in either male or female prairie voles.²¹ Taking a poetic leap from voles to humans, this result suggests that successful romantic relationships engage both the traditionally masculine and the traditionally feminine aspects of each partner’s personality!

In primates, Leonard Rosenblum and his colleagues studied two closely related species of macaque monkeys with different social habits.²² Bonnet macaques tend to be outgoing, emotionally stable, and form social bonds, whereas pigtail macaques tend to be emotionally volatile and socially distant. These researchers found that the more social bonnet macaques have higher levels of oxytocin in their cerebrospinal fluid than do the less social pigtail macaques. The bonnets also have lower levels of a substance called *CRF* that is important in the production of the stress-related hormone cortisol. Oxytocin and cortisol tend to inhibit each other’s formation.

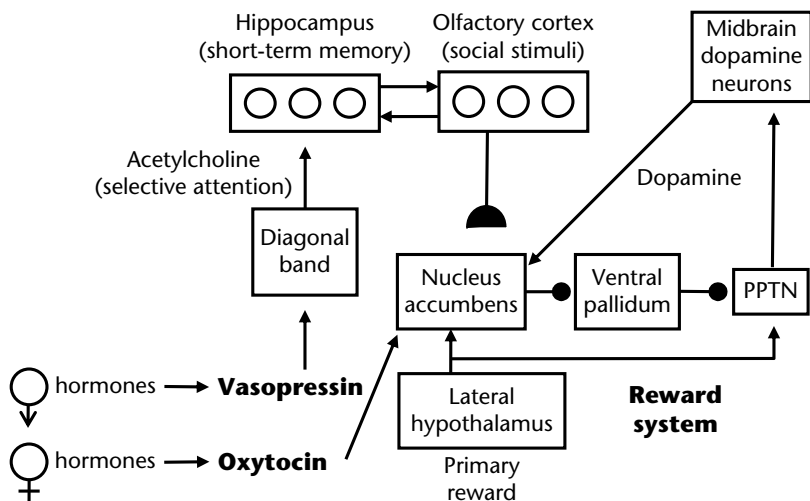


FIGURE 5.1 Proposed network for bonding effects of oxytocin and vasopressin. PPTN is a part of the midbrain. Ventral pallidum is a part of the basal ganglia. Both these areas along with the lateral hypothalamus and nucleus accumbens are part of the neural circuit for processing rewards. Arrows represent excitatory connections; filled circles represent inhibitory connections; semicircles represent modifiable connections. (Reprinted from Eisler and Levine, 2002, with the permission of Kluwer Academic Publishers.)

Oxytocin also tends to promote social bonding in humans of both sexes. For example, Michael Kosfeld and his colleagues found that the administration of oxytocin through the nostrils to men playing a simulated investment game increased their ability to trust their partners.²³ Yet the process of social bonding sometimes means establishing close ties with family, friends, or members of one's own ethnic group at the expense of outsiders who are different from oneself. Carsten De Dreu and his colleagues gave oxytocin to Dutch subjects and found the hormone increased trust only toward other Dutch people and not toward foreign-born Muslims.²⁴ The "cuddle hormone" has been implicated in a variety of social and socializing processes, including conformity with the rules that bind a society together.²⁵

Now let us return to the questions at the start of this section. One of the "switches" proposed in question (1) is the orbital and ventromedial prefrontal cortex (OFC), which has long been regarded as the prime connector between the brain's "emotional" and "cognitive" regions. This is the region that was damaged in the over-impulsive Phineas Gage and in Antonio Damasio's over-deliberate patients.²⁶ Riane Eisler and I proposed as part of our theory that the OFC could mediate gross switches of behavior between fight-or-flight or dissociative modes

with high levels of the stress hormone cortisol and tend-and-befriend modes with high levels of the relaxation hormone oxytocin.²⁷

The OFC plays a special role in our mental lives because it is the part of the cerebral cortex, or outer brain layer, that is most connected with deeper parts of the brain that register emotions and connect to the viscera—the amygdala and hypothalamus (see Chapter 2). In addition, that part of the prefrontal cortex has connections with other parts of the cortex that process the meanings of sensory events. This combination of connections enables the OFC to form and sustain mental linkages between specific sensory events in the environment and positive or negative emotional states.²⁸ This brain area links neural activity patterns in sensory areas of the cerebral cortex that reflect the influence of past sensory events with other neural activity patterns in regions below the cortex that reflect expressions of emotional states.

Eisler and I proposed that the OFC controls the prevalence of large classes of emotionally based responses such as tend-and-befriend, fight-or-flight, and dissociation. This might occur through connections of the OFC with several deeper brain areas. One of them is the *paraventricular nucleus* (PVN), a part of the hypothalamus, which is important for control of endocrine glands. Different parts of the PVN contain the bonding-related hormones oxytocin and vasopressin and the stress-related hormone CRF. How might the OFC “switch” work to control which of these hormones are produced—and therefore which behavioral patterns are enhanced? This is a complex process described crudely in Figure 5.2.

The OFC connects to another part of the hypothalamus called the *dorsomedial hypothalamus* that sends inhibitory signals to the PVN.²⁹ The brain is a complex mixture of excitatory signals that increase electrical activity in an area and

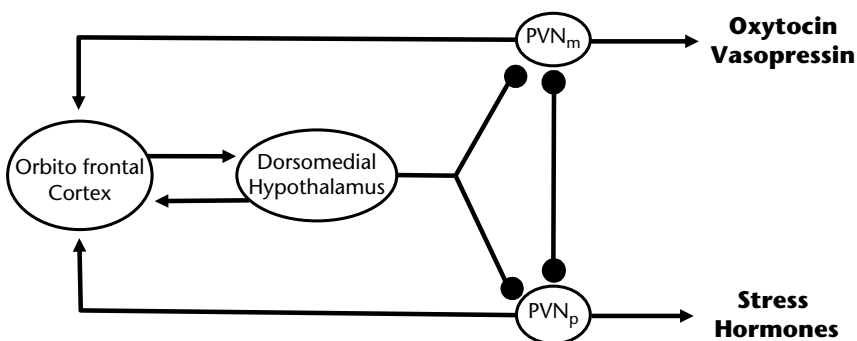


FIGURE 5.2 Part of the stress-regulating interactions between the prefrontal cortex and hypothalamus. Arrows denote excitatory synapses, circles inhibitory ones. PVNp = parvocellular part of paraventricular nucleus, PVNm = magnocellular part. Direct inhibitory connections between the PVN oxytocin and stress hormone systems are suggested but not verified. (Adapted from Eisler and Levine, 2002, with the permission of Kluwer Academic Publishers.)

inhibitory signals that decrease that activity. Sometimes, one area of the brain strengthens the activity of another brain area indirectly, by inhibiting a third area that inhibits it—a process called *disinhibition*. We suggest that at any given time the orbitofrontal cortex sends different strengths of inhibitory signals to the different parts of PVN (called PVN_m and PVN_p) that contain oxytocin or CRF. These signals influence the relative likelihood of oxytocin-mediated (tend-and-befriend) versus cortisol-mediated (fight-or-flight or dissociative) responses. In turn, those two different parts of PVN inhibit each other, so that inhibiting one part disinhibits the other part.

The OFC connections described in Figure 5.2 can also provide a partial answer to Question 2, the influences on the switch. Because the OFC stores the emotional or visceral significance of social memories, the relative strengths of its connections are likely to be influenced by the amount of emotional stress or comfort in the organism's early experiences. In a person who has had a very stressful childhood, because of chronic abuse, a dysfunctional family, or living in a war zone, we suggested that the part of PVN that produces stress hormones is the one that is chronically disinhibited, leading to a greater percentage of either fight-or-flight or dissociative behaviors.³⁰ By contrast, in someone who has grown up prosperous, in a supportive family and a community with a great deal of mutual trust and without drastic economic inequalities, the other part of PVN that produces oxytocin and vasopressin is disinhibited more often, leading to a greater percentage of tend-and-befriend behaviors.

There have not yet been many studies on the prevalence of different brain processes and brain region activities across whole societies. Brain scanning equipment such as fMRI is still expensive: about US\$500 an hour to use at most leading medical research centers, and requiring highly skilled professional technicians to maintain. So at this stage of technology, direct measurement of brain patterns in large numbers of people would be prohibitively expensive. Still, we can speculate that the patterns that drive individual behavioral tendencies will be generally repeated across societies. This means that there is a positive feedback loop between brain function and societal behavior, as there is between brain function and individual behavior. Societal patterns that promote partnership interactions, as shown in Table 5.1, in turn tend to strengthen the brain processes that facilitate partnership interactions. Conversely, societal patterns that promote dominator interactions strengthen the brain processes that facilitate dominator interactions.

Several authors including Riane Eisler, Douglas Fry, and Shelley Taylor document that both present and past societies differ widely in the degree to which they promote partnership versus dominator interactions.³¹ Some of the distinguishing features of the partnership-oriented societies are relative equality of power between women and men; a generous range of social services including paid family leave and daycare for young children; and a lack of wide income differences. Other supporting features of partnership society, and how those

features optimize brain function, are discussed in the next section in the context of fictional utopian societies.

As for question (3), about the role of emotion and reason in promoting partnership, the integrating (“Wizard”) role of the OFC makes it clear that partnership between people includes a partnership between emotion and reason within each person.³² A more just, democratic, and cooperative society requires people who are in touch with their own feelings, doing what they enjoy, and considerate of each other’s feelings. Such a society also requires people who think through the best solutions to complex issues about how to organize society and distribute resources.

Utopia in the Brain

Societies that Eisler, Fry, and Taylor list as close to the partnership ethos include the Nordic countries (Norway, Sweden, Denmark, Finland, and Iceland) and Costa Rica. They also include smaller groupings within countries such as the Minangkabau of Indonesia, the Teduray of the Philippines, and the Musuo (also known as Mosuo or Moso) of China.

The Nordic countries come closer to the partnership ideal than any other affluent sovereign nations. Along with the Netherlands, they rank high in measures of national happiness.³³ Fry, an American anthropologist, lived for several years in Finland and was struck by several ways that Finland was unlike the United States.³⁴ One of them was the lack of extreme differences between wealth and poverty. Another was the generosity of social services, particularly health care (an extended hospital stay only cost him the equivalent of US\$150), with taxes steep only for the very wealthy. Finally, he noted that children were rarely physically disciplined by their parents; in fact, spanking had been outlawed there as in the other Nordic countries.

Several novelists have portrayed fictional utopian societies that come even closer to the partnership ideal. Many people regard utopias as separate from, and therefore irrelevant to, the real world. By contrast, as literary scholar Kenneth Roemer argues, utopias are useful as thought experiments for exploring the limits of the possible in real human society.³⁵

In a 2009 article, I divided fictional utopian societies into two categories.³⁶ One category consists of societies that rely heavily on governmental authority or the charismatic influence of an individual: these include the original *Utopia* by Thomas More and the societies created by Edward Bellamy and B. F. Skinner.³⁷ The other category, mainly written in the middle-to-late Twentieth Century, consists of societies that are decentralized and evolved spontaneously across large segments of society.³⁸

My article argued that decentralized utopias are closer to the partnership ideal. The decentralization allows for more individual freedom and agency by average people, despite social programs that take care of everyone’s basic needs.

Moreover, these societies are organized around several principles that are in harmony with the way our individual brains function best.

What features do the various decentralized utopian societies—the societies described in Ernest Callenbach's *Ecotopia*, Aldous Huxley's *Island*, and Marge Piercy's *Woman on the Edge of Time*—have in common? And how can we understand those common features in the languages of neuroscience and experimental psychology?

My 2009 article identified three overarching principles that distinguish the fictional societies of Callenbach, Huxley, and Piercy from many real current and historical societies. One of these principles is increased trust between members of society (see Table 5.1). People in these utopias tend to be transparent about their motives to a wide range of people in a way that most of us are only to close friends and close family members. This book has already discussed the role of the social hormone oxytocin in inducing trust, with the caveat that oxytocin can sometimes promote ethnocentrism instead of universalism. Hence, the broader range of trust, in addition to the emotional connection that oxytocin enhances, also seems to require cognitive processes that involve parts of the brain's frontal and parietal lobes.

The second principle common to these three fictional utopias is community without conformity. That is, people feel strong ties to groups such as extended families, workplaces, or towns, but those ties are not dependent on restrictive social norms, other than the norms of treating one another fairly and avoiding harm. This principle heals the common split between tradition and freedom, in which traditional community and family ties stifle individual initiative whereas free expression leads to alienation and loneliness. Social psychologists Edward Deci and Richard Ryan have identified *relatedness* (sense of belongingness with others) and *autonomy* (ability to integrate our experiences with or sense of self) as basic universal human needs along with *competence* (having some control over our environment).³⁹ How the synthesis between relatedness and autonomy occurs in the brain is still a mystery, but it is bound to involve both cognitive and emotional processes.

The third utopian principle is a sense of delight. The Western religious tradition that considers earthly pleasures as sinful is absent from the societies of these novels. Rather, people live ethically and responsibly while being driven by pleasure rather than duty. In the words of feminist Marilyn French: "if we want to create a world that *can* live together without utter uniformity and totalitarianism, we must gear ourselves to cooperate, must teach our young the pleasures of working/playing together."⁴⁰ Pleasure can come from the satisfaction of basic biological drives such as hunger and sex drives. A more sophisticated pleasure can come from pleasing visual or auditory patterns, as in art or music, or from conceptual knowledge. In the brain, the mechanism for the sophisticated artistic or conceptual pleasures seems to build on the mechanism for the more basic biological pleasures, which involves opioids and possibly the amygdala, with the

addition of parts of the frontal lobes and other parts of the cerebral cortex⁴¹ (see Chapter 3). In addition, pleasure comes from the rewards of positive social connections. This type of delight is not hedonistic self-indulgence. Nor does it interfere with the necessary tasks of reconciling the interests of different people, which are not always pleasant even between friends or loved ones.

The involvement of both cognitive and emotional brain processes means that all three utopian principles (trust without exclusiveness, community without conformity, and delight without indulgence) are part of the Wizard who gives the Tin Woodman a heart and the Scarecrow a brain. They are the pillars of partnership society and they are supported by characteristic features of social organization. These organizational features are not imposed by a central government, although some of them are enhanced by government programs or laws. Rather, they are social mores that have arisen by custom. I suggest that human welfare and mental health could be advanced by moving existing human societies in similar directions.

The customs that support partnership in these fictional utopias include aspects of family life. Child-rearing promotes independence of thought and action, rather than obedience to adult authorities or to religious precepts. Family units are not confined to the nuclear family of father, mother, and children but include other relatives, close friends or coworkers, and sometimes gain or lose members over time.

Other partnership-friendly customs involve the expression of personal opinions and feelings. Emotions are expressed more openly than in most current societies. Accurate transmission of feelings or information is valued more than keeping up appearances of control.

Conflict resolution emphasizes mediation and giving benefits to both sides, rather than one side winning and the other losing. Of course, there are conflicts where one side is seeking to oppress or bully or be somehow cruel to the other side: in a utopian society that cannot be tolerated. Yet in the majority of conflicts, there is some merit to both sides; on occasion, even bullies can be induced to accept some benefit short of the right to bully.

Finally, the way people are regarded tends toward equality rather than hierarchy, even though individual differences are respected. Female and male members of society are equally valued, and women are in leadership roles as much as men. Perhaps the most radical feature of these societies is what I call *democracy of creativity*. Democracy of creativity means that while world-class artists and scientists are honored, amateur productions and exhibitions in those areas are ubiquitous and appreciated. It also means that talented artists and intellectuals participate in the manual work needed to run society, rather than foisting that work on a separate class of slaves as in ancient Athens or the antebellum American South. And it means that creativity is encouraged in mundane jobs such as those of telephone operators or restaurant wait staff.⁴²

I argued in the 2009 article that all each of these features—child-rearing promoting independence, fluid families, emotional openness, mediation of conflicts, gender equality, and democracy of creativity—are closer to how our brains are designed to function than are their opposites. These arguments, based in part on neuroscience and experimental psychology, are summarized here. Yet the experience of real countries tending toward partnership hints that some of these features may be more essential for a partnership orientation than others. Anthropologist Douglas Fry observed that the features of fluid families and emotional openness are absent in Finland: typical Finns are emotionally restrained and tend to live in nuclear families rather than extended families.⁴³ He adds that Finland does share with the fictional societies the features of raising children to be independent, mediating conflicts, gender equality, and fostering creativity at all levels of society.

As for independence-oriented child rearing, we have already noted the importance of early childhood influences, whether emotionally positive or negative, on the adult brain.⁴⁴ So brain development depends heavily on childhood experience. Development of the frontal lobes, the most important brain area for character and morality, is not complete until a person is in her or his mid-20s and depends on adolescent experience as well.⁴⁵ If these influences on moral development emphasize caring about the welfare of other people more than they emphasize adherence to rigid rules, the young are more likely to become caring adults⁴⁶ who can live by flexible rules that promote partnership. Also, critical thinking skills are most likely to last through adult life if those skills are taught early in childhood.

Extended and fluid families also enhance mental development in childhood and adolescence. That is because cognitive psychologists have shown that any skill is typically learned best when it is learned from more than one source.⁴⁷ It follows that exposure to influence from multiple adults should be beneficial to the development of both cognitive and moral skills.

The benefits of emotional openness for brain function are illustrated by results of Antonio Damasio and other neuroscientists and psychologists showing that effective human decision-making requires strong connections between emotion and cognition. Damasio ran tests on several patients whose orbitofrontal cortex was damaged, the area of the frontal lobes that processes emotional and social stimuli.⁴⁸ He found that those patients were terrible decision makers, even if their cognitive abilities were largely intact. The decision-making deficit occurs because lacking emotional involvement in the possible outcome of a decision, the patients have no basis for deciding on one reasonable course of action over another. This finding suggests that social mores that encourage people to be honest in showing their emotions to others enhance the accuracy of communication of all types of information, to the benefit of everyone's cognitive processing.

Mediation of conflicts is beneficial for brain functioning because the people involved in the conflict are not afraid of a severe loss but expect to gain *something*

regardless of the outcome. This means that mediated conflicts are less likely than win-or-lose conflicts to generate destructive levels of cortisol and other stress hormones. While cortisol is useful in responding to emergency situations, chronic high cortisol levels are harmful to both cognitive and emotional functioning, putting strains on the frontal lobe executive system.⁴⁹ In addition to putting strains on executive function in the frontal lobes, chronic or severe stress reduces the flexibility of neural connections in the hippocampus, the brain area most involved in storing new memories, just after the stressful event.⁵⁰ By contrast, successful conflict resolution often generates positive emotions. Mild short-lasting positive emotions can enhance cognitive functioning, leading to greater mental flexibility and creativity. Neuropsychologists explain the effects of positive emotions by a mechanism involving dopamine, the neurotransmitter associated with rewards.⁵¹

Gender equality and strong female roles encourage tend-and-befriend responses to social conflicts.⁵² This reduces chronic levels of cortisol and other stress-related hormones across society (though in healthy people, cortisol still increases temporarily in response to challenges). At the same time, levels of hormones such as oxytocin involved in relaxation and social bonding are elevated. Such an outcome leads to the empowerment of women and the reduction of social stress for both women and men.⁵³ Also, of course, with gender equality there is greater opportunity for women to use their intellectual and social talents for the benefit of society.

Use of mental talents also argues for the democracy of creativity. We know little so far about how the brain reacts to different power relationships. Future developments in social neuroscience are needed to provide theories of differences between societies where everyone is encouraged to be creative but also asked to do menial tasks, versus other societies where a few are creative while the majority do mostly menial tasks. Yet we already know from animal studies that hierarchies of power have direct biochemical effects on the brains of both dominant and subordinate animals. In male vervet monkeys, higher social status causes an increase in the amount of the neural transmitter substance serotonin and vice versa.⁵⁴ Serotonin is one of the commonest neural transmitters, and among its numerous functions are reality testing and mood stabilization; the antidepressants Prozac and Zoloft work by increasing the amount of circulating serotonin in the brain. By analogy from monkeys to humans, decreased serotonin activity could be a mechanism that decreases the mental ability of people in subordinate positions. If that is true, employees in all jobs perform worse when restricted to following orders from management and perform better when allowed to use their independent initiative.

Organizing society to promote partnership interactions involves a mosaic of imaginative and thoughtful approaches to different spheres of life. So the following sections of this chapter look at implications of partnership for religion, psychotherapy, politics, economics, family, and sex. Riane Eisler in 2002 wrote

The Power of Partnership as a practical self-help book but informed, as most self-help books are not, both by history and by science.⁵⁵ The chapter titles of that book dramatize the multiple interacting levels at which an ethos of partnership—or, conversely, of domination—operate: within the self; intimate relations; work and community relationships; national community; international community; nature; spirituality. Lessons from neuroscience and experimental psychology help us to envision what partnership interactions look like in each of the domains of life.⁵⁶

Partnership Interactions: Religion

The centuries-old conflict between religion and science is an offshoot of the conflict between emotion and reason featured in this book. The rise of science and the Enlightenment liberated the human mind to question authority in the face of observed facts about the world and people. This meant that traditional theism, based on obedience to a supernatural deity, became harder to maintain. Yet the emotional needs that gave rise to religion remained a part of us and had to be fulfilled somehow. People have a universal need to believe that their lives are meaningful and directed toward a purpose, which is also what powered the Romantic and counterculture movements described in Chapter 4. And this need for meaning is present in avowed atheists as much as anyone else.⁵⁷ People also have a need for emotional support, and a supportive community of other people, to deal with life transitions and challenges such as birth, marriage, death of loved ones, and awareness of one's own death. As Ralph Mecklenburger, a rabbi who has written a book about neuroscience and religion, says:

Providing a structure of meaning, a lens as it were, through which to view the world and construe its meaning, is the prime function of religion. A secondary function, but far from a trivial one, is the bringing of people together in community. ... this is a particularly urgent need in contemporary mass society.⁵⁸

Another rabbi who is also a magazine editor, Michael Lerner, has divided the religious approaches within each faith tradition into two subtypes that he calls the Right Hand of God and the Left Hand of God.⁵⁹ Broadly speaking, Lerner's right hand of God is traditional theism, based on revealed doctrine, a supernatural deity, and clerical authority. This type of religion has often been hostile to science. The Seventeenth Century Catholic church opposed the idea that the earth moves around the sun, and modern fundamentalist Protestants oppose the idea of Darwinian evolution; in this century, some parts of the orthodox religious community refuse to accept the idea of human-caused climate change. Lerner's left hand of God seeks meaning and community from spiritual transcendence that relies on the individual's inner experience and intuition rather than on outside

authority. The left hand is the partnership approach to religion and is entirely compatible with scientific advances; in fact, it exhorts people to search for truth wherever they find it.⁶⁰

Lerner lamented in 2006 that the domination-oriented right-hand approach to religion was much more common than the left hand, and also was doing a better job at making people feel welcome in its houses of worship. He added that many social change activists disdain religion because they see only its authoritarian right hand. As a result, these activists neglect people's genuine need for meaning and the modern spiritual crisis that stems from frustration of their meaning needs. That is yet another example of the rationalist Tin Woodman looking down on the emotional Scarecrow. The same attitude is all too common among scientists, including psychologists and neuroscientists—although several authors have noted that more scientists in the United States are religious than they publicly admit.⁶¹

For a true partnership approach—for the Wizard—the mainstream of religion needs to change to accommodate science. Yet the reverse is also true: science needs to change to accommodate religion, by being less value-free and more emotionally engaged. In a book review, I suggested that the complement of the Left Hand of God should be a Left Hand of Science⁶²:

The Left Hand of Science is the “ecumenical” approach to nature that celebrates the depth and complexity of human (and animal) personality, embraces meaning and imagination as universal values, opens itself to multiple interpretations of what it observes, and seeks bridges between scientific analysis and subjective experience.⁶³

In a partnership-oriented “left hand” religion, average people and not just a few mystics appreciate our place in the cosmos. This requires fluidity and depth of feeling and perception, which eschews formal rules but integrates all major subsystems of both the mind/brain and the body. It involves a long-term view of things, a perspective that transcends current needs and stresses to see larger plans. It centers on ethical treatment of people, nature, and the planet, while it values contemplation and visionary thinking as well as moral action. Good use of the planning capacity of the brain's frontal lobes, which integrate reason, emotion, and instinct, becomes a religious obligation. Thus, left-hand religion is part of the Wizard.

Partnership Interactions: Psychotherapy

Individual and group psychotherapy in Western countries has tended to react to overly strict parental and religious control by focusing on individual freedom, self-acceptance, and living in the present. Also, psychotherapy has reacted to society's tendency to over-intellectualize issues by focusing on emotion and intuition. In order to deal with the complete person, psychotherapy needs to

reintegrate concern for other people's welfare⁶⁴ and respect for the intellect. Self-care is not only self-indulgence or advancement of one's personal goals but includes feeling that one is being useful and compassionate to others. And for many of us, awareness of one's emotions includes acknowledging a genuine enjoyment of intellectual challenges.

How can psychotherapy be part of the Wizard, cultivating health of both the intellect and the emotions? It must avoid a "one size fits all" approach based on a narrow interpretation of a single clinical theory, whether Freudian, gestalt, humanistic, self-psychology, cognitive/behavioral therapy, or any other. A partnership approach to psychotherapy notes the daunting complexity of human mental life and the need for the human brain to bridge a variety of paradoxes to live life at its best, including the paradox between emotion and reason.⁶⁵ Respect for the mind's complexity requires that when we evaluate an individual's conflicts, we consider the person's level of development (mental, emotional, physical, and spiritual). As the clinical psychologist Erik Erikson discussed, the struggles of adult life (e.g., "generativity versus stagnation" and "ego integrity versus despair") deal with different issues than the struggles of adolescence (e.g., "identity versus role confusion") or childhood (e.g., "basic trust versus basic mistrust").⁶⁶ Modern neuroscience supports Erikson's general conclusions but suggest there could be wide individual variations in the ages at which conflicts occur.

Psychotherapists should avoid reducing all personal struggles and conflicts to the lowest common denominator, or confusing anxiety about a higher-level need with anxiety about a lower-level need. For example, many people, particularly from oppressed or victimized groups, have difficulty asserting their rights and asking what they want even when they feel they deserve it. The standard explanation for this difficulty is based on low self-esteem, but I have argued elsewhere against that explanation.⁶⁷ Rather, the difficulty with standing up for one's self is just as likely to stem from cognitive dissonance between *high* self-esteem and underestimation of one's power to change things. The best way to solve this problem is a form of assertion training that is combined with consideration for other people.

As more knowledge of neuroscience has become available since the 1960s, psychotherapy has incorporated ideas about the brain and behavior. Since the laboratory of Nobel Laureate Eric Kandel found in the 1960s that connections between neurons can become strengthened with use,⁶⁸ clinical psychologists have used neural plasticity to explain how behavior can change with life experience—including the experience of psychotherapy itself.⁶⁹ Yet some therapists oversimplify neural plasticity into a transition from old, childish, and neurotic state of mind to a new, healthy, and adult state of mind. This two-state model neglects the mind's complex dynamics. Each of us has ups and downs in mental health over time, and some patterns that are healthy adjustments at one stage of life may need to be modified at later stages. Humanist psychotherapist Roger Walsh criticized the unconscious assumption of other therapists that the goal of all

therapy is to break barriers toward reaching a state of being called “mature adult functioning” and that growth stops once this state is reached.⁷⁰

As people make peace with aspects of their lives and take on new challenges, they naturally get anxious about their ability to succeed in more difficult tasks. When someone takes on a new challenge, however, the stress can make her or him revert to patterns of behavior that were previously abandoned in easier situations. Psychotherapists should give these people credit for past growth that may be temporarily extinguished by their current stresses. Responses that were once learned and later extinguished can be relearned faster than they were learned in the first place, as shown by experimental studies of conditioning in animals.⁷¹ In the West, we are too often critical of people who make partial efforts in the right direction because of a cultural overemphasis on definite solutions, which journalist John Saul attributed to the rationalist Tin Woodman.⁷² By contrast, the Wizard encourages people to stretch their limits and live with temporary incomplete answers on the way to synthesizing feelings and thoughts.

Partnership Interactions: Politics

Recall the example at the start of this book about the 2004 election for President of the United States. For many voters that election was characteristic of the reason–emotion split this book deplors. The candidate who appealed to those voters’ values was not the same candidate whose policy proposals they agreed with.

The Wizard needs to heal that disconnect by putting emotional values and rational policies together. How can that be done, both in campaigns for office and in the actual workings of government?

This approach to politics transcends the traditional distinctions of conservative versus liberal by including the best of each. From traditional liberalism, it gathers the notion of activist government that openly seeks to promote the welfare of average people. (Activist government is analogous to the role that the prefrontal executive system plays in the individual brain!⁷³) From conservatism, it gathers the notion of enduring values and communities. In campaigns, candidates need to include rational policy and legislative proposals on specific issues. Yet these same candidates need to embed their policy recommendations in emotional appeals to the value of taking care of one another and of the planet.⁷⁴

In governing, we need to borrow the utopian notion of building bridges between opposing positions, rather than each side seeking to “win.” To promote human welfare in our tense and complex global society, we need to take strong stands on many issues including peace, the environment, income inequality, and health care. But politics, like psychotherapy, has suffered from the Western prejudice in favor of reaching definite answers.⁷⁵ Presidents and Prime Ministers are criticized as vacillating or weak if they don’t come quickly to decisive action, regardless of the daunting complexity of the problems they deal with. Leaders of

the men's movement trace this strain in Western politics to images of masculinity that have grown up over the centuries.⁷⁶ Hopefully, the growing influence of women in politics (for example, as elected heads of state in more than 30 countries) can help both male and female political leaders see the value of taking risks on the way to solving big problems.⁷⁷ Like religion, politics needs time for contemplation as well as time for action.

Finally, the 1960s countercultural ideal of participatory democracy needs to be implemented as much as possible.⁷⁸ The people who are most affected by, and emotionally involved in, a policy decision need to have at least an input in the decision.

Partnership Interactions: Economics

Economics is an area where the rationalist Tin Woodman has been particularly powerful. Since economic decisions are quantitative, involving “dollars and cents,” economic theories until recently have assumed that people act rationally. All people in the marketplace, including buyers and sellers, capitalists and laborers, are treated as self-interested actors trying to maximize their own net earnings (called *utility*).

Yet the pioneering psychological studies of Amos Tversky and Daniel Kahneman, reviewed in Chapter 3 of this book, showed the assumption of rational actors to be false.⁷⁹ Decisions about buying and selling, like any other decisions, are influenced by a host of non-rational factors including emotional moods, time pressure or the lack of it, and the language used to describe alternative choices. The flexibility of our quantitative decision processes implies that the economy can be restructured in ways that facilitate partnership interactions.

Riane Eisler advocates a new method for measuring the economic health of a country that incorporates social values.⁸⁰ Partnership economics values caring. The care of children, the elderly, and people in need would be considered a positive social value and not a cost or drain on the economy as they are presently considered. Conversely, industrial pollution and armaments manufacturing, which are now considered positive contributions to the GDP, would be considered as negative values. Eisler calls for much better pay and professional training for those engaged in caring professions, including daycare workers and home health aides who in the United States are now unlicensed and working at near minimum wage.⁸¹

The neuroscience results we have reviewed indicate that caring makes a positive difference and excessive stress makes a negative difference in human lives, no less in the workplace than anywhere else. Consequently, as Eisler documents, the choice between an organization being efficient and caring for its employees is a false one because on average, employees that are well treated are more productive and perform better.⁸² Surveys of employee attitudes consistently show that supportive working conditions are at least as important as salary in promoting

job satisfaction. Employees need to feel that they are given initiative (“democracy of creativity”), their contributions are respected, and their family and personal needs are honored with flexible time arrangements.

Within the economics profession, there has been a recent growth of the sub-discipline of *behavioral economics* that incorporates emotion and context. The chief founder of behavioral economics, Richard Thaler, won a Nobel Prize in 2017.⁸³ Yet many other economists still hold onto the self-interested, rational, utility-maximizing theory because it is easy to describe mathematically. Mathematical theories of economic behavior that incorporate emotion and context are more difficult to develop, but a few investigators are starting to build brain-based theories about how humans really act in the marketplace.⁸⁴ The Wizard requires scientific understanding that treats humans as real people, not as “econs” who blindly follow rules of self-interest.⁸⁵

Partnership Interactions: Family and Sex

The quality, whether partnership- or dominator-based, of relationships within the family is a microcosm of the quality of relationships in the larger society.⁸⁶ Part of the Wizard is replacing the patriarchal conception of the father-dominated household with one where all adults, female and male, have roughly equal influence. Between adults and children, there is inequality because children’s brains are not fully developed, thus instruction and parental authority are necessary. But the hierarchy between parents or other adults and children is what Riane Eisler calls *a hierarchy of actualization*, one that emphasizes the development of each child’s creativity and independence rather than the obedience that the dominator ethic emphasizes.⁸⁷ The family that results can sometimes be the traditional nuclear family of mother, father, and children but is not restricted to that; it can also be an extended family of relatives or non-relatives that adheres to the partnership model.

In the partnership model, sexuality for both men and women is treated as a source of pleasure and bonding, not as something dirty or immoral.⁸⁸ Heterosexual monogamy is likely to be the most common form of sexual arrangement, but homosexuality is equally accepted if it is part of a loving relationship, and even polyamory, or multiplicity of sexual partners, is accepted if it is open and based on mutual trust (which occurs among the Musuo, a minority ethnic group in China⁸⁹). This approach to family and sexuality is part of the Wizard because it meets both the rational needs to enhance survival and the emotional needs of bonding.

This chapter has shown that consistent integration of emotion and reason promotes partnership within each of us as well as between us. The last chapter will place partnership society and the Wizard in the sweep of human history. It will present some suggestions, informed by neuroscience and experimental psychology, for mental attitudes we need to get there from here.

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6

THE COMPASSIONATE REVOLUTION

Like many Americans who grew up in metropolitan areas, as a child I was a fan of my home-town major league baseball team. Since I lived on the south side of Chicago, this was the Chicago White Sox. They were known as the “Go Go Sox” because they lacked home run power but won games by their wits: base stealing, spray hits, and masterful defensive plays. That style of play generated excitement in their viewers. It also helped me as a short quiet guy to identify with members of my favorite team.

Having a way with figures, I developed an annual ritual in February or March of writing down the projected statistics for every starting position player and starting pitcher on every major league team for the coming season. Most years I would confidently predict that this was the year the White Sox would finally reach their potential and win the World Series. And every year I was disappointed. The Sox usually came in second or third in the American League, except for 1959 when they won the league pennant but lost the World Series to the Los Angeles Dodgers.

For thousands of American boys, sports formed much of our introduction to more consequential aspects of life. From my baseball statistics ritual, I learned that predictions of the future can be comforting and even addictive. We humans abhor uncertainty and long for assurance about what the future will bring.¹ We can often obtain this assurance about our families, friends, workplaces, and small communities. Yet larger systems, such as economies, political parties, countries, and climates are complex dynamical systems with elements that may be chaotic or subject to unpredictable perturbations. In the stock market and in international affairs, for example, there is evidence that the predictions of trained experts are seldom better than chance.²

After the twin surprises of the year 2016—Brexit and the election of Donald Trump—I swore off making detailed predictions about any complex system, even baseball. So I am not going to prognosticate about whether we as a species will succeed at overcoming the perils of climate change, or at saving democracy around the world. Making predictions about these matters, whether optimistic or pessimistic, not only is addictive but can stand in the way of action. Optimistic predictions can make people complacent, thinking things will work out fine no matter what they do. Conversely, pessimistic predictions can make people hopeless, thinking things will fall apart no matter what they do.

Yet some writers have laid out optimistic scenarios for the future of the world that are not inevitable but possible, and desirable enough to be worth working for. One of those writers was the late population ecologist John Calhoun, who was one of my informal mentors when I worked at the National Institutes of Health between 1968 and 1970. Calhoun is sometimes labeled as a pessimist because his studies of rats showed that excessive population growth is socially disruptive even if there is enough food to go around. He extrapolated his results to humans and used them to explain some negative effects of urbanization and technological innovation. Yet Calhoun went further to describe human efforts to control the effects of population growth, using those efforts to account for widespread creativity in social organization, religion, art, science, and engineering at different times in history. He went on to develop three different scenarios for the next stage in world history. Two of those scenarios are bleak but the third is bright, with close parallels to the utopian societies described in Chapter 5 of this book.

At this writing, the world has been hit over just a few months with a vast pandemic of a new virus disease whose long-term effects, both on our personal and economic health, are unknown but likely to be profound. Our responses to this crisis need to combine concern for both our physical safety and our connections to one another. Even more than our pre-virus global situation, the current situation calls for solutions and strategies that are informed by science, including psychology and neuroscience as well as ecology and human biology. Some of the recommendations I make in this chapter depend on a return to normal from the current widespread shutdown, such as workplaces and schools being open and functioning. Yet the recommendations for interpersonal relationships, which are the heart of Calhoun's projected Compassionate Revolution, can start to influence behavior even during the current crisis—and for many people they already have.

Population and Human History

The starting point of Calhoun's speculations was his results (published in 1962) on the behavioral effects of population density in rats and mice.³ He built a system of four pens for Norway rats of which two "outer" pens bordered on

walls, whereas two “inner” pens were accessible both from the outer ones and from each other. This space arrangement caused the two inner pens to become much more crowded than the other two. Since all the rats had more than enough food, Calhoun could observe the disruptive effects of crowding on behavior apart from its effects on the food supply. He observed that the inner pens became desirable as gathering places because of their high social activity. For this reason, rats from the outer pens gradually collected at the food hoppers in the inner pens even though food was available in the outer pens as well. (Compare this to people drawn to the excitement of crowded cities.)

Calhoun found that crowding was particularly bad for female rats bearing young. Female rats normally build nests out of paper strips around the time their young are born, but those in the inner pens became much less systematic in their nest building. They did not form the paper strips into their normal cup shape, being distracted by social events. Other aspects of care and feeding of infants were similarly disrupted. In one set of studies, the decline in infant care was severe enough that 80 percent of infants in these pens died before weaning.

The male rats in the crowded pens also behaved abnormally. While male rats typically establish clear dominance hierarchies, the males in these inner pens constantly struggled for power, with no one rat occupying the top slot permanently. Also, there were two types of males that stayed out of the dominance struggle entirely. One type was passive and ignored other rats of both sexes. The other type was hyperactive and hypersexual, often pursuing females into their burrows which is not part of normal rat courtship.

Why should crowding itself cause behavioral problems, even when food is more than adequate? In several other articles, Calhoun developed a mathematical theory to account for this fact. The general idea is that the number of possible interactions between animals (or people) is proportional to the number of pairs of animals, which is the *square* of the total number of animals. But the number of interactions that can be satisfying, in that one animal gives another what it wants, is proportional only to the total number of animals. So if all interactions are possible, the fraction that is satisfying decreases as the number of animals increases. In other words, an animal wanting anything from another animal—sex, friendship, mutual grooming, or whatever—has more animals to compete with for attention as the number goes up. Also, the cognitive processing needed to determine who is available to do what with whom becomes more difficult as there are more animals.

Calhoun stated that humans, like other animals, experience more potential frustration as their numbers increase. Our more complex brains, however, enable us to develop strategies to cope with the frustrations coming from the rising population. He proposed that we have dealt with the increasing world population throughout history by changing the rules governing what types of interactions were allowed or encouraged. As Calhoun stated:

A critical kind of concept involved production of new categories of social roles which reduced meaningful contacts with others to the level appropriate to that which earlier transpired in the small closed groups. Each increase in density and social roles increased the amount and diversity of information flowing over the contact network. This increased the probability of new ideas emerging, some of which increased the efficiency of resource acquisition, which in turn permitted more people to survive, and more social roles to develop.⁴

He went on to speculate that such development of new rules has made faster population increases possible. It has allowed the world's population to double at successively shorter intervals (in fact, each doubling interval has been shown to be about half the previous one).

Calhoun then looked at the history of major revolutions in human thought. He found that each revolution could be interpreted as emerging at a certain (approximate) date, and that such dates corresponded to critical times for the rise in the world's population. Specifically, the world population at the date where he placed a revolution in thought was about four times its population at the date of the previous revolution. These revolutions and approximate dates⁹⁵ (see Figure 6.1) are:

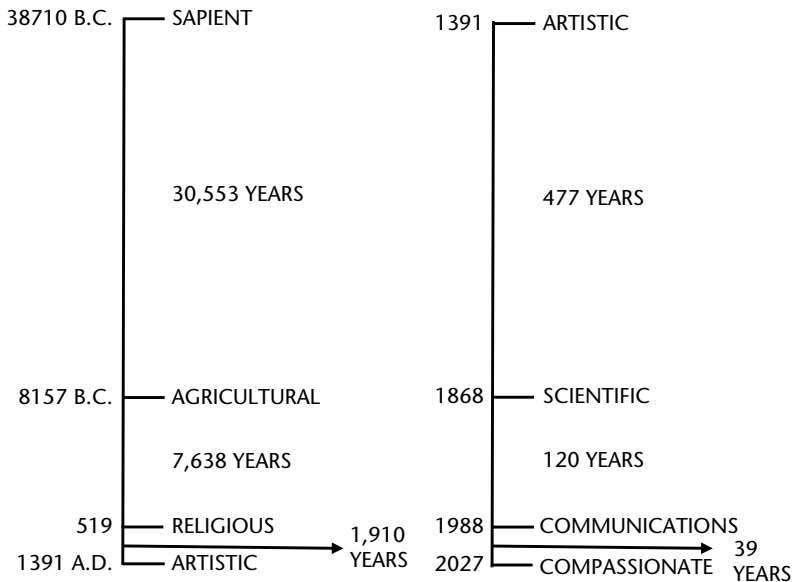


FIGURE 6.1 Calhoun's scheme for revolutions in human history. The time interval between peaks of successive revolutions is about one-fourth of the previous interval. The time scale of modern revolutions on the right is about 64 times as fast as the time scale of ancient revolutions on the left. (Adapted from Levine, 2018.)

Sapient (38710 B.C.)—ushering in our humanity

Agricultural (8157 B.C.)—creating mythology and social form around food production

Religious (519 B.C.)—helping to establish fixed codes of behavior

Artistic (1391 A.D.)—developing holistic attitudes and philosophy

Scientific (1868 A.D.)—emphasizing rational understanding of the world

Communications (1988 A.D.)—emphasizing creativity and broad experience

POSSIBLE FUTURE:

Compassionate (2027 A.D.?)—emphasizing diversity and mutual interdependence

Calhoun's description of the Communications Revolution anticipated many of the recent high technology advances that impact our lives. He foresaw how our lives would change despite dying in 1995 before the growth of the Internet, smartphones, social media, and widespread automation of routine jobs. Calhoun also foresaw that the rapid growth of technology would lead to social disruptions. People would be thrown into contact with a wider range of other people across the world, and the old rules which worked well in isolated communities would work less well in global communities. Indeed, the growth of technology has happened much more quickly than the evolution of our strategies for coping with it. So we need to understand our brains, our minds, and our decision processes much better than we do now to make the technological changes beneficial instead of harmful.

With the world population now growing at the fastest rate in human history, Calhoun predicted *another* revolution peaking between 2018 and 2030. If we act unwisely as a species, he added, this future revolution might entail ecological disaster, with population outstripping diminishing resources. Or it might lead to a world-wide authoritarian rule and cultural sameness. But if we act wisely, it can instead bring about a much more desirable scenario, which he labeled the *Compassionate Revolution*.

The Compassionate Revolution would create societies oriented toward the fulfillment of human potential and not merely toward survival. It also means that we would respond to the complexity of society by acting with greater trust of others, including others who differ from us in race, gender, religion, or cultural beliefs.⁶ Calhoun described the transition process from the Communications to the Compassionate Revolution as follows:

... the present era of radical change will become intensified as the character of roles needed to meet new functions also change. Thus, in the presence of increased exposure to value conflict, there will be required an augmented awareness of the necessity of others to maintain value sets differing from

one's own. Furthermore, realizing one's own functional role requires expenditure of considerable effort in assisting others to fulfill the objectives of their value sets. It is this awareness, and participation in, the realization of values held by others which characterizes the compassionate perspective. This perspective also includes an awareness that many individuals will have trouble in developing and altering their roles and value sets in accordance with the demands of an overall system which is changing and becoming more complex. Holding to this perspective further requires marked attention to assisting others, whom we ourselves might earlier have been, to recoup from this hopefully temporary derailment.⁷

Calhoun emphasized that we can no longer rely on natural selection to direct the further evolution of our species.⁸ More compassionate people do not necessarily survive better or reproduce more than those who are less compassionate. In fact, his scenario for the Compassionate Revolution includes a gradual *decrease* in the world population, meaning that more people would not reproduce biologically but would influence the upbringing of children not their own. We need instead to actively direct our future evolution, socially and not just physically. The goal of our directed evolution should be to make every human being actively concerned about every other human being and the rest of the planet. Psychology and neuroscience are both crucial to this quest.

In the thick of the Communications Revolution, too often we deal with global change via social norms rooted in earlier ages and more parochial communities. They are norms we have unconsciously integrated, based on in-groups and out-groups, winners and losers, and requirements for people to prove that they do not pose a threat to society. In other words, we deal with rapid perplexing change using the dominator model shown in Figure 5.1 of Chapter 5. Calhoun saw the need to cope with global change by a compassionate revolution of consciousness that would promote partnership norms instead.

The Compassionate Revolution would synthesize individualist and communitarian outlooks. People would follow their individual consciences but would treat society as an interdependent web and consider other people's welfare in making their decisions. Children would be raised to feel part of the community, and to develop a sense of responsibility toward others, but their membership in the community would not be bought at the price of conformity. More generally, the rules for acceptable conduct between people would be based on mutual trust, not on the protection of social hierarchies.

The Compassionate Revolution would be built on the three pillars of utopian societies outlined in the last chapter: trust without exclusiveness, community without conformity, and delight without indulgence. It would incorporate the "utopian" features of independence-oriented child-rearing, fluid families, emotional openness, mediation of conflicts, gender equality, and democracy of creativity. All these features help to heal the reason-emotion split.

How do we get there from here? There's no "master plan" for bringing about the Compassionate Revolution, such as "do this in Japan by 2023, do that in Africa by 2027, do the other thing in Minnesota by 2030, et cetera." Such a detailed plan is reminiscent of the various "five-year plans" of the early Soviet Union. It would enhance the dominator outlook and not the partnership interactions we wish to foster. In other words, if a detailed blueprint were to be found for the Compassionate Revolution, the results would not be compassionate! Of course, we need to make plans to deal with specific contingencies, like we have not done effectively enough in the current pandemic. Yet the overall move toward greater partnership needs not to be micromanaged and to be sensitive to the call of unpredictable events in different times and places.

There are small changes we can make at several levels that would move us in the directions of the Compassionate Revolution, changes supported by our knowledge of neuroscience and psychology. The recommendations for partnership politics and economics discussed in Chapter 5, such as devoting more economic resources to caring and fewer to armaments, are likely to be a large part of the solution. In addition to social policies, we can make changes at the level of day-to-day social interactions. We can start with our habits of using language about emotion and reason.

Importance of Language

The relationship between language and thought has been controversial among linguists. Some linguists have argued that all languages are conceptually different and each language binds people to think in ways structured by the specific words they speak.⁹ Others have emphasized language as a thing in itself, a structure largely independent of the minds of its speakers.¹⁰ More recent authors tend to take an intermediate position, that there is dynamic feedback in which cultural thought habits and language influence each other, with neither thought nor language being dominant.¹¹

The words we use to describe complex situations are often metaphorical rather than literal. Yet the meanings those words carry from other situations influence our thinking in ways of which we are not conscious. An example due to linguist George Lakoff and philosopher Mark Johnson is the metaphor of argument as war.¹² Lakoff and Johnson cited several phrases used in everyday American English that support that metaphor, including "Your claims are indefensible;" "He attacked every weak point in my argument" and "His criticisms were right on target." The authors noted that there are alternative ways to think of an argument; for example, as a dance or as a collaborative effort. They suggested, but did not say, that the phrases consistent with seeing argument as war reinforce a mindset that sees people one disagrees with as opponents.

Now, what about our metaphors for discussing emotion and reason? Consider the common use in American English of phrases like "She acted on emotion" or

“His decision was emotionally based.” These phrases are typically used to describe, for example, a person committing a crime of passion; someone falling in love with a partner who is charming but abusive; or a voter who votes for a candidate who is charismatic but dishonest. They are not used for someone who supports his/her family out of the *emotion* of love—or for someone who works steadily on a job out of *passion* for her/his work.

In other words, when we say “acting on emotion,” we typically include in that description only a part of the human experience of emotion. We are restricting emotion to its short-term aspects that interfere with reason and planning. We are excluding the long-term aspects of emotion that integrate values into decision-making and motivate people to act.¹³ So these phrases reinforce the unconscious biases behind the reason–emotionsplit, with reason superior to emotion, which pervades Western culture.¹⁴

The split is also reinforced by the dilemma we sometimes feel: “should I act on reason or emotion?” The answer is usually both—we need emotion to feel the importance of doing something and we need a reason to carry it out effectively. So the question poses a false choice: asking “should I act on reason or emotion?” makes no more sense than asking “should I drive with my hands or with my feet?”

Some leaders of self-help workshops reinforce the reason–emotion split by their exhortations to “get out of your head and into your feelings” (which overlooks the key roles of brain regions such as the amygdala and hypothalamus in generating feelings!). Also, when their workshop attendees sound like they are evading life issues, the leaders may say “stop intellectualizing.” The impetus behind these phrases is a benevolent one: they are encouraging the people to confront difficult emotional issues so as to deal with those issues more effectively. Yet the suggestion of a dichotomy between emotions and intellect sends a subconscious message akin to the excesses of the Romantic Scarecrow rebellion—a message that intellectual activity is a distraction and bad for the human spirit. As discussed in Chapter 5, skillful psychotherapists avoid such dichotomizing. Therapists need to focus on unconscious or semi-conscious emotional and non-rational processes in the people they treat while encouraging those people’s intellectual growth.

The split between reason and emotion is harmful because it suggests that we cannot be both smart and kind at the same time. It also contributes subconsciously to divisions based on gender, race, sexual preference, and income level, because we might put down “the other” as “emotional” or “irrational.” So can we, not by decree but slowly, retire linguistic usages that reinforce this split? It is hard to overcome speech habits. Yet we have sometimes been able to change prevailing speech patterns in response to socio-political changes. For example, the use of “man” as a generic term for human beings has gone out of style since the growth of the women’s movement, and “jew” as a verb meaning to cheat has largely disappeared since more Jews have gained status. I propose that we should be similarly careful in our usage of words about emotion and reason.

We also should be careful about using language that may unintentionally reinforce stereotypes about groups. We sometimes casually make statements like “women are more empathic than men” or “Asians are better than Europeans on spatial reasoning” when we are talking about averages over a large group and not about every individual within a group. Experimental psychologists, who for the most part are not bigots, sometimes unfortunately talk this way because their experimental studies emphasize statistical differences.

Elsewhere I have given an example of where confusing statistical with individual differences can lead if we are not careful:

For example, the educational psychologist Carol Gilligan described an experiment in which college students enrolled in a psychology course were asked to write fictional stories about possible personal relationships. She found a sex difference in the amount of violence in these stories: “Of the eighty-eight men in the motivation class, 51 percent wrote at least one story containing images of violence, in comparison to 20 percent of the fifty women in the class...”¹⁵ Gilligan’s finding is statistically significant, though it doesn’t address whether the root causes of the sex difference are hormonal or cultural. But it’s possible for the unwary to draw the wrong lesson from it. A reader could conclude that the 49 percent of men who didn’t include violence were “unmasculine” or that the 20 percent of women who did were “unfeminine.”¹⁶

As gender roles have loosened since Gilligan wrote in 1982, it is possible that the differences she found in images of violence would be smaller among current college students. Yet the point remains that nonconformists who buck the statistical norms of their groups are often ignored and become invisible. These nonconformists should not be ignored because they can bring valuable insights to society. Among their possible contributions are “family values without intolerance of minorities; lifestyle creativity without ‘anything goes’ amorality; ecological consciousness without rejection of technology; feminism without male-bashing.”¹⁷

Education and Child Development

Yet being able to understand and manipulate nuances of language requires critical thinking. It requires being able to understand conventional usages but not blindly accept them. In other words, people need to think “outside the box,” or even without reference to the conventional “box” at all. This quality is an aspect of the personality factor that experimental psychologists have called *need for cognition*,¹⁸ defined in Chapter 3 as “the motivation to engage in, and enjoy, activities or problems that require thinking.”

Over the last 40 years, spurred by the Communications Revolution's explosion of computer technology and consumer electronics, there has been a worldwide growth of interest and funding in scientific and technical fields. In the United States, these fields are often called by the acronym *STEM* for science, technology, engineering, and mathematics.

The growth of scientific and technical understanding is necessary and welcome. In the United States, the budget of the National Science Foundation (NSF), the prime funder of scientific and engineering research, goes up and down with political changes but recently has hovered around US\$8.3 billion a year.¹⁹ NSF is supplemented by funding from the National Institutes of Health and from the research offices of the Navy and Air Force. The growth of NSF has been beneficial for neuroscientists and psychologists including the author of this book, despite the weakness that the agency generally prioritizes safe over speculative research.

Yet the educational system, at both the secondary school and college and university levels, has been emphasizing STEM to the detriment of other components of learning. The humanities, the arts, and civic engagement are equally important.

In the humanities, the closest equivalent to NSF is the National Endowment for the Humanities (NEH) which was founded in 1965. NEH is the major source of federal funding in the United States for research in literature, philosophy, history, and related areas. It also funds humanities councils in each state which engage in educational and cultural activities. Yet NEH's budget is around US\$150 million a year, much lower than NSF's.²⁰ In current dollars, NEH reached a high of 425 million in 1980, then took two precipitous drops in the early 1980s and in 1996.

Admittedly, much scientific research requires expensive equipment, an example being the magnetic resonance imaging studies discussed in Chapter 2. Literary, philosophical, and historical studies based on library research do not require the same level of funding. Yet difference in research requirements cannot account fully for the stinginess of my country's government toward the humanities. There has also been a mindset that the humanities are an indulgence and that we need only "practical" and technical knowledge to navigate the current fast-paced and globally interconnected world.²¹

Yet recent years have seen a reaction against the overemphasis on technical knowledge to the exclusion of other aspects of education. Employers often say they value critical thinking skills in their potential hires and find these skills in short supply.²² There is no widespread agreement on what exactly constitutes critical thinking, but many writers have rediscovered the value of the traditional humanities and liberal arts in fostering such skills. One of those authors, Frank Badua, has proposed that STEM needs to be balanced by another, less well known, plant-based acronym, *ROOTS*.²³ *ROOTS* stands for rhetoric, orthography, ontology, and teleology, all of which were key elements of the traditional

liberal arts education dating from medieval times. Rhetoric includes the use of logic, structure of arguments to persuade people, and elegance of expression. Orthography, a word most commonly associated with spelling, actually involves writing style more generally. Ontology involves discerning the credibility of arguments, and teleology deals with causes. Badua is particularly interested in applying these humanities-based skills to business education but also argues their importance in the scientific STEM fields themselves.

Another educational acronym that has recently gained momentum is *STEAM*: adding the arts (music, visual arts, and theater) to the STEM mix.²⁴ A 2011 report sponsored by the Obama Administration dramatized the importance of the performing arts in motivating children. This report cited evidence that engagement in the arts particularly improves both the academic performance and social adjustment of children and adolescents from socioeconomically deprived backgrounds.²⁵

Of all the performing arts, the one that is universally appreciated across all cultures and all social classes is music. There is evidence from numerous psychological and neuroscientific studies that music plays a particularly strong role in healing the reason–emotion split.

A variety of benefits on cognitive tasks have been demonstrated both from music listening and from instrumental or vocal musical training.²⁶ In the early 1990s, there was a splash in the popular press about the “Mozart effect”: the results of an experiment demonstrating that visual–spatial abilities could be improved after 10–15 minutes of listening to Mozart’s music.²⁷ Frances Rauscher and her colleagues particularly found this effect with a task that required subjects to envision what a piece of paper that been folded and cut will look like when it is unfolded. This task required what the author called *spatiotemporal abilities*, that is, tracking how a spatial pattern might evolve over time.

Subsequent research by other experimental psychologists moderated the hype about the Mozart effect.²⁸ Yet this research verified that both listening to and being trained in classical music (not Mozart exclusively) had a variety of positive effects on cognitive functions (not spatiotemporal exclusively). There is still dispute among psychologists about how much these effects are due to the cognitive functions contained in music appreciation and how much they are due to music providing positive emotional arousal.

The importance of music in people’s emotional lives is well known, ranging from rock concerts to religious hymns to patriotic parades. Yet psychologists disagree on the exact role music plays for us. Some believe that music is a mere accidental by-product of other mechanisms that provide an evolutionary advantage: one eminent psychologist calls music an “auditory cheesecake,” by analogy with a dessert that is more delightful than nutritious.²⁹ Yet the cheesecake explanation is not popular: more researchers believe that music co-evolved with language and is important for the development of our communication skills. Daniel Levitin, a neuroscientist with a background as a rock musician, has

documented the brain mechanisms involved in music and argued that music (rock, classical, and other types) is an essential part of social bonding.³⁰ Leonid Perlovsky, a neural network theorist, has developed a theory that music's evolutionary role is to mitigate the unpleasant emotions stemming from cognitive dissonance in other spheres of life.³¹ All the work these researchers review points to the social usefulness of widespread music education.

The rush to gear our school systems to the STEM requirements of technological society has also led to a neglect of fostering engagement in civil society.³² In the United States, for example, the public school system arose from an effort to train children to become adults who could be informed citizens of a democratic country. Yet in the last half-century, there has been an increasing push in the direction of making education into a preparation for the global job market. As a result, fewer American public schools offer the formerly near-universal instruction in what was called “civics”: education in how our system of government works at federal, state, and local levels, our Constitution, and how legislation gets passed. In addition to acquiring less knowledge about our politics, citizens have lost faith in government and in their ability to influence the political process:

From 1964 to 2012, the percentage of Americans who believed that government is “pretty much run by a few big interests” increased from 29% to 79%, while the percentage of Americans who believed that it was run “for the benefit of the people” decreased from 64% to 19%.³³

The declines in civics education, political awareness, and trust of government have been paralleled by decreased participation in both civic and charitable organizations.³⁴ Voluntary participation has been recognized as a strength of American society since the days of De Tocqueville in the Nineteenth Century.³⁵ It is an important part of our emotional attachment to the larger community.

This book's thesis that reason and emotion are essential partners instead of opposites plays out pragmatically in education. The arts are not the enemy of the sciences, and the arts and sciences should not have to compete with each other for scarce funding. Nor is preparation for citizenship the enemy of preparation for employment.

Effective forms of education are not simply a matter of what subjects are covered. Whether in the sciences, humanities, social sciences, or performing arts, education at every age needs to foster independence in the learners and allow for exploration and play. Also, for maximum results, it needs to start early in childhood, before children are formally enrolled in school. The importance of early intervention was dramatized by a long-term study of over a hundred African-Americans starting as three- or four-year-old children from poor families in the 1960s.³⁶ These children were randomly divided into two groups, one of which was placed in a high-quality preschool program and one of which was not. Many years later, when these children were 40 years old, the ones who had been in the

program had a substantially lower crime rate and higher earnings than the others who were more likely to have graduated from high school. Results such as these suggest the benefits of a government policy that, among other measures directed toward children, invests in universal pre-kindergarten education, a direction in which a few jurisdictions such as the city of New York are now moving.

Importance of the Theory in This Book

The theory about emotion and reason could strike some readers as an abstract academic exercise with little influence on our real lives. Some people may react that we need to first focus on global emergencies—the COVID-19 pandemic in the short run and climate change in the long run—and that cleaning up our cultural mental attitudes needs to wait until those emergencies are dealt with.

I disagree with the idea that our understanding of emotion and reason is a mere abstraction. Of course, we need to deal with both the current pandemic and any other serious public health issues that may arise later, as well as reverse the destruction of our environment due to climate change. But we will be able to deal with emergencies better if we carry with us a vision for what we want society to be like when the emergencies are mitigated.

Such a vision requires the kind of broad theoretical thinking about human nature found in this book. As the pioneering Twentieth Century social psychologist Kurt Lewin observed, “there is nothing more practical than a good theory.”³⁷ Hence, rather than devoting energy to immediate contingencies *instead of* cultural attitudes, we should do both at the same time.

Bringing about the Compassionate Revolution involves the joint work of millions of people in different occupations. In particular, it includes both social activists and theoreticians, and some individuals who fit into both categories at once. As a writer on science, I like to think of my role as healing people through theories.

There have been theories that have exacerbated discord and inequality, by making some people feel superior and others inferior. Theories that highlight the worst in human nature, that emphasize our innate selfishness, are particularly toxic. Those theories need to be countered by other theories that emphasize the importance of social cooperation in our evolutionary makeup.³⁸ Particularly important is the work of social psychologist David Loye, who has argued that Charles Darwin has been misinterpreted over the years by being associated with survival of the fittest.³⁹ Loye has argued instead that Darwin, particularly in his classic book on human evolution,⁴⁰ emphasized cooperation and love more than he did competition for survival.

The healing this book attempts between reason and emotion is very much in the spirit of Loye’s work. Our reasoning capacities and our emotions are both deeply embedded in our evolutionary history, as Darwin would have agreed. So are the connections between emotion and reason discussed in Chapters 2 and 3,

including the emotional reaction to cognitive dissonance and the need for both cognitive and emotional aspects of empathy.

When theories are regarded as separate from daily life, intellectuals and scholars are regarded as an elite, separate from the general population and from “practical” concerns. The belief that learned people are detached snobs contributes to anti-intellectualism, which is widespread in my country.⁴¹ In a more compassionate, partnership-oriented society, the intellectual activity would be seamlessly connected with the “practical” business of society, rather than being confined to one class of people. American culture, in fact, has at times included a strong strain of public intellectuality. In the Nineteenth Century, as the United States expanded westward and towns arose in former wilderness areas, traveling theater performances, lectures, and newspaper readings drew crowds of average citizens. One example was the Chautauqua Institution, centered in southwestern New York State, which still exists but whose popularity has waned since World War II. At its height, traveling Chautauqua assemblies included “lectures, music, nondenominational religious studies and a focus on current issues.”⁴² For another example, labor unions and pooled workers in Tampa cigar factories paid for *lectors* who entertained workers by reading books and newspapers aloud (some of them left-leaning!). The lector custom was discontinued in Tampa after a 1931 factory strike but has survived in Cuba.⁴³ All these initiatives represented a melding of “rational” enlightenment with “emotional” entertainment that needs to be revived.

Troubled Times Call for Courage

In the current state of the world, it is easy to be frightened of what may come. To the anxiety-enhancing effects of climate change, income inequality, and cultural disruption have been added a pandemic during the writing of this book. It is natural for humans to react to fear by turning conservative and grasping at the ways they know.

Yet these very crises call for courage to adopt forward-looking customs and policies that represent the best of what we are. Social chaos makes people long for stability. Many people look back to the stability they know, which is the old order with its patchwork of dominator and partnership institutions. Yet the world order, like each of our individual brains and minds, is an exceedingly complex dynamical system, which is highly *nonlinear*, meaning that small changes in parts of the system can create massive changes in other parts. Nonlinear dynamical systems are characterized by multiple stable states.⁴⁴ This means that stability also can be achieved by going forward instead of backward. We have the potential to achieve a more satisfying form of stability in a genuine partnership society that meets both our emotional and rational needs.

Yet we often avoid what is unknown, because the path to the Compassionate Revolution involves a great deal of risk-taking and uncertainty. When possible

we need to plan our strategies based on evidence, including evidence from neuroscience and psychology, about what actions will or will not move us toward our goals. Yet at the same time, we need to supplement reason by faith when the evidence is incomplete or ambiguous. The word “faith” is anathema to many humanistic intellectuals because it seems to imply blindness to the facts or submission to a higher, perhaps supernatural, authority. But I mean faith in the sense of willingness to take risks on the side of optimism when the facts are not known fully enough to make reliable predictions about what will happen. This kind of faith was described by the humanist psychologist Erich Fromm:

The position of “the paradox of hope” is one of “faith,” faith in the sense of certainty based on the inner experience of the goal, even though the goal has not been reached and no proof exists that it ever will be. Such faith will never be possible in a spectator who “waits and sees” what will happen. It is possible only for one who with all his (*sic*) energy is tensed toward the goal, and whose faith is not dependent on the fact that the ideal has appeared in the flesh.⁴⁵

Feminist theologian Sharon Welch has said that we need to develop an “ethic of risk” and combat the prevailing Western mindset that avoids actions that will not lead to definite success.⁴⁶ Welch notes that movements for positive social change are seldom safe and have a strong chance of failing, so we need the kind of mental and emotional outlook that sustains us through such difficulties.

This type of faith encourages people to let go of their neediness, thereby becoming more compassionate toward other people. With the current global society in thrall to the Communications Revolution, the mindset of urgent anxiety is on the rise, even in groups promoting aspects of the Compassionate Revolution. In an effort to overcome that mindset, I almost automatically throw out letters and delete e-mails that are labeled “urgent”!

In fact, we humans seem to thrive, psychologically and neurally, on a certain amount of risk in our lives—even though we are also afraid of risk. Abraham Maslow said that people who wish to reach self-actualization need to overcome the fear of living out their destiny. He called that fear the *Jonah complex* after the Biblical character who tried to run away from the hard task which God had set for him.⁴⁷

What is it in our nature that makes us get positive reinforcement from our own acts of courage in the face of fear? The neural transmitter dopamine, the biochemical substance most closely associated with positive reinforcement (see Chapter 2), may provide a clue. A team of Swiss neuroscientists found that the neurons in the midbrain that produce dopamine are most active in the presence of a reward that is uncertain, with the highest level being when the probability of reward occurring is about one-half.⁴⁸ This could be a mechanism

by which our incentive to pursue life goals is sharpened when we are not sure of achieving those goals.

The utopian novels discussed in Chapter 5 include passages that serve as thought experiments for how people can act when they are less anxious about their own needs and able to see the world's larger picture. In the novel *Ecotopia*, set in northern California which has seceded from the United States (joined by Oregon and Washington), the narrator witnesses an episode in a restaurant wherein a customer complains that his scrambled eggs are overcooked.⁴⁹ The woman who cooked the eggs, named Ruth, is a valued employee and appreciated by other customers. She attributes the overcooked eggs to being overburdened and stressed out. So a discussion ensues about her workload and some customers offer to help her in the kitchen. The episode ends with everyone happy including the complainer.

Conclusion: The True Wizard

The Wizard of Oz who supplied the Tin Woodman's heart, Scarecrow's brains, and Cowardly Lion's courage called himself a *humbug*.⁵⁰ The quest of this book is for a "Wizard" within us, and within our societies, which is not a humbug but is founded in science.

As a heritage of the Enlightenment, many of the more idealistic among us have sought a social order which is ruled by rationality. This would be a society in which emotional appeals are overcome and decisions at both the individual and governmental levels are based purely on facts and logic. The results from neuroscience and psychology summarized in this book show that this "ideal" is probably unattainable. The word "ideal" is in quotation marks because such a social order would also be undesirable. The fruits of the "dictatorship of reason"⁵¹ of the last several hundred years suggest that a super-rational society would not be a humane or democratic one. It would be a society where the method is exalted over value, where the market rules our lives except for outbursts of tribal resistance.⁵² It would be a society of beings that Nobel economist Richard Thaler calls *econs*⁵³: people who make objective decisions based on pure self-interest and ignore the interpersonal nuances that enrich our lives.

Moreover, we wish for a society where there are no rank orderings, where women and men, people of color and whites, LGBTQ, gender non-binary, and heterosexual people are equally valued. For that to occur, it is necessary that the different processes in our mental lives, including emotion and reason, be equally valued.

The Compassionate Revolution would strive for another kind of ideal that is more in line with how our brains and minds behave but difficult to define. This chapter and the one before it have outlined some of its contours. Yet because it is hard to define, and democratic, there is no predetermined plan to move toward this revolution. Instead, compassionate change can be achieved by a mixture of processes, some predictable and some spontaneous. The more we gather, and act

on, scientific knowledge of how our minds and brains work, the better the chance we will have some successes.

The view of people as a blend of reason and emotion, playing complementary roles, is more humane than the hyper-rationalist Tin Woodman view. It is also more humane than the Scarecrow view of people as slaves to primitive passions.

Findings discussed in Chapters 2 and 3 of this book have inclined some scientists to pessimism about the human condition. For example, the monumental work of Amos Tversky and Daniel Kahneman, showing that characteristic human decision-making is rationally inconsistent,⁵⁴ led to a quote attributed, rightly or wrongly, to Tversky: “My colleagues, they study artificial intelligence; me, I study natural stupidity.”⁵⁵ Yet other psychologists see the inaccuracies and inconsistencies of human decision-making as *cognitive illusions* that are side effects of a mind-brain decision system which is helpful to us in other ways. That system enables us to generalize to novel situations and make choices based on confusing information and often under time pressure.⁵⁶

If we are not deciding optimally and rationally all the time, then neither individuals nor societies are bound by the way they are acting at a given moment. If we are exhibiting dominator behavior or acquiescing to a dominator system, we are flexible enough to move toward partnership behavior. War, poverty, inequality, and environmental degradation are not the products of a rational optimizing system, so they can be improved on. The religious concept of repentance—or, in the Jewish tradition, *teshuva*, the turning away from sin⁵⁷—embodies the wisdom that humans, due to neural plasticity, are malleable not only by circumstances but by their own choices.

Hence, Tversky and Kahneman’s findings ultimately lead not to pessimism but to a deeper optimism about human potential. So do the neurobiological results discussed in Chapter 2 of this book, indicating that the “rational” cerebral cortex does not rule us but works in partnership with the “emotional” amygdala and the “habitual” basal ganglia, among other brain regions.

As John Calhoun emphasized in his visionary work,⁵⁸ the Compassionate Revolution is not inevitable. Yet it is possible. Speculating on how likely it is to happen is an idle exercise that detracts from the work of making it happen. Believing that it is possible, or believing that it is impossible, is likely to be a self-fulfilling prophecy either way.⁵⁹

Sigmund Freud was supposed to have said, when asked what a mentally healthy person should be able to do, *lieben und arbeiten*—in German, love and work.⁶⁰ Freud’s phrase captures the wisdom that we need to be both thoughtful and passionate, both smart and kind, both discerning and caring. These rational-emotional paradoxes are at the heart of our mental organization. They are a prime example of the workings of what neural network theorist Stephen Grossberg called the *complementary brain*: neural systems that synthesize two sets of seemingly opposed requirements for adapting to a changing environment.⁶¹

If we bridge those paradoxes at the levels of customs and policies as well as individual lives, we synthesize the Enlightenment glorification of human thinking and the Romantic and Countercultural glorifications of human passion, while avoiding the excesses of those eras. We heal the reason–emotion split and move toward the Compassionate Revolution.

Notes

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