"A MASTERPIECE THAT COMBINES THE BOUNDLESS CURIOSITY OF THE SCIENTIST, THE ERUDITION OF THE SCHOLAR, AND THE PASSION OF THE TRUTH TELLER." —JUDITH HERMAN, M.D.

THE BODY KEEPS THE SCORE

BRAIN, MIND, AND BODY IN THE HEALING OF TRAUMA

BESSEL VAN DER KOLK, M.D.

Praise for *The Body Keeps the Score*

"The trauma caused by childhood neglect, sexual or domestic abuse, and war wreaks havoc in our bodies, says Bessel van der Kolk in *The Body Keeps the Score*. . . . Van der Kolk draws on thirty years of experience to argue powerfully that trauma is one of the West's most urgent public health issues. . . . Packed with science and human stories, the book is an intense read. . . . The struggle and resilience of his patients is very moving."

—Shaoni Bhattacharya, *New Scientist*

"War zones may be nearer than you think, as the 25 percent of U.S. citizens raised with alcoholic relatives might attest. Psychiatrist Bessel van der Kolk argues, moreover, that severe trauma is 'encoded in the viscera' and demands tailored approaches that enable people to experience deep relief from rage and helplessness. In a narrative packed with decades of findings and case studies, he traces the evolution of treatments from the 'chemical coshes' of the 1970s to neurofeedback, mindfulness, and other nuanced techniques."

—Nature

"An astonishing amount of information on almost every aspect of trauma experience, research, interventions, and theories is brought together in this book, which . . . has a distinctly holistic feel to it. The title suggests that what will be explored is how the body retains the imprints of trauma. However, it delivers much more than this, delving into how the brain is impacted by overwhelming traumatic events, and is studded with sections on neuroscience which draw on the author's own numerous studies as well as those of his peers. In addition, it investigates the effects of adverse childhood attachment patterns, child abuse, and chronic and long-term abuse. . . . This book is a veritable goldmine of information."

—European Journal of Psychotraumatology

"Dr. van der Kolk . . . has written a fascinating and empowering book about trauma and its effects. He uses modern neuroscience to demonstrate that trauma physically affects the brain and the body, causing anxiety, rage, and the inability to concentrate. Victims have problems remembering, trusting, and forming relationships. They have lost control. Although news reports and discussions tend to focus on war veterans, abused children, domestic violence victims, and victims of violent crime suffer as well. Using a combination of traditional therapy techniques and alternative treatments such as EMDR, yoga, neurofeedback, and theater, patients can regain control of their bodies and rewire their brains so that they can rebuild their lives. The author uses case histories to demonstrate the process. He includes a resource list, bibliography, and extensive notes. This accessible book offers hope and inspiration to those who suffer from trauma and those who care for them. It is an outstanding addition to all library collections."

—Medical Library Association, Consumer Connections

"[A] wonderful new book that everyone involved with trauma ought to read and have available. . . . Beautifully, compellingly, and sweepingly written in its grand vision of integrating medical, psychological, and mixed or alternative approaches, based on a careful reading of the client and a holistic mind-body view . . . There are very few practitioners who could not learn from this book and become more effective, as well as inspired, by reading and studying it."

—Henry Strick van Linschoten, *European Society for Trauma and Dissociation* newsletter

"Psychological trauma can befall anyone, not just soldiers, refugees, or victims of rape. . . . This important and helpful book makes sense of suffering and offers opportunity for healing."

—*Booklist*

"Comprehensive in scope. This valuable work . . . offers hope for the millions of sufferers and their families seeking meaningful treatment and relief from the ongoing pain of trauma."

—*Library Journal* (starred review)

"Dr. van der Kolk's masterpiece combines the boundless curiosity of the scientist, the erudition of the scholar, and the passion of the truth teller."

—Judith Herman, MD, clinical professor of psychiatry, Harvard Medical School; author of *Trauma and Recovery*

"This is an absolutely fascinating and clearly written book by one of the nation's most experienced physicians in the field of emotional trauma. *The Body Keeps the Score* helps us understand how life experiences play out in the function and the malfunction of our bodies, years later."

—Vincent J. Felitti, M.D., chief of preventative medicine, emeritus, Kaiser Permanente San Diego, and co-principal investigator, ACE study

"In this inspirational work which seamlessly weaves keen clinical observation, neuroscience, historical analysis, the arts, and personal narrative, Dr. van der Kolk has created an authoritative guide to the effects of trauma and pathways to recovery. The book is full of wisdom, humanity, compassion, and scientific insight, gleaned from a lifetime of clinical service, research, and scholarship in the field of traumatic stress. A must-read for mental health and other health care professionals, trauma survivors, their loved ones, and those who seek clinical, social, or political solutions to the cycle of trauma and violence in our society."

—Rachel Yehuda, Ph.D., professor of psychiatry and neuroscience; director of the traumatic stress studies division at the Mount Sinai School of Medicine, New York

"Breathtaking in its scope and breadth, *The Body Keeps the Score* is a seminal work by one of the preeminent pioneers in trauma research and treatment. This essential book unites the evolving neuroscience of trauma research with an emergent wave of body-oriented therapies and traditional mind/body practices that go beyond symptom relief and connect us with our vital energy and here-and-now presence."

—Peter A. Levine, Ph.D., author of *In an Unspoken Voice: How the Body Releases Trauma and Restores Goodness*

"In *The Body Keeps the Score* we share the author's courageous journey into the parallel dissociative worlds of trauma victims and the medical and psychological disciplines that are meant to provide relief. In this compelling book we learn that as our minds desperately try to leave trauma behind, our bodies keep us trapped in the past with wordless emotions and feelings. These inner disconnections cascade into ruptures in social relationships with disastrous effects on marriages, families, and friendships. Van der Kolk offers hope by describing treatments and strategies that have successfully helped his patients reconnect their thoughts with their bodies. We leave this shared journey understanding that only through fostering self-awareness and gaining an inner sense of safety will we, as a species, fully experience the richness of life."

—Stephen W. Porges, Ph.D., professor of psychiatry, University of North Carolina at Chapel Hill; author of *The Polyvagal Theory: Neurophysiological Foundations of Emotions, Attachment, Communication, and Self-Regulation*

"This exceptional book will be a classic of modern psychiatric thought. The impact of overwhelming experience can only be truly understood when many disparate domains of knowledge, such as neuroscience, developmental psychopathology, and interpersonal neurobiology are integrated, as this work uniquely does. There is no other volume in the field of traumatic stress that has distilled these domains of science with such rich historical and clinical perspectives, and arrived at such innovative treatment approaches. The clarity of vision and breadth of wisdom of this unique but highly accessible work is remarkable. This book is essential reading for anyone interested in understanding and treating traumatic stress and the scope of its impact on society."

—Alexander McFarlane AO, MB BS (Hons) MD FRANZCP, director of the Centre for Traumatic Stress Studies, The University of Adelaide, South Australia

"This book is a tour de force. Its deeply empathic, insightful, and compassionate perspective promises to further humanize the treatment of trauma victims, dramatically expand their repertoire of self-regulatory healing practices and therapeutic options, and also stimulate greater creative thinking and research on trauma and its effective treatment. The body does keep the score, and van der Kolk's ability to demonstrate this through compelling descriptions of the work of others, his own pioneering trajectory and experience as the field evolved and him along with it, and above all, his discovery of ways to work skillfully with people by bringing mindfulness to the body (as well as to their thoughts and emotions) through yoga, movement, and theater are a wonderful and welcome breath of fresh air and possibility in the therapy world."

—Jon Kabat-Zinn, professor of medicine emeritus, UMass Medical School; author of *Full Catastrophe Living*

"This is an amazing accomplishment from the neuroscientist most responsible for the contemporary revolution in mental health toward the recognition that so many mental problems are the product of trauma. With the compelling writing of a good novelist, van der Kolk revisits his fascinating journey of discovery that has challenged established wisdom in psychiatry. Interspersed with that narrative are clear and understandable descriptions of the neurobiology of trauma; explanations of the ineffectiveness of traditional approaches to treating trauma; and introductions to the approaches that take patients beneath their cognitive minds to heal the parts

of them that remained frozen in the past. All this is illustrated vividly with dramatic case histories and substantiated with convincing research. This is a watershed book that will be remembered as tipping the scales within psychiatry and the culture at large toward the recognition of the toll traumatic events and our attempts to deny their impact take on us all."

—Richard Schwartz, originator, Internal Family Systems Therapy

"*The Body Keeps the Score* is clear, fascinating, hard to put down, and filled with powerful case histories. Van der Kolk, the eminent impresario of trauma treatment, who has spent a career bringing together diverse trauma scientists and clinicians and their ideas, while making his own pivotal contributions, describes what is arguably the most important series of breakthroughs in mental health in the last thirty years. We've known that psychological trauma fragments the mind. Here we see not only how psychological trauma also breaks connections within the brain, but also between mind *and* body, and learn about the exciting new approaches that allow people with the severest forms of trauma to put all the parts back together again."

—Norman Doidge, author of *The Brain That Changes Itself*

"Every once in a while, a book comes along that fundamentally changes the way we look at the world. Bessel van der Kolk has written such a book. The arc of van der Kolk's story is vast and comprehensive, but he is such a skillful storyteller that he keeps us riveted to the page. I could not put this book down. It is, simply put, a great work."

—Stephen Cope, founder and director, Kripalu Institute for Extraordinary Living; author of *Yoga and the Quest for the True Self*

"Bessel van der Kolk is unequaled in his ability to synthesize the stunning developments in the field of psychological trauma over the past few decades. Thanks in part to his work, psychological trauma—ranging from chronic child abuse and neglect to war trauma and natural disasters—is now generally recognized as a major cause of individual, social, and cultural breakdown. In this masterfully lucid and engaging tour de force, van der Kolk takes us—both specialists and the general public—on his personal journey and shows what he has learned from his research, from his colleagues and students, and, most important, from his patients. *The Body Keeps the Score* is, simply put, brilliant."

—Onno van der Hart, Ph.D., Utrecht University, The Netherlands; senior author of *The Haunted Self: Structural Dissociation and the Treatment of Chronic Traumatization*

"*The Body Keeps the Score* articulates new and better therapies for toxic stress based on a deep understanding of the effects of trauma on brain development and attachment systems. This volume provides a moving summary of what is currently known about the effects of trauma on individuals and societies, and introduces the healing potential of both age old and novel approaches to help traumatized children and adults to fully engage in the present."

—Jessica Stern, policy consultant on terrorism; author of *Denial: A Memoir of Terror*

"A book about understanding the impact of trauma by one of the true pioneers in the field. It is a rare book that integrates cutting edge neuroscience with wisdom and understanding about the experience and meaning of trauma, for people who have suffered from it. Like its author, this

book is wise and compassionate, occasionally quite provocative, and always interesting."

—Glenn N. Saxe, M.D., Arnold Simon Professor and chairman, Department of Child and Adolescent Psychiatry; director, NYU Child Study Center, New York University School of Medicine

"A fascinating exploration of a wide range of therapeutic treatments shows readers how to take charge of the healing process, gain a sense of safety, and find their way out of the morass of suffering."

—Francine Shapiro, Ph.D., originator of EMDR therapy, senior research fellow emeritus, Mental Research Institute; author of *Getting Past Your Past*

"As an attachment researcher I know that infants are psychobiological beings. They are as much of the body as they are of the brain. Without language or symbols infants use every one of their biological systems to make meaning of their self in relation to the world of things and people. Van der Kolk shows that those very same systems continue to operate at every age, and that traumatic experiences, especially chronic toxic experience during early development, produce psychic devastation. With this understanding he provides insight and guidance for survivors, researchers, and clinicians alike. Bessel van der Kolk may focus on the body and trauma, but what a mind he must have to have written this book."

—Ed Tronick, distinguished professor, University of Massachusetts, Boston; author of *Neurobehavior and Social Emotional Development of Infants and Young Children*

"*The Body Keeps the Score* eloquently articulates how overwhelming experiences affect the development of brain, mind, and body awareness, all of which are closely intertwined. The resulting derailments have a profound impact on the capacity for love and work. This rich integration of clinical case examples with groundbreaking scientific studies provides us with a new understanding of trauma, which inevitably leads to the exploration of novel therapeutic approaches that 'rewire' the brain, and help traumatized people to (re)-engage in the present. This book will provide traumatized individuals with a guide to healing and permanently change how psychologists and psychiatrists think about trauma and recovery."

—Ruth A. Lanius, M.D., Ph.D., Harris-Woodman chair in Psyche and Soma, professor of psychiatry, and director of PTSD research at the University of Western Ontario, and author of *The Impact of Early Life Trauma on Health and Disease*

"When it comes to understanding the impact of trauma and being able to continue to grow despite overwhelming life experiences, Bessel van der Kolk leads the way in his comprehensive knowledge, clinical courage, and creative strategies to help us heal. *The Body Keeps the Score* is a cutting-edge offering for the general reader to comprehend the complex effects of trauma, and a guide to a wide array of scientifically informed approaches to not only reduce suffering, but to move beyond mere survival—and to thrive."

—Daniel J. Siegel, M.D., clinical professor, UCLA School of Medicine; author of *Brainstorm: The Power and Purpose of the Teenage Brain*, *Mindsight: The New Science of Personal Transformation*, and *The Developing Mind: How Relationships and the Brain Interact to Shape Who We Are*

“In this magnificent book, Bessel van der Kolk takes the reader on a captivating journey that is chock full of riveting stories of patients and their struggles interpreted through history, research, and neuroscience made accessible in the words of a gifted storyteller. We are privy to the author’s own courageous efforts to understand and treat trauma over the past forty years, the results of which have broken new ground and challenged the status quo of psychiatry and psychotherapy. *The Body Keeps the Score* leaves us with both a profound appreciation for and a felt sense of, the debilitating effects of trauma, along with hope for the future through fascinating descriptions of novel approaches to treatment. This outstanding volume is absolutely essential reading not only for therapists but for all who seek to understand, prevent, or treat the immense suffering caused by trauma.”

—Pat Ogden Ph.D., founder/educational director of the Sensorimotor Psychotherapy Institute; author of *Sensorimotor Psychotherapy: Interventions for Trauma and Attachment*

“This is masterpiece of powerful understanding and brave heartedness, one of the most intelligent and helpful works on trauma I have ever read. Dr. van der Kolk offers a brilliant synthesis of clinical cases, neuroscience, powerful tools, and caring humanity, offering a whole new level of healing for the traumas carried by so many.”

—Jack Kornfied, author of *A Path with Heart*

“*The Body Keeps the Score* is masterful in bringing together science and humanism to clearly explain how trauma affects the whole person. Bessel van der Kolk brings deep understanding to the pain and chaos of the trauma experience. The treatment approaches he recommends heal the body and the mind, restoring hope, and the possibility of joy. One reads this book with profound gratitude for its wisdom.”

—Alicia Lieberman, Ph.D., professor of medical psychology UCSF, director of the Child Trauma Research Project, San Francisco General Hospital; author of *The Emotional Life of the Toddler*

PENGUIN BOOKS

THE BODY KEEPS THE SCORE

Bessel van der Kolk, M.D., is the founder and medical director of the Trauma Center in Brookline, Massachusetts. He is also a professor of psychiatry at Boston University School of Medicine and director of the National Complex Trauma Treatment Network. When he is not teaching around the world, Dr. van der Kolk works and lives in Boston.

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IN THE HEALING OF TRAUMA

Bessel A. van der Kolk, M.D.

Penguin Books

PENGUIN BOOKS
An imprint of Penguin Random House LLC
375 Hudson Street
New York, New York 10014
penguin.com

First published in the United States of America by Viking Penguin,
a member of Penguin Group (USA) LLC, 2014
Published in Penguin Books 2015

THE LIBRARY OF CONGRESS HAS CATALOGED THE HARDCOVER EDITION AS FOLLOWS:
Van der Kolk, Bessel A., 1943– author.
The body keeps the score : brain, mind, and body in the healing of trauma / Bessel A. van der Kolk.
p. ; cm.
Includes bibliographical references and index.
ISBN 978-1-101-60830-2
I. Title.
[DNLM: 1. Stress Disorders, Post-Traumatic—physiopathology.
2. Stress Disorders, Post-Traumatic—therapy.
WM 172.5]
RC552.P67
616.85'21206—dc23
2014021365

Cover design: Alex Merto
Cover art: 2015 Succession H. Matisse/Artists Rights Society (ARS), New York; Icarus, plate VIII from *Jazz*, 1947, Henri Matisse (1869–1954)/Scottish National Gallery of Modern Art, Edinburgh, UK/ © 2015 Succession H. Matisse/DACS, London/Photo: Bridgeman Images

Version_2

To my patients, who kept the score and were the textbook.

CONTENTS

PROLOGUE

FACING TRAUMA

One does not have be a combat soldier, or visit a refugee camp in Syria or the Congo to encounter trauma. Trauma happens to us, our friends, our families, and our neighbors. Research by the Centers for Disease Control and Prevention has shown that one in five Americans was sexually molested as a child; one in four was beaten by a parent to the point of a mark being left on their body; and one in three couples engages in physical violence. A quarter of us grew up with alcoholic relatives, and one out of eight witnessed their mother being beaten or hit.[1]

As human beings we belong to an extremely resilient species. Since time immemorial we have rebounded from our relentless wars, countless disasters (both natural and man-made), and the violence and betrayal in our own lives. But traumatic experiences do leave traces, whether on a large scale (on our histories and cultures) or close to home, on our families, with dark secrets being imperceptibly passed down through generations. They also leave traces on our minds and emotions, on our capacity for joy and intimacy, and even on our biology and immune systems.

Trauma affects not only those who are directly exposed to it, but also those around them. Soldiers returning home from combat may frighten their families with their rages and emotional absence. The wives of men who suffer from PTSD tend to become depressed, and the children of depressed mothers are at risk of growing up insecure and anxious. Having been exposed to family violence as a child often makes it difficult to establish stable, trusting relationships as an adult.

Trauma, by definition, is unbearable and intolerable. Most rape victims, combat soldiers, and children who have been molested become so upset when they think about what they experienced that they try to push it out of their minds, trying to act as if nothing happened, and move on. It takes tremendous energy to keep functioning while carrying the memory of terror, and the shame of utter weakness and vulnerability.

While we all want to move beyond trauma, the part of our brain that is devoted to ensuring our survival (deep below our rational brain) is not very good at denial. Long after a traumatic experience is over, it may be reactivated at the slightest hint of danger and mobilize disturbed brain circuits and secrete massive amounts of stress hormones. This precipitates unpleasant emotions intense physical sensations, and impulsive and aggressive actions. These posttraumatic reactions feel incomprehensible and overwhelming. Feeling out of control, survivors of trauma often begin to fear that they are damaged to the core and beyond redemption.

• • •

The first time I remember being drawn to study medicine was at a summer camp when I was about fourteen years old. My cousin Michael kept me up all night explaining the intricacies of how kidneys work, how they secrete the body's waste materials and then reabsorb the chemicals that keep the system in balance. I was riveted by his account of the miraculous way the body functions. Later, during every stage of my medical training, whether I was studying surgery, cardiology, or pediatrics, it was obvious to me that the key to healing was understanding how the human organism works. When I began my psychiatry rotation, however, I was struck by the contrast between the incredible complexity of the mind and the ways that we human beings are connected and attached to one another, and how little psychiatrists knew about the origins of the problems they were treating. Would it be possible one day to know as much about brains, minds, and love as we do about the other systems that make up our organism?

We are obviously still years from attaining that sort of detailed understanding, but the birth of three new branches of science has led to an explosion of knowledge about the effects of psychological trauma, abuse, and neglect. Those new disciplines are neuroscience, the study of how the brain supports mental processes; developmental psychopathology, the study of the impact of adverse experiences on the development of mind and brain; and interpersonal neurobiology, the study of how our behavior influences the emotions, biology, and mind-sets of those around us.

Research from these new disciplines has revealed that trauma produces actual physiological changes, including a recalibration of the brain's alarm system, an increase in stress hormone activity, and alterations in the system that filters relevant information from irrelevant. We now know that trauma compromises the brain area that communicates the physical, embodied feeling of being alive. These changes explain why traumatized individuals become hypervigilant to threat at the expense of spontaneously engaging in their day-to-day lives. They also help us understand why traumatized people so often keep repeating the same problems and have such trouble learning from experience. We now know that their behaviors are not the result of moral failings or signs of lack of willpower or bad character—they are caused by actual changes in the brain.

This vast increase in our knowledge about the basic processes that underlie trauma has also opened up new possibilities to palliate or even reverse the damage. We can now develop methods and experiences that utilize the brain's own natural neuroplasticity to help survivors feel fully alive in the present and move on with their lives. There are fundamentally three avenues: 1) top down, by talking, (re-) connecting with others, and allowing ourselves to know and understand what is going on with us, while processing the memories of the trauma; 2) by taking medicines that shut down inappropriate alarm reactions, or by utilizing other technologies that change the way the brain organizes information, and 3) bottom up: by allowing the body to have experiences that deeply and viscerally contradict the helplessness, rage, or collapse that result from trauma. Which one of these is best for any particular survivor is an empirical question. Most people I have worked with require a combination.

This has been my life's work. In this effort I have been supported by my colleagues and students at the Trauma Center, which I founded thirty years ago. Together we have treated thousands of traumatized children and adults: victims of child abuse, natural disasters, wars, accidents, and human trafficking; people who have suffered assaults by intimates and strangers.

We have a long tradition of discussing all our patients in great depth at weekly treatment team meetings and carefully tracking how well different forms of treatment work for particular individuals.

Our principal mission has always been to take care of the children and adults who have come to us for treatment, but from the very beginning we also have dedicated ourselves to conducting research to explore the effects of traumatic stress on different populations and to determine what treatments work for whom. We have been supported by research grants from the National Institute of Mental Health, the National Center for Complementary and Alternative Medicine, the Centers for Disease Control, and a number of private foundations to study the efficacy of many different forms of treatment, from medications to talking, yoga, EMDR, theater, and neurofeedback.

The challenge is: How can people gain control over the residues of past trauma and return to being masters of their own ship? Talking, understanding, and human connections help, and drugs can dampen hyperactive alarm systems. But we will also see that the imprints from the past can be transformed by having physical experiences that directly contradict the helplessness, rage, and collapse that are part of trauma, and thereby regaining self-mastery. I have no preferred treatment modality, as no single approach fits everybody, but I practice all the forms of treatment that I discuss in this book. Each one of them can produce profound changes, depending on the nature of the particular problem and the makeup of the individual person.

I wrote this book to serve as both a guide and an invitation—an invitation to dedicate ourselves to facing the reality of trauma, to explore how best to treat it, and to commit ourselves, as a society, to using every means we have to prevent it.

PART ONE

THE REDISCOVERY OF TRAUMA

CHAPTER 1

LESSONS FROM VIETNAM VETERANS

> I became what I am today at the age of twelve, on a frigid overcast day in the winter of 1975. . . . That was a long time ago, but it's wrong what they say about the past. . . . Looking back now, I realize I have been peeking into that deserted alley for the last twenty-six years.
>
> **—Khaled Hosseini, *The Kite Runner***

> Some people's lives seem to flow in a narrative; mine had many stops and starts. That's what trauma does. It interrupts the plot. . . . It just happens, and then life goes on. No one prepares you for it.
>
> **—Jessica Stern, *Denial: A Memoir of Terror***

The Tuesday after the Fourth of July weekend, 1978, was my first day as a staff psychiatrist at the Boston Veterans Administration Clinic. As I was hanging a reproduction of my favorite Breughel painting, "The Blind Leading the Blind," on the wall of my new office, I heard a commotion in the reception area down the hall. A moment later a large, disheveled man in a stained three-piece suit, carrying a copy of *Soldier of Fortune* magazine under his arm, burst through my door. He was so agitated and so clearly hungover that I wondered how I could possibly help this hulking man. I asked him to take a seat, and tell me what I could do for him.

His name was Tom. Ten years earlier he had been in the Marines, doing his service in Vietnam. He had spent the holiday weekend holed up in his downtown-Boston law office, drinking and looking at old photographs, rather than with his family. He knew from previous years' experience that the noise, the fireworks, the heat, and the picnic in his sister's backyard against the backdrop of dense early-summer foliage, all of which reminded him of Vietnam, would drive him crazy. When he got upset he was afraid to be around his family because he behaved like a monster with his wife and two young boys. The noise of his kids made him so agitated that he would storm out of the house to keep himself from hurting them. Only drinking himself into oblivion or riding his Harley-Davidson at dangerously high speeds helped him to calm down.

Nighttime offered no relief—his sleep was constantly interrupted by nightmares about an ambush in a rice paddy back in 'Nam, in which all the members of his platoon were killed or wounded. He also had terrifying flashbacks in which he saw dead Vietnamese children. The nightmares were so horrible that he dreaded falling asleep and he often stayed up for most of the night, drinking. In the morning his wife would find him passed out on the living room couch, and she and the boys had to tiptoe around him while she made them breakfast before taking them to school.

Filling me in on his background, Tom said that he had graduated from high school in 1965, the valedictorian of his class. In line with his family tradition of military service he enlisted in the Marine Corps immediately after graduation. His father had served in World War II in General Patton's army, and Tom never questioned his father's expectations. Athletic, intelligent, and an obvious leader, Tom felt powerful and effective after finishing basic training, a member of a team that was prepared for just about anything. In Vietnam he quickly became a platoon leader, in charge of eight other Marines. Surviving slogging through the mud while being strafed by machine-gun fire can leave people feeling pretty good about themselves—and their comrades.

At the end of his tour of duty Tom was honorably discharged, and all he wanted was to put Vietnam behind him. Outwardly that's exactly what he did. He attended college on the GI Bill, graduated from law school, married his high school sweetheart, and had two sons. Tom was upset by how difficult it was to feel any real affection for his wife, even though her letters had kept him alive in the madness of the jungle. Tom went through the motions of living a normal life, hoping that by faking it he would learn to become his old self again. He now had a thriving law practice and a picture-perfect family, but he sensed he wasn't normal; he felt dead inside.

Although Tom was the first veteran I had ever encountered on a professional basis, many aspects of his story were familiar to me. I grew up in postwar Holland, playing in bombed-out buildings, the son of a man who had been such an outspoken opponent of the Nazis that he had been sent to an internment camp. My father never talked about his war experiences, but he was given to outbursts of explosive rage that stunned me as a little boy. How could the man I heard quietly going down the stairs every morning to pray and read the Bible while the rest of the family slept have such a terrifying temper? How could someone whose life was devoted to the pursuit of social justice be so filled with anger? I witnessed the same puzzling behavior in my uncle, who had been captured by the Japanese in the Dutch East Indies (now Indonesia) and sent as a slave laborer to Burma, where he worked on the famous bridge over the river Kwai. He also rarely mentioned the war, and he, too, often erupted into uncontrollable rages.

As I listened to Tom, I wondered if my uncle and my father had had nightmares and flashbacks—if they, too, had felt disconnected from their loved ones and unable to find any real pleasure in their lives. Somewhere in the back of my mind there must also have been my memories of my frightened—and often frightening—mother, whose own childhood trauma was sometimes alluded to and, I now believe, was frequently reenacted. She had the unnerving habit of fainting when I asked her what her life was like as a little girl and then blaming me for making her so upset.

Reassured by my obvious interest, Tom settled down to tell me just how scared and confused he was. He was afraid that he was becoming just like his father, who was always angry and rarely talked with his children—except to compare them unfavorably with his comrades who had lost their lives around Christmas 1944, during the Battle of the Bulge.

As the session was drawing to a close, I did what doctors typically do: I focused on the one

part of Tom's story that I thought I understood—his nightmares. As a medical student I had worked in a sleep laboratory, observing people's sleep/dream cycles, and had assisted in writing some articles about nightmares. I had also participated in some early research on the beneficial effects of the psychoactive drugs that were just coming into use in the 1970s. So, while I lacked a true grasp of the scope of Tom's problems, the nightmares were something I could relate to, and as an enthusiastic believer in better living through chemistry, I prescribed a drug that we had found to be effective in reducing the incidence and severity of nightmares. I scheduled Tom for a follow-up visit two weeks later.

When he returned for his appointment, I eagerly asked Tom how the medicines had worked. He told me he hadn't taken any of the pills. Trying to conceal my irritation, I asked him why. "I realized that if I take the pills and the nightmares go away," he replied, "I will have abandoned my friends, and their deaths will have been in vain. I need to be a living memorial to my friends who died in Vietnam."

I was stunned: Tom's loyalty to the dead was keeping him from living his own life, just as his father's devotion to his friends had kept him from living. Both father's and son's experiences on the battlefield had rendered the rest of their lives irrelevant. How had that happened, and what could we do about it? That morning I realized I would probably spend the rest of my professional life trying to unravel the mysteries of trauma. How do horrific experiences cause people to become hopelessly stuck in the past? What happens in people's minds and brains that keeps them frozen, trapped in a place they desperately wish to escape? Why did this man's war not come to an end in February 1969, when his parents embraced him at Boston's Logan International Airport after his long flight back from Da Nang?

Tom's need to live out his life as a memorial to his comrades taught me that he was suffering from a condition much more complex than simply having bad memories or damaged brain chemistry—or altered fear circuits in the brain. Before the ambush in the rice paddy, Tom had been a devoted and loyal friend, someone who enjoyed life, with many interests and pleasures. In one terrifying moment, trauma had transformed everything.

During my time at the VA I got to know many men who responded similarly. Faced with even minor frustrations, our veterans often flew instantly into extreme rages. The public areas of the clinic were pockmarked with the impacts of their fists on the drywall, and security was kept constantly busy protecting claims agents and receptionists from enraged veterans. Of course, their behavior scared us, but I also was intrigued.

At home my wife and I were coping with similar problems in our toddlers, who regularly threw temper tantrums when told to eat their spinach or to put on warm socks. Why was it, then, that I was utterly unconcerned about my kids' immature behavior but deeply worried by what was going on with the vets (aside from their size, of course, which gave them the potential to inflict much more harm than my two-footers at home)? The reason was that I felt perfectly confident that, with proper care, my kids would gradually learn to deal with frustrations and disappointments, but I was skeptical that I would be able to help my veterans reacquire the skills of self-control and self-regulation that they had lost in the war.

Unfortunately, nothing in my psychiatric training had prepared me to deal with any of the challenges that Tom and his fellow veterans presented. I went down to the medical library to look for books on war neurosis, shell shock, battle fatigue, or any other term or diagnosis I could think of that might shed light on my patients. To my surprise the library at the VA didn't have a single book about any of these conditions. Five years after the last American soldier left

Vietnam, the issue of wartime trauma was still not on anybody's agenda. Finally, in the Countway Library at Harvard Medical School, I discovered *The Traumatic Neuroses of War*, which had been published in 1941 by a psychiatrist named Abram Kardiner. It described Kardiner's observations of World War I veterans and had been released in anticipation of the flood of shell-shocked soldiers expected to be casualties of World War II.[1]

Kardiner reported the same phenomena I was seeing: After the war his patients were overtaken by a sense of futility; they became withdrawn and detached, even if they had functioned well before. What Kardiner called "traumatic neuroses," today we call posttraumatic stress disorder—PTSD. Kardiner noted that sufferers from traumatic neuroses develop a chronic vigilance for and sensitivity to threat. His summation especially caught my eye: "The nucleus of the neurosis is a physioneurosis."[2] In other words, posttraumatic stress isn't "all in one's head," as some people supposed, but has a physiological basis. Kardiner understood even then that the symptoms have their origin in the entire body's response to the original trauma.

Kardiner's description corroborated my own observations, which was reassuring, but it provided me with little guidance on how to help the veterans. The lack of literature on the topic was a handicap, but my great teacher, Elvin Semrad, had taught us to be skeptical about textbooks. We had only one real textbook, he said: our patients. We should trust only what we could learn from them—and from our own experience. This sounds so simple, but even as Semrad pushed us to rely upon self-knowledge, he also warned us how difficult that process really is, since human beings are experts in wishful thinking and obscuring the truth. I remember him saying: "The greatest sources of our suffering are the lies we tell ourselves." Working at the VA I soon discovered how excruciating it can be to face reality. This was true both for my patients and for myself.

We don't really want to know what soldiers go through in combat. We do not really want to know how many children are being molested and abused in our own society or how many couples—almost a third, as it turns out—engage in violence at some point during their relationship. We want to think of families as safe havens in a heartless world and of our own country as populated by enlightened, civilized people. We prefer to believe that cruelty occurs only in faraway places like Darfur or the Congo. It is hard enough for observers to bear witness to pain. Is it any wonder, then, that the traumatized individuals themselves cannot tolerate remembering it and that they often resort to using drugs, alcohol, or self-mutilation to block out their unbearable knowledge?

Tom and his fellow veterans became my first teachers in my quest to understand how lives are shattered by overwhelming experiences, and in figuring out how to enable them to feel fully alive again.

TRAUMA AND THE LOSS OF SELF

The first study I did at the VA started with systematically asking veterans what had happened to them in Vietnam. I wanted to know what had pushed them over the brink, and why some had broken down as a result of that experience while others had been able to go on with their lives.[3] Most of the men I interviewed had gone to war feeling well prepared, drawn close by the rigors of basic training and the shared danger. They exchanged pictures of their families and girlfriends; they put up with one another's flaws. And they were prepared to risk their lives for their friends.

Most of them confided their dark secrets to a buddy, and some went so far as to share each other's shirts and socks.

Many of the men had friendships similar to Tom's with Alex. Tom met Alex, an Italian guy from Malden, Massachusetts, on his first day in country, and they instantly became close friends. They drove their jeep together, listened to the same music, and read each other's letters from home. They got drunk together and chased the same Vietnamese bar girls.

After about three months in country Tom led his squad on a foot patrol through a rice paddy just before sunset. Suddenly a hail of gunfire spurted from the green wall of the surrounding jungle, hitting the men around him one by one. Tom told me how he had looked on in helpless horror as all the members of his platoon were killed or wounded in a matter of seconds. He would never get one image out of his mind: the back of Alex's head as he lay facedown in the rice paddy, his feet in the air. Tom wept as he recalled, "He was the only real friend I ever had." Afterward, at night, Tom continued to hear the screams of his men and to see their bodies falling into the water. Any sounds, smells, or images that reminded him of the ambush (like the popping of firecrackers on the Fourth of July) made him feel just as paralyzed, terrified, and enraged as he had the day the helicopter evacuated him from the rice paddy.

Maybe even worse for Tom than the recurrent flashbacks of the ambush was the memory of what happened afterward. I could easily imagine how Tom's rage about his friend's death had led to the calamity that followed. It took him months of dealing with his paralyzing shame before he could tell me about it. Since time immemorial veterans, like Achilles in Homer's *Iliad*, have responded to the death of their comrades with unspeakable acts of revenge. The day after the ambush Tom went into a frenzy to a neighboring village, killing children, shooting an innocent farmer, and raping a Vietnamese woman. After that it became truly impossible for him to go home again in any meaningful way. How can you face your sweetheart and tell her that you brutally raped a woman just like her, or watch your son take his first step when you are reminded of the child you murdered? Tom experienced the death of Alex as if part of himself had been forever destroyed—the part that was good and honorable and trustworthy. Trauma, whether it is the result of something done to you or something you yourself have done, almost always makes it difficult to engage in intimate relationships. After you have experienced something so unspeakable, how do you learn to trust yourself or anyone else again? Or, conversely, how can you surrender to an intimate relationship after you have been brutally violated?

Tom kept showing up faithfully for his appointments, as I had become for him a lifeline—the father he'd never had, an Alex who had survived the ambush. It takes enormous trust and courage to allow yourself to remember. One of the hardest things for traumatized people is to confront their shame about the way they behaved during a traumatic episode, whether it is objectively warranted (as in the commission of atrocities) or not (as in the case of a child who tries to placate her abuser). One of the first people to write about this phenomenon was Sarah Haley, who occupied an office next to mine at the VA Clinic. In an article entitled "When the Patient Reports Atrocities,"[4] which became a major impetus for the ultimate creation of the PTSD diagnosis, she discussed the well-nigh intolerable difficulty of talking about (and listening to) the horrendous acts that are often committed by soldiers in the course of their war experiences. It's hard enough to face the suffering that has been inflicted by others, but deep down many traumatized people are even more haunted by the shame they feel about what they themselves did or did not do under the circumstances. They despise themselves for how terrified,

dependent, excited, or enraged they felt.

In later years I encountered a similar phenomenon in victims of child abuse: Most of them suffer from agonizing shame about the actions they took to survive and maintain a connection with the person who abused them. This was particularly true if the abuser was someone close to the child, someone the child depended on, as is so often the case. The result can be confusion about whether one was a victim or a willing participant, which in turn leads to bewilderment about the difference between love and terror; pain and pleasure. We will return to this dilemma throughout this book.

NUMBING

Maybe the worst of Tom's symptoms was that he felt emotionally numb. He desperately wanted to love his family, but he just couldn't evoke any deep feelings for them. He felt emotionally distant from everybody, as though his heart were frozen and he were living behind a glass wall. That numbness extended to himself, as well. He could not really feel anything except for his momentary rages and his shame. He described how he hardly recognized himself when he looked in the mirror to shave. When he heard himself arguing a case in court, he would observe himself from a distance and wonder how this guy, who happened to look and talk like him, was able to make such cogent arguments. When he won a case he pretended to be gratified, and when he lost it was as though he had seen it coming and was resigned to the defeat even before it happened. Despite the fact that he was a very effective lawyer, he always felt as though he were floating in space, lacking any sense of purpose or direction.

The only thing that occasionally relieved this feeling of aimlessness was intense involvement in a particular case. During the course of our treatment Tom had to defend a mobster on a murder charge. For the duration of that trial he was totally absorbed in devising a strategy for winning the case, and there were many occasions on which he stayed up all night to immerse himself in something that actually excited him. It was like being in combat, he said—he felt fully alive, and nothing else mattered. The moment Tom won that case, however, he lost his energy and sense of purpose. The nightmares returned, as did his rage attacks—so intensely that he had to move into a motel to ensure that he would not harm his wife or children. But being alone, too, was terrifying, because the demons of the war returned in full force. Tom tried to stay busy, working, drinking, and drugging—doing anything to avoid confronting his demons.

He kept thumbing through *Soldier of Fortune,* fantasizing about enlisting as a mercenary in one of the many regional wars then raging in Africa. That spring he took out his Harley and roared up the Kancamagus Highway in New Hampshire. The vibrations, speed, and danger of that ride helped him pull himself back together, to the point that he was able to leave his motel room and return to his family.

THE REORGANIZATION OF PERCEPTION

Another study I conducted at the VA started out as research about nightmares but ended up exploring how trauma changes people's perceptions and imagination. Bill, a former medic who had seen heavy action in Vietnam a decade earlier, was the first person enrolled in my nightmare study. After his discharge he had enrolled in a theological seminary and had been assigned to his

first parish in a Congregational church in a Boston suburb. He was doing fine until he and his wife had their first child. Soon after the baby's birth, his wife, a nurse, had gone back to work while he remained at home, working on his weekly sermon and other parish duties and taking care of their newborn. On the very first day he was left alone with the baby, it began to cry, and he found himself suddenly flooded with unbearable images of dying children in Vietnam.

Bill had to call his wife to take over child care and came to the VA in a panic. He described how he kept hearing the sounds of babies crying and seeing images of burned and bloody children's faces. My medical colleagues thought that he must surely be psychotic, because the textbooks of the time said that auditory and visual hallucinations were symptoms of paranoid schizophrenia. The same texts that provided this diagnosis also supplied a cause: Bill's psychosis was probably triggered by his feeling displaced in his wife's affections by their new baby.

As I arrived at the intake office that day, I saw Bill surrounded by worried doctors who were preparing to inject him with a powerful antipsychotic drug and ship him off to a locked ward. They described his symptoms and asked my opinion. Having worked in a previous job on a ward specializing in the treatment of schizophrenics, I was intrigued. Something about the diagnosis didn't sound right. I asked Bill if I could talk with him, and after hearing his story, I unwittingly paraphrased something Sigmund Freud had said about trauma in 1895: "I think this man is suffering from memories." I told Bill that I would try to help him and, after offering him some medications to control his panic, asked if he would be willing to come back a few days later to participate in my nightmare study.[5] He agreed.

As part of that study we gave our participants a Rorschach test.[6] Unlike tests that require answers to straightforward questions, responses to the Rorschach are almost impossible to fake. The Rorschach provides us with a unique way to observe how people construct a mental image from what is basically a meaningless stimulus: a blot of ink. Because humans are meaning-making creatures, we have a tendency to create some sort of image or story out of those inkblots, just as we do when we lie in a meadow on a beautiful summer day and see images in the clouds floating high above. What people make out of these blots can tell us a lot about how their minds work.

On seeing the second card of the Rorschach test, Bill exclaimed in horror, "This is that child that I saw being blown up in Vietnam. In the middle, you see the charred flesh, the wounds, and the blood is spurting out all over." Panting and with sweat beading on his forehead, he was in a panic similar to the one that had initially brought him to the VA clinic. Although I had heard veterans describing their flashbacks, this was the first time I actually witnessed one. In that very moment in my office, Bill was obviously seeing the same images, smelling the same smells, and feeling the same physical sensations he had felt during the original event. Ten years after helplessly holding a dying baby in his arms, Bill was reliving the trauma in response to an inkblot.

Experiencing Bill's flashback firsthand in my office helped me realize the agony that regularly visited the veterans I was trying to treat and helped me appreciate again how critical it was to find a solution. The traumatic event itself, however horrendous, had a beginning, a middle, and an end, but I now saw that flashbacks could be even worse. You never know when you will be assaulted by them again and you have no way of telling when they will stop. It took me years to learn how to effectively treat flashbacks, and in this process Bill turned out to be one of my most important mentors.

When we gave the Rorschach test to twenty-one additional veterans, the response was consistent: Sixteen of them, on seeing the second card, reacted as if they were experiencing a wartime trauma. The second Rorschach card is the first card that contains color and often elicits so-called color shock in response. The veterans interpreted this card with descriptions like "These are the bowels of my friend Jim after a mortar shell ripped him open" and "This is the neck of my friend Danny after his head was blown off by a shell while we were eating lunch." None of them mentioned dancing monks, fluttering butterflies, men on motorcycles, or any of the other ordinary, sometimes whimsical images that most people see.

While the majority of the veterans were greatly upset by what they saw, the reactions of the remaining five were even more alarming: They simply went blank. "This is nothing," one observed, "just a bunch of ink." They were right, of course, but the normal human response to ambiguous stimuli is to use our imagination to read something into them.

We learned from these Rorschach tests that traumatized people have a tendency to superimpose their trauma on everything around them and have trouble deciphering whatever is going on around them. There appeared to be little in between. We also learned that trauma affects the imagination. The five men who saw nothing in the blots had lost the capacity to let their minds play. But so, too, had the other sixteen men, for in viewing scenes from the past in those blots they were not displaying the mental flexibility that is the hallmark of imagination. They simply kept replaying an old reel.

Imagination is absolutely critical to the quality of our lives. Our imagination enables us to leave our routine everyday existence by fantasizing about travel, food, sex, falling in love, or having the last word—all the things that make life interesting. Imagination gives us the opportunity to envision new possibilities—it is an essential launchpad for making our hopes come true. It fires our creativity, relieves our boredom, alleviates our pain, enhances our pleasure, and enriches our most intimate relationships. When people are compulsively and constantly pulled back into the past, to the last time they felt intense involvement and deep emotions, they suffer from a failure of imagination, a loss of the mental flexibility. Without imagination there is no hope, no chance to envision a better future, no place to go, no goal to reach.

The Rorschach tests also taught us that traumatized people look at the world in a fundamentally different way from other people. For most of us a man coming down the street is just someone taking a walk. A rape victim, however, may see a person who is about to molest her and go into a panic. A stern schoolteacher may be an intimidating presence to an average kid, but for a child whose stepfather beats him up, she may represent a torturer and precipitate a rage attack or a terrified cowering in the corner.

STUCK IN TRAUMA

Our clinic was inundated with veterans seeking psychiatric help. However, because of an acute shortage of qualified doctors, all we could do was put most of them on a waiting list, even as they continued brutalizing themselves and their families. We began seeing a sharp increase in arrests of veterans for violent offenses and drunken brawls—as well as an alarming number of suicides. I received permission to start a group for young Vietnam veterans to serve as a sort of holding tank until "real" therapy could start.

At the opening session for a group of former Marines, the first man to speak flatly declared, “I do not want to talk about the war.” I replied that the members could discuss anything they wanted. After half an hour of excruciating silence, one veteran finally started to talk about his helicopter crash. To my amazement the rest immediately came to life, speaking with great intensity about their traumatic experiences. All of them returned the following week and the week after. In the group they found resonance and meaning in what had previously been only sensations of terror and emptiness. They felt a renewed sense of the comradeship that had been so vital to their war experience. They insisted that I had to be part of their newfound unit and gave me a Marine captain’s uniform for my birthday. In retrospect that gesture revealed part of the problem: You were either in or out—you either belonged to the unit or you were nobody. After trauma the world becomes sharply divided between those who know and those who don’t. People who have not shared the traumatic experience cannot be trusted, because they can’t understand it. Sadly, this often includes spouses, children, and co-workers.

Later I led another group, this time for veterans of Patton’s army—men now well into their seventies, all old enough to be my father. We met on Monday mornings at eight o’clock. In Boston winter snowstorms occasionally paralyze the public transit system, but to my amazement all of them showed up even during blizzards, some of them trudging several miles through the snow to reach the VA Clinic. For Christmas they gave me a 1940s GI-issue wristwatch. As had been the case with my group of Marines, I could not be their doctor unless they made me one of them.

Moving as these experiences were, the limits of group therapy became clear when I urged the men to talk about the issues they confronted in their daily lives: their relationships with their wives, children, girlfriends, and family; dealing with their bosses and finding satisfaction in their work; their heavy use of alcohol. Their typical response was to balk and resist and instead recount yet again how they had plunged a dagger through the heart of a German soldier in the Hürtgen Forest or how their helicopter had been shot down in the jungles of Vietnam.

Whether the trauma had occurred ten years in the past or more than forty, my patients could not bridge the gap between their wartime experiences and their current lives. Somehow the very event that caused them so much pain had also become their sole source of meaning. They felt fully alive only when they were revisiting their traumatic past.

DIAGNOSING POSTTRAUMATIC STRESS

In those early days at the VA, we labeled our veterans with all sorts of diagnoses—alcoholism, substance abuse, depression, mood disorder, even schizophrenia—and we tried every treatment in our textbooks. But for all our efforts it became clear that we were actually accomplishing very little. The powerful drugs we prescribed often left the men in such a fog that they could barely function. When we encouraged them to talk about the precise details of a traumatic event, we often inadvertently triggered a full-blown flashback, rather than helping them resolve the issue. Many of them dropped out of treatment because we were not only failing to help but also sometimes making things worse.

A turning point arrived in 1980, when a group of Vietnam veterans, aided by the New York psychoanalysts Chaim Shatan and Robert J. Lifton, successfully lobbied the American Psychiatric Association to create a new diagnosis: posttraumatic stress disorder (PTSD), which

described a cluster of symptoms that was common, to a greater or lesser extent, to all of our veterans. Systematically identifying the symptoms and grouping them together into a disorder finally gave a name to the suffering of people who were overwhelmed by horror and helplessness. With the conceptual framework of PTSD in place, the stage was set for a radical change in our understanding of our patients. This eventually led to an explosion of research and attempts at finding effective treatments.

Inspired by the possibilities presented by this new diagnosis, I proposed a study on the biology of traumatic memories to the VA. Did the memories of those suffering from PTSD differ from those of others? For most people the memory of an unpleasant event eventually fades or is transformed into something more benign. But most of our patients were unable to make their past into a story that happened long ago.[7]

The opening line of the grant rejection read: "It has never been shown that PTSD is relevant to the mission of the Veterans Administration." Since then, of course, the mission of the VA has become organized around the diagnosis of PTSD and brain injury, and considerable resources are dedicated to applying "evidence-based treatments" to traumatized war veterans. But at the time things were different and, unwilling to keep working in an organization whose view of reality was so at odds with my own, I handed in my resignation; in 1982 I took a position at the Massachusetts Mental Health Center, the Harvard teaching hospital where I had trained to become a psychiatrist. My new responsibility was to teach a fledgling area of study: psychopharmacology, the administration of drugs to alleviate mental illness.

In my new job I was confronted on an almost daily basis with issues I thought I had left behind at the VA. My experience with combat veterans had so sensitized me to the impact of trauma that I now listened with a very different ear when depressed and anxious patients told me stories of molestation and family violence. I was particularly struck by how many female patients spoke of being sexually abused as children. This was puzzling, as the standard textbook of psychiatry at the time stated that incest was extremely rare in the United States, occurring about once in every million women.[8] Given that there were then only about one hundred million women living in the United States, I wondered how forty seven, almost half of them, had found their way to my office in the basement of the hospital.

Furthermore, the textbook said, "There is little agreement about the role of father-daughter incest as a source of serious subsequent psychopathology." My patients with incest histories were hardly free of "subsequent psychopathology"—they were profoundly depressed, confused, and often engaged in bizarrely self-harmful behaviors, such as cutting themselves with razor blades. The textbook went on to practically endorse incest, explaining that "such incestuous activity diminishes the subject's chance of psychosis and allows for a better adjustment to the external world."[9] In fact, as it turned out, incest had devastating effects on women's well-being.

In many ways these patients were not so different from the veterans I had just left behind at the VA. They also had nightmares and flashbacks. They also alternated between occasional bouts of explosive rage and long periods of being emotionally shut down. Most of them had great difficulty getting along with other people and had trouble maintaining meaningful relationships.

As we now know, war is not the only calamity that leaves human lives in ruins. While about a quarter of the soldiers who serve in war zones are expected to develop serious posttraumatic problems,[10] the majority of Americans experience a violent crime at some time during their lives, and more accurate reporting has revealed that twelve million women in the United States have

been victims of rape. More than half of all rapes occur in girls below age fifteen.[11] For many people the war begins at home: Each year about three million children in the United States are reported as victims of child abuse and neglect. One million of these cases are serious and credible enough to force local child protective services or the courts to take action.[12] In other words, for every soldier who serves in a war zone abroad, there are ten children who are endangered in their own homes. This is particularly tragic, since it is very difficult for growing children to recover when the source of terror and pain is not enemy combatants but their own caretakers.

A NEW UNDERSTANDING

In the three decades since I met Tom, we have learned an enormous amount not only about the impact and manifestations of trauma but also about ways to help traumatized people find their way back. Since the early 1990s brain-imaging tools have started to show us what actually happens inside the brains of traumatized people. This has proven essential to understanding the damage inflicted by trauma and has guided us to formulate entirely new avenues of repair.

We have also begun to understand how overwhelming experiences affect our innermost sensations and our relationship to our physical reality—the core of who we are. We have learned that trauma is not just an event that took place sometime in the past; it is also the imprint left by that experience on mind, brain, and body. This imprint has ongoing consequences for how the human organism manages to survive in the present.

Trauma results in a fundamental reorganization of the way mind and brain manage perceptions. It changes not only how we think and what we think about, but also our very capacity to think. We have discovered that helping victims of trauma find the words to describe what has happened to them is profoundly meaningful, but usually it is not enough. The act of telling the story doesn’t necessarily alter the automatic physical and hormonal responses of bodies that remain hypervigilant, prepared to be assaulted or violated at any time. For real change to take place, the body needs to learn that the danger has passed and to live in the reality of the present. Our search to understand trauma has led us to think differently not only about the structure of the mind but also about the processes by which it heals.

CHAPTER 2

REVOLUTIONS IN UNDERSTANDING MIND AND BRAIN

> The greater the doubt, the greater the awakening; the smaller the doubt, the smaller the awakening. No doubt, no awakening.
>
> **—C.-C. Chang, *The Practice of Zen***

> You live through that little piece of time that is yours, but that piece of time is not only your own life, it is the summing-up of all the other lives that are simultaneous with yours. . . . What you are is an expression of History.
>
> **—Robert Penn Warren, *World Enough and Time***

In the late 1960s, during a year off between my first and second years of medical school, I became an accidental witness to a profound transition in the medical approach to mental suffering. I had landed a plum job as an attendant on a research ward at the Massachusetts Mental Health Center, where I was in charge of organizing recreational activities for the patients. MMHC had long been considered one of the finest psychiatric hospitals in the country, a jewel in the crown of the Harvard Medical School teaching empire. The goal of the research on my ward was to determine whether psychotherapy or medication was the best way to treat young people who had suffered a first mental breakdown diagnosed as schizophrenia.

The talking cure, an offshoot of Freudian psychoanalysis, was still the primary treatment for mental illness at MMHC. However, in the early 1950s a group of French scientists had discovered a new compound, chlorpromazine (sold under the brand name Thorazine), that could "tranquilize" patients and make them less agitated and delusional. That inspired hope that drugs could be developed to treat serious mental problems such as depression, panic, anxiety, and mania, as well as to manage some of the most disturbing symptoms of schizophrenia.

As an attendant I had nothing to do with the research aspect of the ward and was never told what treatment any of the patients was receiving. They were all close to my age—college students from Harvard, MIT, and Boston University. Some had tried to kill themselves; others cut themselves with knives or razor blades; several had attacked their roommates or had otherwise terrified their parents or friends with their unpredictable, irrational behavior. My job

was to keep them involved in normal activities for college students, such as eating at the local pizza parlor, camping in a nearby state forest, attending Red Sox games, and sailing on the Charles River.

Totally new to the field, I sat in rapt attention during ward meetings, trying to decipher the patients' complicated speech and logic. I also had to learn to deal with their irrational outbursts and terrified withdrawal. One morning I found a patient standing like a statue in her bedroom with one arm raised in a defensive gesture, her face frozen in fear. She remained there, immobile, for at least twelve hours. The doctors gave me the name for her condition, catatonia, but even the textbooks I consulted didn't tell me what could be done about it. We just let it run its course.

TRAUMA BEFORE DAWN

I spent many nights and weekends on the unit, which exposed me to things the doctors never saw during their brief visits. When patients could not sleep, they often wandered in their tightly wrapped bathrobes into the darkened nursing station to talk. The quiet of the night seemed to help them open up, and they told me stories about having been hit, assaulted, or molested, often by their own parents, sometimes by relatives, classmates, or neighbors. They shared memories of lying in bed at night, helpless and terrified, hearing their mother being beaten by their father or a boyfriend, hearing their parents yell horrible threats at each other, hearing the sounds of furniture breaking. Others told me about fathers who came home drunk—hearing their footsteps on the landing and how they waited for them to come in, pull them out of bed, and punish them for some imagined offense. Several of the women recalled lying awake, motionless, waiting for the inevitable—a brother or father coming in to molest them.

During morning rounds the young doctors presented their cases to their supervisors, a ritual that the ward attendants were allowed to observe in silence. They rarely mentioned stories like the ones I'd heard. However, many later studies have confirmed the relevance of those midnight confessions: We now know that more than half the people who seek psychiatric care have been assaulted, abandoned, neglected, or even raped as children, or have witnessed violence in their families.[1] But such experiences seemed to be off the table during rounds. I was often surprised by the dispassionate way patients' symptoms were discussed and by how much time was spent on trying to manage their suicidal thoughts and self-destructive behaviors, rather than on understanding the possible causes of their despair and helplessness. I was also struck by how little attention was paid to their accomplishments and aspirations; whom they cared for, loved, or hated; what motivated and engaged them, what kept them stuck, and what made them feel at peace—the ecology of their lives.

A few years later, as a young doctor, I was confronted with an especially stark example of the medical model in action. I was then moonlighting at a Catholic hospital, doing physical examinations on women who'd been admitted to receive electroshock treatment for depression. Being my curious immigrant self, I'd look up from their charts to ask them about their lives. Many of them spilled out stories about painful marriages, difficult children, and guilt over abortions. As they spoke, they visibly brightened and often thanked me effusively for listening to them. Some of them wondered if they really still needed electroshock after having gotten so much off their chests. I always felt sad at the end of these meetings, knowing that the treatments that would be administered the following morning would erase all memory of our conversation. I

did not last long in that job.

On my days off from the ward at MMHC, I often went to the Countway Library of Medicine to learn more about the patients I was supposed to help. One Saturday afternoon I came across a treatise that is still revered today: Eugen Bleuler's 1911 textbook *Dementia Praecox*. Bleuler's observations were fascinating:

> Among schizophrenic body hallucinations, the sexual ones are by far the most frequent and the most important. All the raptures and joys of normal and abnormal sexual satisfaction are experienced by these patients, but even more frequently every obscene and disgusting practice which the most extravagant fantasy can conjure up. Male patients have their semen drawn off; painful erections are stimulated. The women patients are raped and injured in the most devilish ways. . . . In spite of the symbolic meaning of many such hallucinations, the majority of them correspond to real sensations.[2]

This made me wonder: Our patients had hallucinations—the doctors routinely asked about them and noted them as signs of how disturbed the patients were. But if the stories I'd heard in the wee hours were true, could it be that these "hallucinations" were in fact the fragmented memories of real experiences? Were hallucinations just the concoctions of sick brains? Could people make up physical sensations they had never experienced? Was there a clear line between creativity and pathological imagination? Between memory and imagination? These questions remain unanswered to this day, but research has shown that people who've been abused as children often feel sensations (such as abdominal pain) that have no obvious physical cause; they hear voices warning of danger or accusing them of heinous crimes.

There was no question that many patients on the ward engaged in violent, bizarre, and self-destructive behaviors, particularly when they felt frustrated, thwarted, or misunderstood. They threw temper tantrums, hurled plates, smashed windows, and cut themselves with shards of glass. At that time I had no idea why someone might react to a simple request ("Let me clean that goop out of your hair") with rage or terror. I usually followed the lead of the experienced nurses, who signaled when to back off or, if that did not work, to restrain a patient. I was surprised and alarmed by the satisfaction I sometimes felt after I'd wrestled a patient to the floor so a nurse could give an injection, and I gradually realized how much of our professional training was geared to helping us stay in control in the face of terrifying and confusing realities.

Sylvia was a gorgeous nineteen-year-old Boston University student who usually sat alone in the corner of the ward, looking frightened to death and virtually mute, but whose reputation as the girlfriend of an important Boston mafioso gave her an aura of mystery. After she refused to eat for more than a week and rapidly started to lose weight, the doctors decided to force-feed her. It took three of us to hold her down, another to push the rubber feeding tube down her throat, and a nurse to pour the liquid nutrients into her stomach. Later, during a midnight confession, Sylvia spoke timidly and hesitantly about her childhood sexual abuse by her brother and uncle. I realized then our display of "caring" must have felt to her much like a gang rape. This experience, and others like it, helped me formulate this rule for my students: If you do something to a patient that you would not do to your friends or children, consider whether you are unwittingly replicating a trauma from the patient's past.

In my role as recreation leader I noticed other things: As a group the patients were strikingly clumsy and physically uncoordinated. When we went camping, most of them stood helplessly by as I pitched the tents. We almost capsized once in a squall on the Charles River because they huddled rigidly in the lee, unable to grasp that they needed to shift position to balance the boat. In volleyball games the staff members invariably were much better coordinated than the patients. Another characteristic they shared was that even their most relaxed conversations seemed stilted, lacking the natural flow of gestures and facial expressions that are typical among friends. The relevance of these observations became clear only after I'd met the body-based therapists Peter Levine and Pat Ogden; in the later chapters I'll have a lot to say about how trauma is held in people's bodies.

MAKING SENSE OF SUFFERING

After my year on the research ward I resumed medical school and then, as a newly minted MD, returned to MMHC to be trained as a psychiatrist, a program to which I was thrilled to be accepted. Many famous psychiatrists had trained there, including Eric Kandel, who later won the Nobel Prize in Physiology and Medicine. Allan Hobson discovered the brain cells responsible for the generation of dreams in a lab in the hospital basement while I trained there, and the first studies on the chemical underpinnings of depression were also conducted at MMHC. But for many of us residents, the greatest draw was the patients. We spent six hours each day with them and then met as a group with senior psychiatrists to share our observations, pose our questions, and compete to make the wittiest remarks.

Our great teacher, Elvin Semrad, actively discouraged us from reading psychiatry textbooks during our first year. (This intellectual starvation diet may account for the fact that most of us later became voracious readers and prolific writers.) Semrad did not want our perceptions of reality to become obscured by the pseudocertainties of psychiatric diagnoses. I remember asking him once: "What would you call this patient—schizophrenic or schizoaffective?" He paused and stroked his chin, apparently in deep thought. "I think I'd call him Michael McIntyre," he replied.

Semrad taught us that most human suffering is related to love and loss and that the job of therapists is to help people "acknowledge, experience, and bear" the reality of life—with all its pleasures and heartbreak. "The greatest sources of our suffering are the lies we tell ourselves," he'd say, urging us to be honest with ourselves about every facet of our experience. He often said that people can never get better without knowing what they know and feeling what they feel.

I remember being surprised to hear this distinguished old Harvard professor confess how comforted he was to feel his wife's bum against him as he fell asleep at night. By disclosing such simple human needs in himself he helped us recognize how basic they were to our lives. Failure to attend to them results in a stunted existence, no matter how lofty our thoughts and worldly accomplishments. Healing, he told us, depends on experiential knowledge: You can be fully in charge of your life only if you can acknowledge the reality of your body, in all its visceral dimensions.

Our profession, however, was moving in a different direction. In 1968 the *American Journal of Psychiatry* had published the results of the study from the ward where I'd been an attendant. They showed unequivocally that schizophrenic patients who received drugs alone had a better outcome than those who talked three times a week with the best therapists in Boston.[3] This study

was one of many milestones on a road that gradually changed how medicine and psychiatry approached psychological problems: from infinitely variable expressions of intolerable feelings and relationships to a brain-disease model of discrete “disorders.”

The way medicine approaches human suffering has always been determined by the technology available at any given time. Before the Enlightenment aberrations in behavior were ascribed to God, sin, magic, witches, and evil spirits. It was only in the nineteenth century that scientists in France and Germany began to investigate behavior as an adaptation to the complexities of the world. Now a new paradigm was emerging: Anger, lust, pride, greed, avarice, and sloth—as well as all the other problems we humans have always struggled to manage—were recast as “disorders” that could be fixed by the administration of appropriate chemicals.[4] Many psychiatrists were relieved and delighted to become “real scientists,” just like their med school classmates who had laboratories, animal experiments, expensive equipment, and complicated diagnostic tests, and set aside the wooly-headed theories of philosophers like Freud and Jung. A major textbook of psychiatry went so far as to state: “The cause of mental illness is now considered an aberration of the brain, a chemical imbalance.”[5]

Like my colleagues, I eagerly embraced the pharmacological revolution. In 1973 I became the first chief resident in psychopharmacology at MMHC. I may also have been the first psychiatrist in Boston to administer lithium to a manic-depressive patient. (I’d read about John Cade’s work with lithium in Australia, and I received permission from a hospital committee to try it.) On lithium a woman who had been manic every May for the past thirty-five years, and suicidally depressed every November, stopped cycling and remained stable for the three years she was under my care. I was also part of the first U.S. research team to test the antipsychotic Clozaril on chronic patients who were warehoused in the back wards of the old insane asylums.[6] Some of their responses were miraculous: People who had spent much of their lives locked in their own separate, terrifying realities were now able to return to their families and communities; patients mired in darkness and despair started to respond to the beauty of human contact and the pleasures of work and play. These amazing results made us optimistic that we could finally conquer human misery.

Antipsychotic drugs were a major factor in reducing the number of people living in mental hospitals in the United States, from over 500,000 in 1955 to fewer than 100,000 in 1996.[7] For people today who did not know the world before the advent of these treatments, the change is almost unimaginable. As a first-year medical student I visited Kankakee State Hospital in Illinois and saw a burly ward attendant hose down dozens of filthy, naked, incoherent patients in an unfurnished dayroom supplied with gutters for the runoff water. This memory now seems more like a nightmare than like something I witnessed with my own eyes. My first job after finishing my residency in 1974 was as the second-to-last director of a once-venerable institution, the Boston State Hospital, which had formerly housed thousands of patients and been spread over hundreds of acres with dozens of buildings, including greenhouses, gardens, and workshops—most of them by then in ruins. During my time there patients were gradually dispersed into “the community,” the blanket term for the anonymous shelters and nursing homes where most of them ended up. (Ironically, the hospital was started as an “asylum,” a word meaning “sanctuary” that gradually took on a sinister connotation. It actually did offer a sheltered community where everybody knew the patients’ names and idiosyncrasies.) In 1979, shortly after I went to work at the VA, the Boston State Hospital’s gates were permanently locked, and it became a ghost town.

During my time at Boston State I continued to work in the MMHC psychopharmacology lab, which was now focusing on another direction for research. In the 1960s scientists at the National Institutes of Health had begun to develop techniques for isolating and measuring hormones and neurotransmitters in blood and the brain. Neurotransmitters are chemical messengers that carry information from neuron to neuron, enabling us to engage effectively with the world.

Now that scientists were finding evidence that abnormal levels of norepinephrine were associated with depression, and of dopamine with schizophrenia, there was hope that we could develop drugs that target specific brain abnormalities. That hope was never fully realized, but our efforts to measure how drugs could affect mental symptoms led to another profound change in the profession. Researchers' need for a precise and systematic way to communicate their findings resulted in the development of the so-called Research Diagnostic Criteria, to which I contributed as a lowly research assistant. These eventually became the basis for the first systematic system to diagnose psychiatric problems, the American Psychiatric Association's *Diagnostic and Statistical Manual of Mental Disorders* (DSM), which is commonly referred to as the "bible of psychiatry." The foreword to the landmark 1980 DSM-III was appropriately modest and acknowledged that this diagnostic system was imprecise—so imprecise that it never should be used for forensic or insurance purposes.[8] As we will see, that modesty was tragically short-lived.

INESCAPABLE SHOCK

Preoccupied with so many lingering questions about traumatic stress, I became intrigued with the idea that the nascent field of neuroscience could provide some answers and started to attend the meetings of the American College of Neuropsychopharmacology (ACNP). In 1984 the ACNP offered many fascinating lectures about drug development, but it was not until a few hours before my scheduled flight back to Boston that I heard a presentation by Steven Maier of the University of Colorado, who had collaborated with Martin Seligman of the University of Pennsylvania. His topic was learned helplessness in animals. Maier and Seligman had repeatedly administered painful electric shocks to dogs who were trapped in locked cages. They called this condition "inescapable shock."[9] Being a dog lover, I realized that I could never have done such research myself, but I was curious about how this cruelty would affect the animals.

After administering several courses of electric shock, the researchers opened the doors of the cages and then shocked the dogs again. A group of control dogs who had never been shocked before immediately ran away, but the dogs who had earlier been subjected to inescapable shock made no attempt to flee, even when the door was wide open—they just lay there, whimpering and defecating. The mere opportunity to escape does not necessarily make traumatized animals, or people, take the road to freedom. Like Maier and Seligman's dogs, many traumatized people simply give up. Rather than risk experimenting with new options they stay stuck in the fear they know.

I was riveted by Maier's account. What they had done to these poor dogs was exactly what had happened to my traumatized human patients. They, too, had been exposed to somebody (or something) who had inflicted terrible harm on them—harm they had no way of escaping. I made a rapid mental review of the patients I had treated. Almost all had in some way been trapped or immobilized, unable to take action to stave off the inevitable. Their fight/flight response had been thwarted, and the result was either extreme agitation or collapse.

Maier and Seligman also found that traumatized dogs secreted much larger amounts of stress hormones than was normal. This supported what we were beginning to learn about the biological underpinnings of traumatic stress. A group of young researchers, among them Steve Southwick and John Krystal at Yale, Arieh Shalev at Hadassah Medical School in Jerusalem, Frank Putnam at the National Institute of Mental Health (NIMH), and Roger Pitman, later at Harvard, were all finding that traumatized people keep secreting large amounts of stress hormones long after the actual danger has passed, and Rachel Yehuda at Mount Sinai in New York confronted us with her seemingly paradoxical findings that the levels of the stress hormone cortisol are low in PTSD. Her discoveries only started to make sense when her research clarified that cortisol puts an end to the stress response by sending an all-safe signal, and that, in PTSD, the body's stress hormones do, in fact, not return to baseline after the threat has passed.

Ideally our stress hormone system should provide a lightning-fast response to threat, but then quickly return us to equilibrium. In PTSD patients, however, the stress hormone system fails at this balancing act. Fight/flight/freeze signals continue after the danger is over, and, as in the case of the dogs, do not return to normal. Instead, the continued secretion of stress hormones is expressed as agitation and panic and, in the long term, wreaks havoc with their health.

I missed my plane that day because I had to talk with Steve Maier. His workshop offered clues not only about the underlying problems of my patients but also potential keys to their resolution. For example, he and Seligman had found that the only way to teach the traumatized dogs to get off the electric grids when the doors were open was to repeatedly drag them out of their cages so they could physically experience how they could get away. I wondered if we also could help my patients with their fundamental orientation that there was nothing they could do to defend themselves? Did my patients also need to have *physical* experiences to restore a visceral sense of control? What if they could be taught to physically move to escape a potentially threatening situation that was similar to the trauma in which they had been trapped and immobilized? As I will discuss in the treatment part 5 of this book, that was one of the conclusions I eventually reached.

Further animal studies involving mice, rats, cats, monkeys, and elephants brought more intriguing data.[10] For example, when researchers played a loud, intrusive sound, mice that had been raised in a warm nest with plenty of food scurried home immediately. But another group, raised in a noisy nest with scarce food supplies, also ran for home, even after spending time in more pleasant surroundings.[11]

Scared animals return home, regardless of whether home is safe or frightening. I thought about my patients with abusive families who kept going back to be hurt again. Are traumatized people condemned to seek refuge in what is familiar? If so, why, and is it possible to help them become attached to places and activities that are safe and pleasurable?[12]

ADDICTED TO TRAUMA: THE PAIN OF PLEASURE AND THE PLEASURE OF PAIN

One of the things that struck my colleague Mark Greenberg and me when we ran therapy groups for Vietnam combat veterans was how, despite their feelings of horror and grief, many of them seemed to come to life when they talked about their helicopter crashes and their dying comrades. (Former *New York Times* correspondent Chris Hedges, who covered a number of brutal conflicts, entitled his book *War Is a Force That Gives Us Meaning*.[13]) Many traumatized people seem to

seek out experiences that would repel most of us,[14] and patients often complain about a vague sense of emptiness and boredom when they are not angry, under duress, or involved in some dangerous activity.

My patient Julia was brutally raped at gunpoint in a hotel room at age sixteen. Shortly thereafter she got involved with a violent pimp who prostituted her and with whom she abused a variety of illegal drugs. He regularly beat her up. She was repeatedly jailed for prostitution, but she always went back to her pimp. Finally her grandparents intervened and paid for an intense rehab program. After she successfully completed inpatient treatment, she started working as a receptionist and taking courses at a local college. In her sociology class she wrote a term paper about the liberating possibilities of prostitution, for which she read the memoirs of several famous prostitutes. She gradually dropped all her other courses. A brief relationship with a classmate quickly went sour—he bored her to tears, she said, and she was repelled by his boxer shorts. She then picked up an addict on the subway who first beat her up and then started to stalk her. She finally became motivated to return to treatment when she was once again severely beaten.

Freud had a term for such traumatic reenactments: "the compulsion to repeat." He and many of his followers believed that reenactments were an unconscious attempt to get control over a painful situation and that they eventually could lead to mastery and resolution. There is no evidence for that theory—repetition leads only to further pain and self-hatred. In fact, even reliving the trauma repeatedly in therapy may reinforce preoccupation and fixation.

Mark Greenberg and I decided to learn more about attractors—the things that draw us, motivate us, and make us feel alive. Normally attractors are meant to make us feel better. So, why are so many people attracted to dangerous or painful situations? We eventually found a study that explained how activities that cause fear or pain can later become thrilling experiences.[15] In the 1970s Richard Solomon of the University of Pennsylvania had shown that the body learns to adjust to all sorts of stimuli. We may get hooked on recreational drugs because they right away make us feel so good, but activities like sauna bathing, marathon running, or parachute jumping, which initially cause discomfort and even terror, can ultimately become very enjoyable. This gradual adjustment signals that a new chemical balance has been established within the body, so that marathon runners, say, get a sense of well-being and exhilaration from pushing their bodies to the limit.

At this point, just as with drug addiction, we start to crave the activity and experience withdrawal when it's not available. In the long run people become more preoccupied with the pain of withdrawal than the activity itself. This theory could explain why some people hire someone to beat them, or burn themselves with cigarettes. or why they are only attracted to people who hurt them. Fear and aversion, in some perverse way, can be transformed into pleasure.

Solomon hypothesized that endorphins—the morphinelike chemicals that the brain secretes in response to stress—play a role in the paradoxical addictions he described. I thought of his theory again when my library habit led me to a paper titled "Pain in Men Wounded in Battle," published in 1946. Having observed that 75 percent of severely wounded soldiers on the Italian front did not request morphine, a surgeon by the name of Henry K. Beecher speculated that "strong emotions can block pain."[16]

Were Beecher's observations relevant to people with PTSD? Mark Greenberg, Roger

Pitman, Scott Orr, and I decided to ask eight Vietnam combat veterans if they would be willing to take a standard pain test while they watched scenes from a number of movies. The first clip we showed was from Oliver Stone's graphically violent *Platoon* (1986), and while it ran we measured how long the veterans could keep their right hands in a bucket of ice water. We then repeated this process with a peaceful (and long-forgotten) movie clip. Seven of the eight veterans kept their hands in the painfully cold water 30 percent longer during *Platoon*. We then calculated that the amount of analgesia produced by watching fifteen minutes of a combat movie was equivalent to that produced by being injected with eight milligrams of morphine, about the same dose a person would receive in an emergency room for crushing chest pain.

We concluded that Beecher's speculation that "strong emotions can block pain" was the result of the release of morphinelike substances manufactured in the brain. This suggested that for many traumatized people, reexposure to stress might provide a similar relief from anxiety.[17] It was an interesting experiment, but it did not fully explain why Julia kept going back to her violent pimp.

SOOTHING THE BRAIN

The 1985 ACNP meeting was, if possible, even more thought provoking than the previous year's session. Kings College professor Jeffrey Gray gave a talk about the amygdala, a cluster of brain cells that determines whether a sound, image, or body sensation is perceived as a threat. Gray's data showed that the sensitivity of the amygdala depended, at least in part, on the amount of the neurotransmitter serotonin in that part of the brain. Animals with low serotonin levels were hyperreactive to stressful stimuli (like loud sounds), while higher levels of serotonin dampened their fear system, making them less likely to become aggressive or frozen in response to potential threats.[18]

That struck me as an important finding: My patients were always blowing up in response to small provocations and felt devastated by the slightest rejection. I became fascinated by the possible role of serotonin in PTSD. Other researchers had shown that dominant male monkeys had much higher levels of brain serotonin than lower-ranking animals but that their serotonin levels dropped when they were prevented from maintaining eye contact with the monkeys they had once lorded over. In contrast, low-ranking monkeys who were given serotonin supplements emerged from the pack to assume leadership.[19] The social environment interacts with brain chemistry. Manipulating a monkey into a lower position in the dominance hierarchy made his serotonin drop, while chemically enhancing serotonin elevated the rank of former subordinates.

The implications for traumatized people were obvious. Like Gray's low-serotonin animals, they were hyperreactive, and their ability to cope socially was often compromised. If we could find ways to increase brain serotonin levels, perhaps we could address both problems simultaneously. At that same 1985 meeting I learned that drug companies were developing two new products to do precisely that, but since neither was yet available, I experimented briefly with the health-food-store supplement L-tryptophan, which is a chemical precursor of serotonin in the body. (The results were disappointing.) One of the drugs under investigation never made it to the market. The other was fluoxetine, which, under the brand name Prozac, became one of the most successful psychoactive drugs ever created.

On Monday, February 8, 1988, Prozac was released by the drug company Eli Lilly. The first

patient I saw that day was a young woman with a horrendous history of childhood abuse who was now struggling with bulimia—she basically spent much of her life bingeing and purging. I gave her a prescription for this brand-new drug, and when she returned on Thursday she said, "I've had a very different last few days: I ate when I was hungry, and the rest of the time I did my schoolwork." This was one of the most dramatic statements I had ever heard in my office.

On Friday I saw another patient to whom I'd given Prozac the previous Monday. She was a chronically depressed mother of two school-aged children, preoccupied with her failures as a mother and wife and overwhelmed by demands from the parents who had badly mistreated her as a child. After four days on Prozac she asked me if she could skip her appointment the following Monday, which was Presidents' Day. "After all," she explained, "I've never taken my kids skiing—my husband always does—and they are off that day. It would really be nice for them to have some good memories of us having fun together."

This was a patient who had always struggled merely to get through the day. After her appointment I called someone I knew at Eli Lilly and said, "You have a drug that helps people to be in the present, instead of being locked in the past." Lilly later gave me a small grant to study the effects of Prozac on PTSD in sixty-four people—twenty-two women and forty-two men—the first study of the effects of this new class of drugs on PTSD. Our Trauma Clinic team enrolled thirty-three nonveterans and my collaborators, former colleagues at the VA, enrolled thirty-one combat veterans. For eight weeks half of each group received Prozac and the other half a placebo. The study was blinded: Neither we nor the patients knew which substance they were taking, so that our preconceptions could not skew our assessments.

Everyone in the study—even those who had received the placebo—improved, at least to some degree. Most treatment studies of PTSD find a significant placebo effect. People who screw up their courage to participate in a study for which they aren't paid, in which they're repeatedly poked with needles, and in which they have only a fifty-fifty chance of getting an active drug are intrinsically motivated to solve their problem. Maybe their reward is only the attention paid to them, the opportunity to respond to questions about how they feel and think. But maybe the mother's kisses that soothe her child's scrapes are "just" a placebo as well.

Prozac worked significantly better than the placebo for the patients from the Trauma Clinic. They slept more soundly; they had more control over their emotions and were less preoccupied with the past than those who received a sugar pill.[20] Surprisingly, however, the Prozac had no effect at all on the combat veterans at the VA—their PTSD symptoms were unchanged. These results have held true for most subsequent pharmacological studies on veterans: While a few have shown modest improvements, most have not benefited at all. I have never been able to explain this, and I cannot accept the most common explanation: that receiving a pension or disability benefits prevents people from getting better. After all, the amygdala knows nothing of pensions—it just detects threats.

Nonetheless, medications such as Prozac and related drugs like Zoloft, Celexa, Cymbalta, and Paxil, have made a substantial contribution to the treatment of trauma-related disorders. In our Prozac study we used the Rorschach test to measure how traumatized people perceive their surroundings. These data gave us an important clue to how this class of drugs (formally known as selective serotonin reuptake inhibitors, or SSRIs) might work. Before taking Prozac these patients' emotions controlled their reactions. I think of a Dutch patient, for example (not in the Prozac study) who came to see me for treatment for a childhood rape and who was convinced

that I would rape her as soon as she heard my Dutch accent. Prozac made a radical difference: It gave PTSD patients a sense of perspective[21] and helped them to gain considerable control over their impulses. Jeffrey Gray must have been right: When their serotonin levels rose, many of my patients became less reactive.

THE TRIUMPH OF PHARMACOLOGY

It did not take long for pharmacology to revolutionize psychiatry. Drugs gave doctors a greater sense of efficacy and provided a tool beyond talk therapy. Drugs also produced income and profits. Grants from the pharmaceutical industry provided us with laboratories filled with energetic graduate students and sophisticated instruments. Psychiatry departments, which had always been located in the basements of hospitals, started to move up, both in terms of location and prestige.

One symbol of this change occurred at MMHC, where in the early 1990s the hospital's swimming pool was paved over to make space for a laboratory, and the indoor basketball court was carved up into cubicles for the new medication clinic. For decades doctors and patients had democratically shared the pleasures of splashing in the pool and passing balls down the court. I'd spent hours in the gym with patients back when I was a ward attendant. It was the one place where we all could restore a sense of physical well-being, an island in the midst of the misery we faced every day. Now it had become a place for patients to "get fixed."

The drug revolution that started out with so much promise may in the end have done as much harm as good. The theory that mental illness is caused primarily by chemical imbalances in the brain that can be corrected by specific drugs has become broadly accepted, by the media and the public as well as by the medical profession.[22] In many places drugs have displaced therapy and enabled patients to suppress their problems without addressing the underlying issues. Antidepressants can make all the difference in the world in helping with day-to-day functioning, and if it comes to a choice between taking a sleeping pill and drinking yourself into a stupor every night to get a few hours of sleep, there is no question which is preferable. For people who are exhausted from trying to make it on their own through yoga classes, workout routines, or simply toughing it out, medications often can bring life-saving relief. The SSRIs can be very helpful in making traumatized people less enslaved by their emotions, but they should only be considered adjuncts in their overall treatment.[23]

After conducting numerous studies of medications for PTSD, I have come to realize that psychiatric medications have a serious downside, as they may deflect attention from dealing with the underlying issues. The brain-disease model takes control over people's fate out of their own hands and puts doctors and insurance companies in charge of fixing their problems.

Over the past three decades psychiatric medications have become a mainstay in our culture, with dubious consequences. Consider the case of antidepressants. If they were indeed as effective as we have been led to believe, depression should by now have become a minor issue in our society. Instead, even as antidepressant use continues to increase, it has not made a dent in hospital admissions for depression. The number of people treated for depression has tripled over the past two decades, and one in ten Americans now take antidepressants.[24]

The new generation of antipsychotics, such as Abilify, Risperdal, Zyprexa, and Seroquel, are the top-selling drugs in the United States. In 2012 the public spent $1,526,228,000 on Abilify,

more than on any other medication. Number three was Cymbalta, an antidepressant that sold well over a billion dollars' worth of pills,[25] even though it has never been shown to be superior to older antidepressants like Prozac, for which much cheaper generics are available. Medicaid, the government health program for the poor, spends more on antipsychotics than on any other class of drugs.[26] In 2008, the most recent year for which complete data are available, it funded $3.6 billion for antipsychotic medications, up from $1.65 billion in 1999. The number of people under the age of twenty receiving Medicaid-funded prescriptions for antipsychotic drugs tripled between 1999 and 2008. On November 4, 2013, Johnson & Johnson agreed to pay more than $2.2 billion in criminal and civil fines to settle accusations that it had improperly promoted the antipsychotic drug Risperdal to older adults, children, and people with developmental disabilities.[27] But nobody is holding the doctors who prescribed them accountable.

Half a million children in the United States currently take antipsychotic drugs. Children from low-income families are four times as likely as privately insured children to receive antipsychotic medicines. These medications often are used to make abused and neglected children more tractable. In 2008 19,045 children age five and under were prescribed antipsychotics through Medicaid.[28] One study, based on Medicaid data in thirteen states, found that 12.4 percent of children in foster care received antipsychotics, compared with 1.4 percent of Medicaid-eligible children in general.[29] These medications make children more manageable and less aggressive, but they also interfere with motivation, play, and curiosity, which are indispensable for maturing into a well-functioning and contributing member of society. Children who take them are also at risk of becoming morbidly obese and developing diabetes. Meanwhile, drug overdoses involving a combination of psychiatric and pain medications continue to rise.[30]

Because drugs have become so profitable, major medical journals rarely publish studies on nondrug treatments of mental health problems.[31] Practitioners who explore treatments are typically marginalized as "alternative." Studies of nondrug treatments are rarely funded unless they involve so-called manualized protocols, where patients and therapists go through narrowly prescribed sequences that allow little fine-tuning to individual patients' needs. Mainstream medicine is firmly committed to a better life through chemistry, and the fact that we can actually change our own physiology and inner equilibrium by means other than drugs is rarely considered.

ADAPTATION OR DISEASE?

The brain-disease model overlooks four fundamental truths: (1) our capacity to destroy one another is matched by our capacity to heal one another. Restoring relationships and community is central to restoring well-being; (2) language gives us the power to change ourselves and others by communicating our experiences, helping us to define what we know, and finding a common sense of meaning; (3) we have the ability to regulate our own physiology, including some of the so-called involuntary functions of the body and brain, through such basic activities as breathing, moving, and touching; and (4) we can change social conditions to create environments in which children and adults can feel safe and where they can thrive.

When we ignore these quintessential dimensions of humanity, we deprive people of ways to heal from trauma and restore their autonomy. Being a patient, rather than a participant in one's healing process, separates suffering people from their community and alienates them from an

inner sense of self. Given the limitations of drugs, I started to wonder if we could find more natural ways to help people deal with their post-traumatic responses.

CHAPTER 3

LOOKING INTO THE BRAIN: THE NEUROSCIENCE REVOLUTION

> If we could look through the skull into the brain of a consciously thinking person, and if the place of optimal excitability were luminous, then we should see playing over the cerebral surface, a bright spot, with fantastic, waving borders constantly fluctuating in size and form, and surrounded by darkness, more or less deep, covering the rest of the hemisphere.
>
> **—Ivan Pavlov**

> You observe a lot by watching.
>
> **—Yogi Berra**

In the early 1990s novel brain-imaging techniques opened up undreamed-of capacities to gain a sophisticated understanding about the way the brain processes information. Gigantic multimillion-dollar machines based on advanced physics and computer technology rapidly made neuroscience into one of the most popular areas for research. Positron emission tomography (PET) and, later, functional magnetic resonance imaging (fMRI) enabled scientists to visualize how different parts of the brain are activated when people are engaged in certain tasks or when they remember events from the past. For the first time we could watch the brain as it processed memories, sensations, and emotions and begin to map the circuits of mind and consciousness. The earlier technology of measuring brain chemicals like serotonin or norepinephrine had enabled scientists to look at what *fueled* neural activity, which is a bit like trying to understand a car's engine by studying gasoline. Neuroimaging made it possible to see inside the engine. By doing so it has also transformed our understanding of trauma.

Harvard Medical School was and is at the forefront of the neuroscience revolution, and in 1994 a young psychiatrist, Scott Rauch, was appointed as the first director of the Massachusetts General Hospital Neuroimaging Laboratory. After considering the most relevant questions that this new technology could answer and reading some articles I had written, Scott asked me whether I thought we could study what happens in the brains of people who have flashbacks.

I had just finished a study on how trauma is remembered (to be discussed in chapter 12), in which participants repeatedly told me how upsetting it was to be suddenly hijacked by images, feelings, and sounds from the past. When several said they wished they knew what trick their brains were playing on them during these flashbacks, I asked eight of them if they would be willing to return to the clinic and lie still inside a scanner (an entirely new experience that I described in detail) while we re-created a scene from the painful events that haunted them. To my surprise, all eight agreed, many of them expressing their hope that what we learned from their suffering could help other people.

My research assistant, Rita Fisler, who was working with us prior to entering Harvard Medical School, sat down with every participant and carefully constructed a script that re-created their trauma moment to moment. We deliberately tried to collect just isolated fragments of their experience—particular images, sounds, and feelings—rather than the entire story, because that is how trauma is experienced. Rita also asked the participants to describe a scene where they felt safe and in control. One person described her morning routine; another, sitting on the porch of a farmhouse in Vermont overlooking the hills. We would use this script for a second scan, to provide a baseline measurement.

After the participants checked the scripts for accuracy (reading silently, which is less overwhelming than hearing or speaking), Rita made a voice recording that would be played back to them while they were in the scanner. A typical script:

> You are six years old and getting ready for bed. You hear your mother and father yelling at each other. You are frightened and your stomach is in a knot. You and your younger brother and sister are huddled at the top of the stairs. You look over the banister and see your father holding your mother's arms while she struggles to free herself. Your mother is crying, spitting and hissing like an animal. Your face is flushed and you feel hot all over. When your mother frees herself, she runs to the dining room and breaks a very expensive Chinese vase. You yell at your parents to stop, but they ignore you. Your mom runs upstairs and you hear her breaking the TV. Your little brother and sister try to get her to hide in the closet. Your heart pounds and you are trembling.

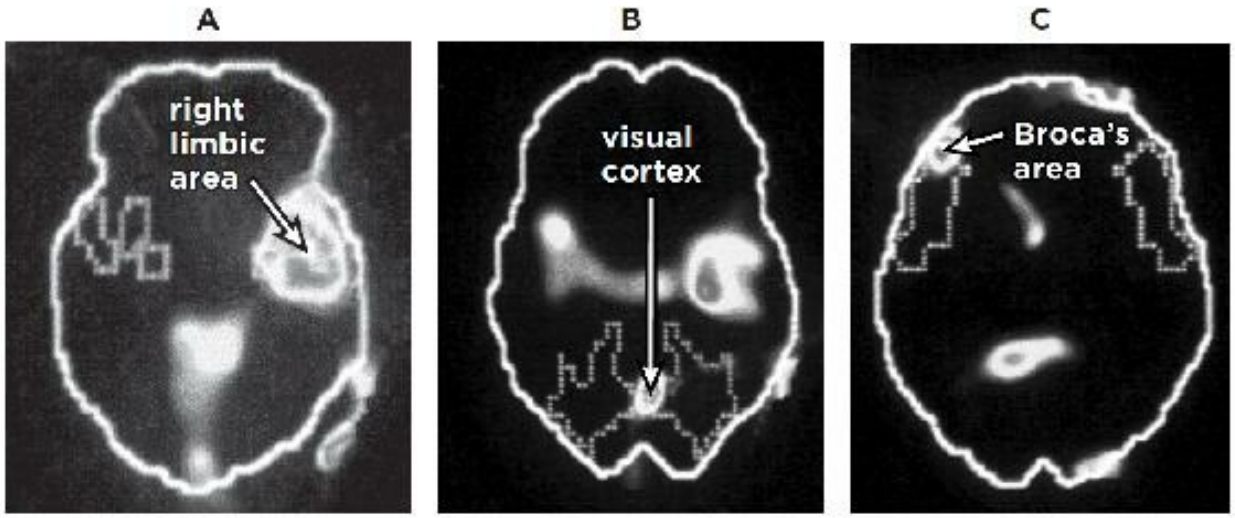
At this first session we explained the purpose of the radioactive oxygen the participants would be breathing: As any part of the brain became more or less metabolically active, its rate of oxygen consumption would immediately change, which would be picked up by the scanner. We would monitor their blood pressure and heart rate throughout the procedure, so that these physiological signs could be compared with brain activity.

Several days later the participants came to the imaging lab. Marsha, a forty-year-old schoolteacher from a suburb outside of Boston, was the first volunteer to be scanned. Her script took her back to the day, thirteen years earlier, when she picked up her five-year-old daughter, Melissa, from day camp. As they drove off, Marsha heard a persistent beeping, indicating that Melissa's seatbelt was not properly fastened. When Marsha reached over to adjust the belt, she ran a red light. Another car smashed into hers from the right, instantly killing her daughter. In the ambulance on the way to the emergency room, the seven-month-old fetus Marsha was carrying also died.

Overnight Marsha had changed from a cheerful woman who was the life of the party into a haunted and depressed person filled with self-blame. She moved from classroom teaching into school administration, because working directly with children had become intolerable—as for many parents who have lost children, their happy laughter had become a powerful trigger. Even hiding behind her paperwork she could barely make it through the day. In a futile attempt to keep her feelings at bay, she coped by working day and night.

I was standing outside the scanner as Marsha underwent the procedure and could follow her physiological reactions on a monitor. The moment we turned on the tape recorder, her heart started to race, and her blood pressure jumped. Simply hearing the script activated the same physiological responses that had occurred during the accident thirteen years earlier. After the recorded script concluded and Marsha's heart rate and blood pressure returned to normal, we played her second script: getting out of bed and brushing her teeth. This time her heart rate and blood pressure did not change.

As she emerged from the scanner, Marsha looked defeated, drawn out, and frozen. Her breathing was shallow, her eyes were opened wide, and her shoulders were hunched—the very image of vulnerability and defenselessness. We tried to comfort her, but I wondered if whatever we discovered would be worth the price of her distress.



Picturing the brain on trauma. Bright spots in (A) the limbic brain, and (B) the visual cortex, show heightened activation. In drawing (C) the brain's speech center shows markedly decreased activation.

After all eight participants completed the procedure, Scott Rauch went to work with his mathematicians and statisticians to create composite images that compared the arousal created by a flashback with the brain in neutral. After a few weeks he sent me the results, which you see above. I taped the scans up on the refrigerator in my kitchen, and for the next few months I stared at them every evening. It occurred to me that this was how early astronomers must have felt when they peered through a telescope at a new constellation.

There were some puzzling dots and colors on the scan, but the biggest area of brain activation—a large red spot in the right lower center of the brain, which is the limbic area, or emotional brain—came as no surprise. It was already well known that intense emotions activate

the limbic system, in particular an area within it called the amygdala. We depend on the amygdala to warn us of impending danger and to activate the body's stress response. Our study clearly showed that when traumatized people are presented with images, sounds, or thoughts related to their particular experience, the amygdala reacts with alarm—even, as in Marsha's case, thirteen years after the event. Activation of this fear center triggers the cascade of stress hormones and nerve impulses that drive up blood pressure, heart rate, and oxygen intake—preparing the body for fight or flight.[1] The monitors attached to Marsha's arms recorded this physiological state of frantic arousal, even though she never totally lost track of the fact that she was resting quietly in the scanner.

SPEECHLESS HORROR

Our most surprising finding was a white spot in the left frontal lobe of the cortex, in a region called Broca's area. In this case the change in color meant that there was a significant decrease in that part of the brain. Broca's area is one of the speech centers of the brain, which is often affected in stroke patients when the blood supply to that region is cut off. Without a functioning Broca's area, you cannot put your thoughts and feelings into words. Our scans showed that Broca's area went offline whenever a flashback was triggered. In other words, we had visual proof that the effects of trauma are not necessarily different from—and can overlap with—the effects of physical lesions like strokes.

All trauma is preverbal. Shakespeare captures this state of speechless terror in *Macbeth*, after the murdered king's body is discovered: "Oh horror! horror! horror! Tongue nor heart cannot conceive nor name thee! Confusion now hath made his masterpiece!" Under extreme conditions people may scream obscenities, call for their mothers, howl in terror, or simply shut down. Victims of assaults and accidents sit mute and frozen in emergency rooms; traumatized children "lose their tongues" and refuse to speak. Photographs of combat soldiers show hollow-eyed men staring mutely into a void.

Even years later traumatized people often have enormous difficulty telling other people what has happened to them. Their bodies reexperience terror, rage, and helplessness, as well as the impulse to fight or flee, but these feelings are almost impossible to articulate. Trauma by nature drives us to the edge of comprehension, cutting us off from language based on common experience or an imaginable past.

This doesn't mean that people can't talk about a tragedy that has befallen them. Sooner or later most survivors, like the veterans in chapter 1, come up with what many of them call their "cover story" that offers some explanation for their symptoms and behavior for public consumption. These stories, however, rarely capture the inner truth of the experience. It is enormously difficult to organize one's traumatic experiences into a coherent account—a narrative with a beginning, a middle, and an end. Even a seasoned reporter like the famed CBS correspondent Ed Murrow struggled to convey the atrocities he saw when the Nazi concentration camp Buchenwald was liberated in 1945: "I pray you believe what I have said. I reported what I saw and heard, but only part of it. For most of it I have no words."

When words fail, haunting images capture the experience and return as nightmares and flashbacks. In contrast to the deactivation of Broca's area, another region, Brodmann's area 19, lit up in our participants. This is a region in the visual cortex that registers images when they first

enter the brain. We were surprised to see brain activation in this area so long after the original experience of the trauma. Under ordinary conditions raw images registered in area 19 are rapidly diffused to other brain areas that interpret the meaning of what has been seen. Once again, we were witnessing a brain region rekindled as if the trauma were actually occurring.

As we will see in chapter 12, which discusses memory, other unprocessed sense fragments of trauma, like sounds and smells and physical sensations, are also registered separately from the story itself. Similar sensations often trigger a flashback that brings them back into consciousness, apparently unmodified by the passage of time.

SHIFTING TO ONE SIDE OF THE BRAIN

The scans also revealed that during flashbacks, our subjects' brains lit up only on the right side. Today there's a huge body of scientific and popular literature about the difference between the right and left brains. Back in the early nineties I had heard that some people had begun to divide the world between left-brainers (rational, logical people) and right-brainers (the intuitive, artistic ones), but I hadn't paid much attention to this idea. However, our scans clearly showed that images of past trauma activate the right hemisphere of the brain and deactivate the left.

We now know that the two halves of the brain do speak different languages. The right is intuitive, emotional, visual, spatial, and tactual, and the left is linguistic, sequential, and analytical. While the left half of the brain does all the talking, the right half of the brain carries the music of experience. It communicates through facial expressions and body language and by making the sounds of love and sorrow: by singing, swearing, crying, dancing, or mimicking. The right brain is the first to develop in the womb, and it carries the nonverbal communication between mothers and infants. We know the left hemisphere has come online when children start to understand language and learn how to speak. This enables them to name things, compare them, understand their interrelations, and begin to communicate their own unique, subjective experiences to others.

The left and right sides of the brain also process the imprints of the past in dramatically different ways.[2] The left brain remembers facts, statistics, and the vocabulary of events. We call on it to explain our experiences and put them in order. The right brain stores memories of sound, touch, smell, and the emotions they evoke. It reacts automatically to voices, facial features, and gestures and places experienced in the past. What it recalls feels like intuitive truth—the way things are. Even as we enumerate a loved one's virtues to a friend, our feelings may be more deeply stirred by how her face recalls the aunt we loved at age four.[3]

Under ordinary circumstances the two sides of the brain work together more or less smoothly, even in people who might be said to favor one side over the other. However, having one side or the other shut down, even temporarily, or having one side cut off entirely (as sometimes happened in early brain surgery) is disabling.

Deactivation of the left hemisphere has a direct impact on the capacity to organize experience into logical sequences and to translate our shifting feelings and perceptions into words. (Broca's area, which blacks out during flashbacks, is on the left side.) Without sequencing we can't identify cause and effect, grasp the long-term effects of our actions, or create coherent plans for the future. People who are very upset sometimes say they are "losing their minds." In technical terms they are experiencing the loss of executive functioning.

When something reminds traumatized people of the past, their right brain reacts as if the traumatic event were happening in the present. But because their left brain is not working very well, they may not be aware that they are reexperiencing and reenacting the past—they are just furious, terrified, enraged, ashamed, or frozen. After the emotional storm passes, they may look for something or somebody to blame for it. They behaved the way they did because *you* were ten minutes late, or because *you* burned the potatoes, or because *you* "never listen to me." Of course, most of us have done this from time to time, but when we cool down, we hopefully can admit our mistake. Trauma interferes with this kind of awareness, and, over time, our research demonstrated why.

STUCK IN FIGHT OR FLIGHT

What had happened to Marsha in the scanner gradually started to make sense. Thirteen years after her tragedy we had activated the sensations—the sounds and images from the accident—that were still stored in her memory. When these sensations came to the surface, they activated her alarm system, which caused her to react as if she were back in the hospital being told that her daughter had died. The passage of thirteen years was erased. Her sharply increased heart rate and blood pressure readings reflected her physiological state of frantic alarm.

Adrenaline is one of the hormones that are critical to help us fight back or flee in the face of danger. Increased adrenaline was responsible for our participants' dramatic rise in heart rate and blood pressure while listening to their trauma narrative. Under normal conditions people react to a threat with a temporary increase in their stress hormones. As soon as the threat is over, the hormones dissipate and the body returns to normal. The stress hormones of traumatized people, in contrast, take much longer to return to baseline and spike quickly and disproportionately in response to mildly stressful stimuli. The insidious effects of constantly elevated stress hormones include memory and attention problems, irritability, and sleep disorders. They also contribute to many long-term health issues, depending on which body system is most vulnerable in a particular individual.

We now know that there is another possible response to threat, which our scans aren't yet capable of measuring. Some people simply go into denial: Their bodies register the threat, but their conscious minds go on as if nothing has happened. However, even though the mind may learn to ignore the messages from the emotional brain, the alarm signals don't stop. The emotional brain keeps working, and stress hormones keep sending signals to the muscles to tense for action or immobilize in collapse. The physical effects on the organs go on unabated until they demand notice when they are expressed as illness. Medications, drugs, and alcohol can also temporarily dull or obliterate unbearable sensations and feelings. But the body continues to keep the score.

We can interpret what happened to Marsha in the scanner from several different perspectives, each of which has implications for treatment. We can focus on the neurochemical and physiological disruptions that were so evident and make a case that she is suffering from a biochemical imbalance that is reactivated whenever she is reminded of her daughter's death. We might then search for a drug or a combination of drugs that would damp down the reaction or, in the best case, restore her chemical equilibrium. Based on the results of our scans, some of my colleagues at MGH began investigating drugs that might make people less responsive to the

effects of elevated adrenaline.

We can also make a strong case that Marsha is hypersensitized to her memories of the past and that the best treatment would be some form of desensitization.[4] After repeatedly rehearsing the details of the trauma with a therapist, her biological responses might become muted, so that she could realize and remember that "that was then and this is now," rather than reliving the experience over and over.

For a hundred years or more, every textbook of psychology and psychotherapy has advised that some method of talking about distressing feelings can resolve them. However, as we've seen, the experience of trauma itself gets in the way of being able to do that. No matter how much insight and understanding we develop, the rational brain is basically impotent to talk the emotional brain out of its own reality. I am continually impressed by how difficult it is for people who have gone through the unspeakable to convey the essence of their experience. It is so much easier for them to talk about what has been done to them—to tell a story of victimization and revenge—than to notice, feel, and put into words the reality of their internal experience.

Our scans had revealed how their dread persisted and could be triggered by multiple aspects of daily experience. They had not integrated their experience into the ongoing stream of their life. They continued to be "there" and did not know how to be "here"—fully alive in the present.

Three years after being a participant in our study Marsha came to see me as a patient. I successfully treated her with EMDR, the subject of chapter 15.

PART TWO

THIS IS YOUR BRAIN ON TRAUMA

CHAPTER 4

RUNNING FOR YOUR LIFE: THE ANATOMY OF SURVIVAL

> Prior to the advent of brain, there was no color and no sound in the universe, nor was there any flavor or aroma and probably little sense and no feeling or emotion. Before brains the universe was also free of pain and anxiety.
>
> **—Roger Sperry**[1]

On September 11, 2001, five-year-old Noam Saul witnessed the first passenger plane slam into the World Trade Center from the windows of his first-grade classroom at PS 234, less than 1,500 feet away. He and his classmates ran with their teacher down the stairs to the lobby, where most of them were reunited with parents who had dropped them off at school just moments earlier. Noam, his older brother, and their dad were three of the tens of thousands of people who ran for their lives through the rubble, ash, and smoke of lower Manhattan that morning.

Ten days later I visited his family, who are friends of mine, and that evening his parents and I went for a walk in the eerie darkness through the still-smoking pit where Tower One once stood, making our way among the rescue crews who were working around the clock under the blazing klieg lights. When we returned home, Noam was still awake, and he showed me a picture that he had drawn at 9:00 a.m. on September 12. The drawing depicted what he had seen the day before: an airplane slamming into the tower, a ball of fire, firefighters, and people jumping from the tower's windows. But at the bottom of the picture he had drawn something else: a black circle at the foot of the buildings. I had no idea what it was, so I asked him. "A trampoline," he replied. What was a trampoline doing there? Noam explained, "So that the next time when people have to jump they will be safe." I was stunned: This five-year-old boy, a witness to unspeakable mayhem and disaster just twenty-four hours before he made that drawing, had used his imagination to process what he had seen and begin to go on with his life.

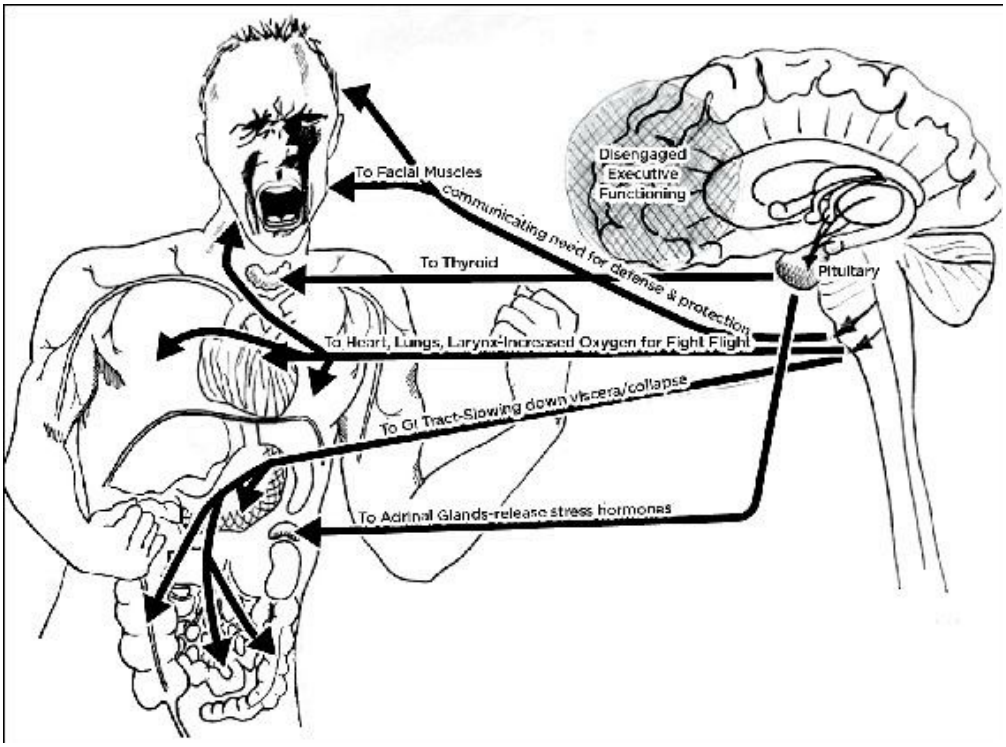
Noam was fortunate. His entire family was unharmed, he had grown up surrounded by love, and he was able to grasp that the tragedy they had witnessed had come to an end. During disasters young children usually take their cues from their parents. As long as their caregivers

remain calm and responsive to their needs, they often survive terrible incidents without serious psychological scars.

Five-year-old Noam's drawing made after he witnessed the World Trade Center attack on 9/11. He reproduced the image that haunted so many survivors—people jumping to escape from the inferno—but with a life-saving addition: a trampoline at the bottom of the collapsing building.

But Noam's experience allows us to see in outline two critical aspects of the adaptive response to threat that is basic to human survival. At the time the disaster occurred, he was able to take an active role by running away from it, thus becoming an agent in his own rescue. And once he had reached the safety of home, the alarm bells in his brain and body quieted. This freed his mind to make some sense of what had happened and even to imagine a creative alternative to what he had seen—a lifesaving trampoline.

In contrast to Noam, traumatized people become stuck, stopped in their growth because they can't integrate new experiences into their lives. I was very moved when the veterans of Patton's army gave me a World War II army-issue watch for Christmas, but it was a sad memento of the year their lives had effectively stopped: 1944. Being traumatized means continuing to organize your life as if the trauma were still going on—unchanged and immutable—as every new encounter or event is contaminated by the past.



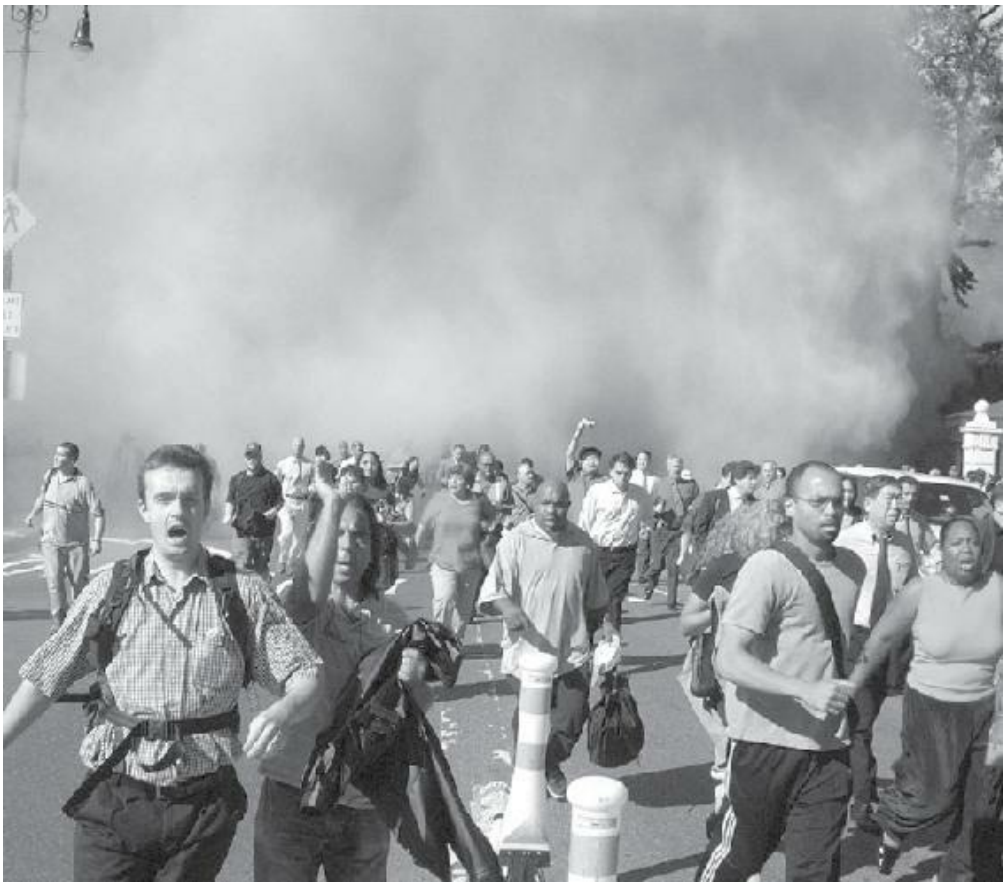
Trauma affects the entire human organism—body, mind, and brain. In PTSD the body continues to defend against a threat that belongs to the past. Healing from PTSD means being able to terminate this continued stress mobilization and restore the entire organism to safety.

After trauma the world is experienced with a different nervous system. The survivor's energy now becomes focused on suppressing inner chaos, at the expense of spontaneous involvement in their life. These attempts to maintain control over unbearable physiological reactions can result in a whole range of physical symptoms, including fibromyalgia, chronic fatigue, and other autoimmune diseases. This explains why it is critical for trauma treatment to engage the entire organism, body, mind, and brain.

ORGANIZED TO SURVIVE

This illustration on page 53 shows the whole-body response to threat.

When the brain's alarm system is turned on, it automatically triggers preprogrammed physical escape plans in the oldest parts of the brain. As in other animals, the nerves and chemicals that make up our basic brain structure have a direct connection with our body. When the old brain takes over, it partially shuts down the higher brain, our conscious mind, and propels the body to run, hide, fight, or, on occasion, freeze. By the time we are fully aware of our situation, our body may already be on the move. If the fight/flight/freeze response is successful and we escape the danger, we recover our internal equilibrium and gradually "regain our senses."



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Effective action versus immobilization. Effective action (the result of fight/flight) ends the threat. Immobilization keeps the body in a state of inescapable shock and learned helplessness. Faced with danger people automatically secrete stress hormones to fuel resistance and escape. Brain and body are programmed to run for home, where safety can be restored and stress hormones can come to rest. In these strapped-down men who are being evacuated far from home after Hurricane Katrina stress hormone levels remain elevated and are turned against the survivors, stimulating ongoing fear, depression, rage, and physical disease.

If for some reason the normal response is blocked—for example, when people are held down, trapped, or otherwise prevented from taking effective action, be it in a war zone, a car accident, domestic violence, or a rape—the brain keeps secreting stress chemicals, and the brain's electrical circuits continue to fire in vain.[2] Long after the actual event has passed, the brain may keep sending signals to the body to escape a threat that no longer exists. Since at least 1889, when the French psychologist Pierre Janet published the first scientific account of traumatic stress,[3] it has been recognized that trauma survivors are prone to "continue the action, or rather the (futile) attempt at action, which began when the thing happened." Being able to move and *do* something to protect oneself is a critical factor in determining whether or not a horrible experience will leave long-lasting scars.

In this chapter I'm going to go deeper into the brain's response to trauma. The more neuroscience discovers about the brain, the more we realize that it is a vast network of interconnected parts organized to help us survive and flourish. Knowing how these parts work together is essential to understanding how trauma affects every part of the human organism and can serve as an indispensable guide to resolving traumatic stress.

THE BRAIN FROM BOTTOM TO TOP

The most important job of the brain is to ensure our survival, even under the most miserable conditions. Everything else is secondary. In order to do that, brains need to: (1) generate internal signals that register what our bodies need, such as food, rest, protection, sex, and shelter; (2) create a map of the world to point us where to go to satisfy those needs; (3) generate the necessary energy and actions to get us there; (4) warn us of dangers and opportunities along the way; and (5) adjust our actions based on the requirements of the moment.[4] And since we human beings are mammals, creatures that can only survive and thrive in groups, all of these imperatives require coordination and collaboration. Psychological problems occur when our internal signals don't work, when our maps don't lead us where we need to go, when we are too paralyzed to move, when our actions do not correspond to our needs, or when our relationships break down. Every brain structure that I discuss has a role to play in these essential functions, and as we will see, trauma can interfere with every one of them.

Our rational, cognitive brain is actually the youngest part of the brain and occupies only about 30 percent of the area inside our skull. The rational brain is primarily concerned with the world outside us: understanding how things and people work and figuring out how to accomplish our goals, manage our time, and sequence our actions. Beneath the rational brain lie two evolutionarily older, and to some degree separate, brains, which are in charge of everything else: the moment-by-moment registration and management of our body's physiology and the identification of comfort, safety, threat, hunger, fatigue, desire, longing, excitement, pleasure, and pain.

The brain is built from the bottom up. It develops level by level within every child in the womb, just as it did in the course of evolution. The most primitive part, the part that is already online when we are born, is the ancient animal brain, often called the reptilian brain. It is located in the brain stem, just above the place where our spinal cord enters the skull. The reptilian brain is responsible for all the things that newborn babies can do: eat, sleep, wake, cry, breathe; feel temperature, hunger, wetness, and pain; and rid the body of toxins by urinating and defecating. The brain stem and the hypothalamus (which sits directly above it) together control the energy levels of the body. They coordinate the functioning of the heart and lungs and also the endocrine and immune systems, ensuring that these basic life-sustaining systems are maintained within the relatively stable internal balance known as homeostasis.

Breathing, eating, sleeping, pooping, and peeing are so fundamental that their significance is easily neglected when we're considering the complexities of mind and behavior. However, if your sleep is disturbed or your bowels don't work, or if you always feel hungry, or if being touched makes you want to scream (as is often the case with traumatized children and adults), the entire organism is thrown into disequilibrium. It is amazing how many psychological problems involve difficulties with sleep, appetite, touch, digestion, and arousal. Any effective treatment for trauma has to address these basic housekeeping functions of the body.

Right above the reptilian brain is the limbic system. It's also known as the mammalian brain, because all animals that live in groups and nurture their young possess one. Development of this part of the brain truly takes off after a baby is born. It is the seat of the emotions, the monitor of danger, the judge of what is pleasurable or scary, the arbiter of what is or is not important for survival purposes. It is also a central command post for coping with the challenges of living within our complex social networks.

The limbic system is shaped in response to experience, in partnership with the infant's own genetic makeup and inborn temperament. (As all parents of more than one child quickly notice, babies differ from birth in the intensity and nature of their reactions to similar events.) Whatever happens to a baby contributes to the emotional and perceptual map of the world that its developing brain creates. As my colleague Bruce Perry explains it, the brain is formed in a "use-dependent manner."[5] This is another way of describing neuroplasticity, the relatively recent discovery that neurons that "fire together, wire together." When a circuit fires repeatedly, it can become a default setting—the response most likely to occur. If you feel safe and loved, your brain becomes specialized in exploration, play, and cooperation; if you are frightened and unwanted, it specializes in managing feelings of fear and abandonment.

As infants and toddlers we learn about the world by moving, grabbing, and crawling and by discovering what happens when we cry, smile, or protest. We are constantly experimenting with our surroundings—how do our interactions change the way our bodies feel? Attend any two-year-old's birthday party and notice how little Kimberly will engage you, play with you, flirt with you, without any need for language. These early explorations shape the limbic structures devoted to emotions and memory, but these structures can also be significantly modified by later experiences: for the better by a close friendship or a beautiful first love, for example, or for the worse by a violent assault, relentless bullying, or neglect.

Taken together the reptilian brain and limbic system make up what I'll call the "emotional brain" throughout this book.[6] The emotional brain is at the heart of the central nervous system, and its key task is to look out for your welfare. If it detects danger or a special opportunity—such as a promising partner—it alerts you by releasing a squirt of hormones. The resulting visceral sensations (ranging from mild queasiness to the grip of panic in your chest) will interfere with whatever your mind is currently focused on and get you moving—physically and mentally—in a different direction. Even at their most subtle, these sensations have a huge influence on the small and large decisions we make throughout our lives: what we choose to eat, where we like to sleep and with whom, what music we prefer, whether we like to garden or sing in a choir, and whom we befriend and whom we detest.

The emotional brain's cellular organization and biochemistry are simpler than those of the neocortex, our rational brain, and it assesses incoming information in a more global way. As a result, it jumps to conclusions based on rough similarities, in contrast with the rational brain, which is organized to sort through a complex set of options. (The textbook example is leaping back in terror when you see a snake—only to realize that it's just a coiled rope.) The emotional brain initiates preprogrammed escape plans, like the fight-or-flight responses. These muscular and physiological reactions are automatic, set in motion without any thought or planning on our part, leaving our conscious, rational capacities to catch up later, often well after the threat is over.

Finally we reach the top layer of the brain, the neocortex. We share this outer layer with other mammals, but it is much thicker in us humans. In the second year of life the frontal lobes, which make up the bulk of our neocortex, begin to develop at a rapid pace. The ancient philosophers called seven years "the age of reason." For us first grade is the prelude of things to come, a life organized around frontal-lobe capacities: sitting still; keeping sphincters in check; being able to use words rather than acting out; understanding abstract and symbolic ideas; planning for tomorrow; and being in tune with teachers and classmates.

The frontal lobes are responsible for the qualities that make us unique within the animal

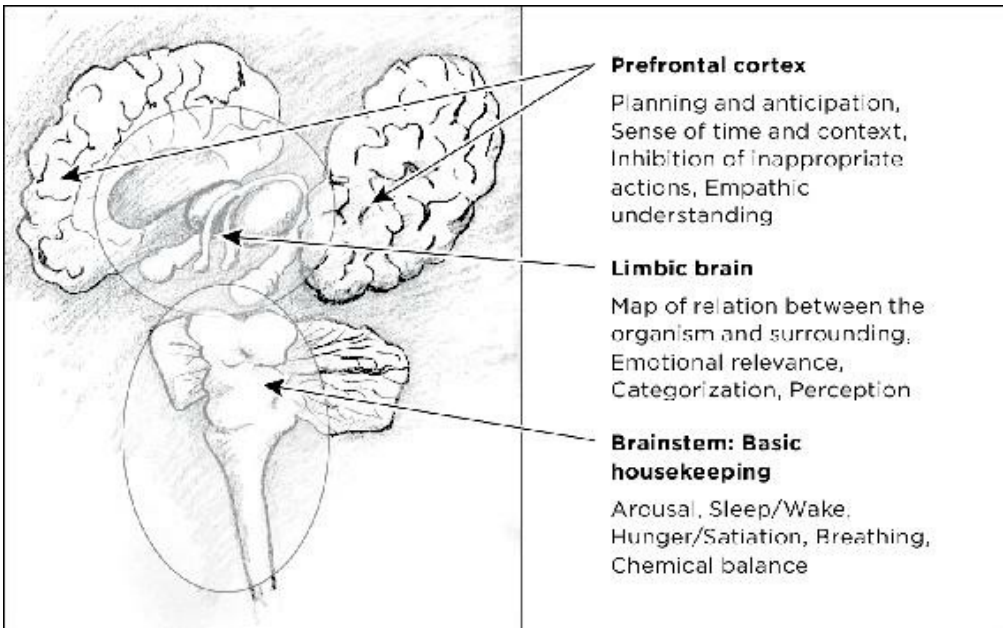
kingdom.[7] They enable us to use language and abstract thought. They give us our ability to absorb and integrate vast amounts of information and attach meaning to it. Despite our excitement about the linguistic feats of chimpanzees and rhesus monkeys, only human beings command the words and symbols necessary to create the communal, spiritual, and historical contexts that shape our lives.

The frontal lobes allow us to plan and reflect, to imagine and play out future scenarios. They help us to predict what will happen if we take one action (like applying for a new job) or neglect another (not paying the rent). They make choice possible and underlie our astonishing creativity. Generations of frontal lobes, working in close collaboration, have created culture, which got us from dug-out canoes, horse-drawn carriages, and letters to jet planes, hybrid cars, and e-mail. They also gave us Noam's lifesaving trampoline.

MIRRORING EACH OTHER: INTERPERSONAL NEUROBIOLOGY

Crucial for understanding trauma, the frontal lobes are also the seat of empathy—our ability to "feel into" someone else. One of the truly sensational discoveries of modern neuroscience took place in 1994, when in a lucky accident a group of Italian scientists identified specialized cells in the cortex that came to be known as mirror neurons.[8] The researchers had attached electrodes to individual neurons in a monkey's premotor area, then set up a computer to monitor precisely which neurons fired when the monkey picked up a peanut or grasped a banana. At one point an experimenter was putting food pellets into a box when he looked up at the computer. The monkey's brain cells were firing at the exact location where the motor command neurons were located. But the monkey wasn't eating or moving. He was watching the researcher, and his brain was vicariously mirroring the researcher's actions.

Numerous other experiments followed around the world, and it soon became clear that mirror neurons explained many previously unexplainable aspects of the mind, such as empathy, imitation, synchrony, and even the development of language. One writer compared mirror neurons to "neural WiFi"[9]—we pick up not only another person's movement but her emotional state and intentions as well. When people are in sync with each other, they tend to stand or sit similar ways, and their voices take on the same rhythms. But our mirror neurons also make us vulnerable to others' negativity, so that we respond to their anger with fury or are dragged down by their depression. I'll have more to say about mirror neurons later in this book, because trauma almost invariably involves not being seen, not being mirrored, and not being taken into account. Treatment needs to reactivate the capacity to safely mirror, and be mirrored, by others, but also to resist being hijacked by others' negative emotions.



The Triune (Three-part) Brain. The brain develops from the bottom up. The reptilian brain develops in the womb and organizes basic life sustaining functions. It is highly responsive to threat throughout our entire life span. The limbic system is organized mainly during the first six years of life but continues to evolve in a use-dependent manner. Trauma can have a major impact of its functioning throughout life. The prefrontal cortex develops last, and also is affected by trauma exposure, including being unable to filter out irrelevant information. Throughout life it is vulnerable to go off-line in response to threat.

As anybody who has worked with brain-damaged people or taken care of demented parents has learned the hard way, well-functioning frontal lobes are crucial for harmonious relationships with our fellow humans. Realizing that other people can think and feel differently from us is a huge developmental step for two- and three-year-olds. They learn to understand others' motives, so they can adapt and stay safe in groups that have different perceptions, expectations, and values. Without flexible, active frontal lobes people become creatures of habit, and their relationships become superficial and routine. Invention and innovation, discovery and wonder—all are lacking.

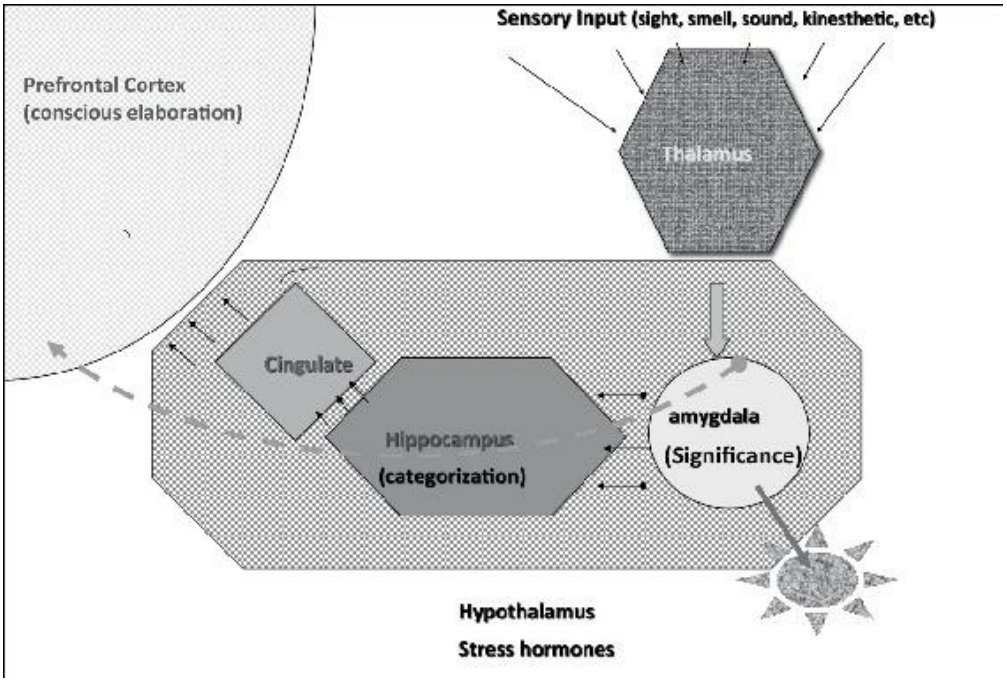
Our frontal lobes can also (sometimes, but not always) stop us from doing things that will embarrass us or hurt others. We don't have to eat every time we're hungry, kiss anybody who rouses our desires, or blow up every time we're angry. But it is exactly on that edge between impulse and acceptable behavior where most of our troubles begin. The more intense the visceral, sensory input from the emotional brain, the less capacity the rational brain has to put a damper on it.

IDENTIFYING DANGER: THE COOK AND THE SMOKE DETECTOR

Danger is a normal part of life, and the brain is in charge of detecting it and organizing our response. Sensory information about the outside world arrives through our eyes, nose, ears, and skin. These sensations converge in the thalamus, an area inside the limbic system that acts as the "cook" within the brain. The thalamus stirs all the input from our perceptions into a fully blended

autobiographical soup, an integrated, coherent experience of "this is what is happening to me."[10] The sensations are then passed on in two directions—down to the amygdala, two small almond-shaped structures that lie deeper in the limbic, unconscious brain, and up to the frontal lobes, where they reach our conscious awareness. The neuroscientist Joseph LeDoux calls the pathway to the amygdala "the low road," which is extremely fast, and that to the frontal cortex the "high road," which takes several milliseconds longer in the midst of an overwhelmingly threatening experience. However, processing by the thalamus can break down. Sights, sounds, smells, and touch are encoded as isolated, dissociated fragments, and normal memory processing disintegrates. Time freezes, so that the present danger feels like it will last forever.

The central function of the amygdala, which I call the brain's smoke detector, is to identify whether incoming input is relevant for our survival.[11] It does so quickly and automatically, with the help of feedback from the hippocampus, a nearby structure that relates the new input to past experiences. If the amygdala senses a threat—a potential collision with an oncoming vehicle, a person on the street who looks threatening—it sends an instant message down to the hypothalamus and the brain stem, recruiting the stress-hormone system and the autonomic nervous system (ANS) to orchestrate a whole-body response. Because the amygdala processes the information it receives from the thalamus faster than the frontal lobes do, it decides whether incoming information is a threat to our survival even before we are consciously aware of the danger. By the time we realize what is happening, our body may already be on the move.



The emotional brain has first dibs on interpreting incoming information. Sensory Information about the environment and body state received by the eyes, ears, touch, kinesthetic sense, etc., converges on the thalamus, where it is processed, and then passed on to the amygdala to interpret its emotional significance. This occurs with lightning speed. If a threat is detected the amygdala sends messages to the hypothalamus to secrete stress hormones to defend against that threat. The neuroscientist Joseph LeDoux calls this "the low road." The second neural pathway, the high road, runs from the thalamus, via the hippocampus and anterior cingulate, to

the prefrontal cortex, the rational brain, for a conscious and much more refined interpretation. This takes several microseconds longer. If the interpretation of threat by the amygdala is too intense, and/or the filtering system from the higher areas of the brain are too weak, as often happens in PTSD, people lose control over automatic emergency responses, like prolonged startle or aggressive outbursts.

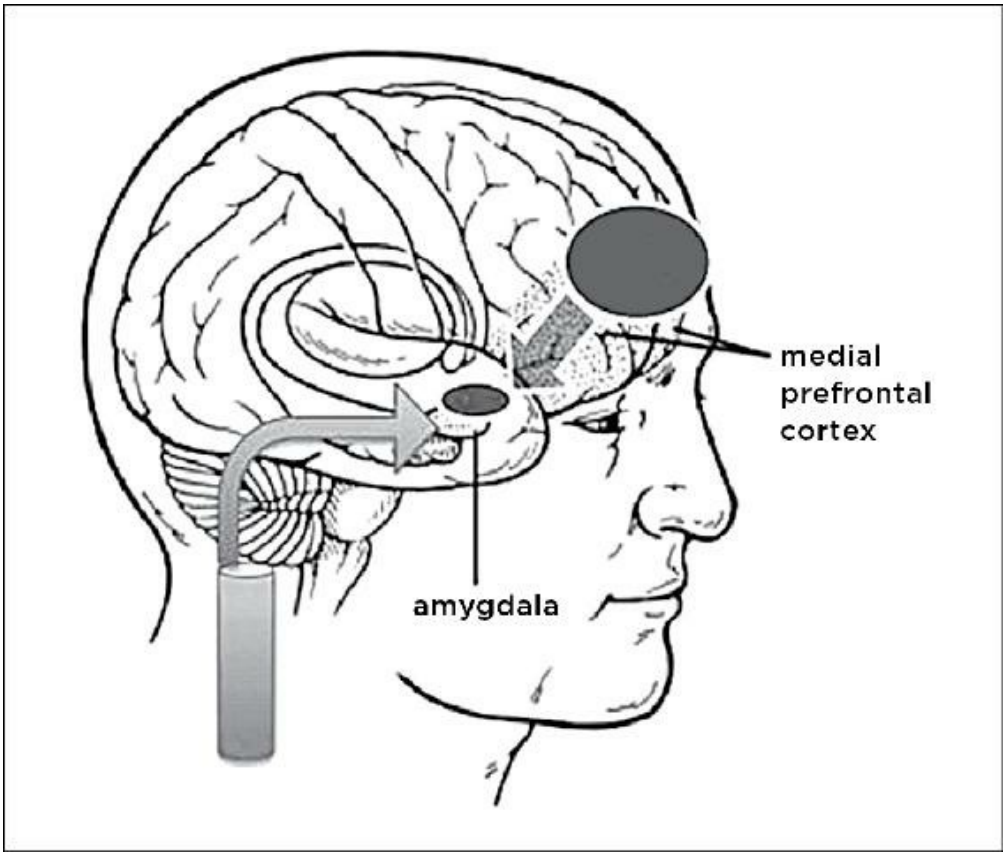
The amygdala's danger signals trigger the release of powerful stress hormones, including cortisol and adrenaline, which increase heart rate, blood pressure, and rate of breathing, preparing us to fight back or run away. Once the danger is past, the body returns to its normal state fairly quickly. But when recovery is blocked, the body is triggered to defend itself, which makes people feel agitated and aroused.

While the smoke detector is usually pretty good at picking up danger clues, trauma increases the risk of misinterpreting whether a particular situation is dangerous or safe. You can get along with other people only if you can accurately gauge whether their intentions are benign or dangerous. Even a slight misreading can lead to painful misunderstandings in relationships at home and at work. Functioning effectively in a complex work environment or a household filled with rambunctious kids requires the ability to quickly assess how people are feeling and continuously adjusting your behavior accordingly. Faulty alarm systems lead to blowups or shutdowns in response to innocuous comments or facial expressions.

CONTROLLING THE STRESS RESPONSE: THE WATCHTOWER

If the amygdala is the smoke detector in the brain, think of the frontal lobes—and specifically the medial prefrontal cortex (MPFC),[12] located directly above our eyes—as the watchtower, offering a view of the scene from on high. Is that smoke you smell the sign that your house is on fire and you need to get out, fast—or is it coming from the steak you put over too high a flame? The amygdala doesn't make such judgments; it just gets you ready to fight back or escape, even before the frontal lobes get a chance to weigh in with their assessment. As long as you are not too upset, your frontal lobes can restore your balance by helping you realize that you are responding to a false alarm and abort the stress response.

Ordinarily the executive capacities of the prefrontal cortex enable people to observe what is going on, predict what will happen if they take a certain action, and make a conscious choice. Being able to hover calmly and objectively over our thoughts, feelings, and emotions (an ability I'll call mindfulness throughout this book) and then take our time to respond allows the executive brain to inhibit, organize, and modulate the hardwired automatic reactions preprogrammed into the emotional brain. This capacity is crucial for preserving our relationships with our fellow human beings. As long as our frontal lobes are working properly, we're unlikely to lose our temper every time a waiter is late with our order or an insurance company agent puts us on hold. (Our watchtower also tells us that other people's anger and threats are a function of *their* emotional state.) When that system breaks down, we become like conditioned animals: The moment we detect danger we automatically go into fight-or-flight mode.



Top down or bottom up. Structures in the emotional brain decide what we perceive as dangerous or safe. There are two ways of changing the threat detection system: from the top down, via modulating messages from the medial prefrontal cortex (not just prefrontal cortex), or from the bottom up, via the reptilian brain, through breathing, movement, and touch.

In PTSD the critical balance between the amygdala (smoke detector) and the MPFC (watchtower) shifts radically, which makes it much harder to control emotions and impulses. Neuroimaging studies of human beings in highly emotional states reveal that intense fear, sadness, and anger all increase the activation of subcortical brain regions involved in emotions and significantly reduce the activity in various areas in the frontal lobe, particularly the MPFC. When that occurs, the inhibitory capacities of the frontal lobe break down, and people "take leave of their senses": They may startle in response to any loud sound, become enraged by small frustrations, or freeze when somebody touches them.[13]

Effectively dealing with stress depends upon achieving a balance between the smoke detector and the watchtower. If you want to manage your emotions better, your brain gives you two options: You can learn to regulate them from the top down or from the bottom up.

Knowing the difference between top down and bottom up regulation is central for understanding and treating traumatic stress. Top-down regulation involves strengthening the capacity of the watchtower to monitor your body's sensations. Mindfulness meditation and yoga can help with this. Bottom-up regulation involves recalibrating the autonomic nervous system, (which, as we have seen, originates in the brain stem). We can access the ANS through breath, movement, or touch. Breathing is one of the few body functions under both conscious and autonomic control. In part 5 of this book we'll explore specific techniques for increasing both

top-down and bottom-up regulation.

THE RIDER AND THE HORSE

For now I want to emphasize that emotion is not opposed to reason; our emotions assign value to experiences and thus are the foundation of reason. Our self-experience is the product of the balance between our rational and our emotional brains. When these two systems are in balance, we "feel like ourselves." However, when our survival is at stake, these systems can function relatively independently.

If, say, you are driving along, chatting with a friend, and a truck suddenly looms in the corner of your eye, you instantly stop talking, slam on the brakes, and turn your steering wheel to get out of harm's way. If your instinctive actions have saved you from a collision, you may resume where you left off. Whether you are able to do so depends largely on how quickly your visceral reactions subside to the threat.

The neuroscientist Paul MacLean, who developed the three-part description of the brain that I've used here, compared the relationship between the rational brain and the emotional brain to that between a more or less competent rider and his unruly horse.[14] As long as the weather is calm and the path is smooth, the rider can feel in excellent control. But unexpected sounds or threats from other animals can make the horse bolt, forcing the rider to hold on for dear life. Likewise, when people feel that their survival is at stake or they are seized by rages, longings, fear, or sexual desires, they stop listening to the voice of reason, and it makes little sense to argue with them. Whenever the limbic system decides that something is a question of life or death, the pathways between the frontal lobes and the limbic system become extremely tenuous.

Psychologists usually try to help people use insight and understanding to manage their behavior. However, neuroscience research shows that very few psychological problems are the result of defects in understanding; most originate in pressures from deeper regions in the brain that drive our perception and attention. When the alarm bell of the emotional brain keeps signaling that you are in danger, no amount of insight will silence it. I am reminded of the comedy in which a seven-time recidivist in an anger-management program extols the virtue of the techniques he's learned: "They are great and work terrific—as long as you are not really angry."

When our emotional and rational brains are in conflict (as when we're enraged with someone we love, frightened by someone we depend on, or lust after someone who is off limits), a tug-of-war ensues. This war is largely played out in the theater of visceral experience—your gut, your heart, your lungs—and will lead to both physical discomfort and psychological misery. Chapter 6 will discuss how the brain and viscera interact in safety and danger, which is key to understanding the many physical manifestations of trauma.

I'd like to end this chapter by examining two more brain scans that illustrate some of the core features of traumatic stress: timeless reliving; reexperiencing images, sounds, and emotions; and dissociation.

STAN AND UTE'S BRAINS ON TRAUMA

On a fine September morning in 1999, Stan and Ute Lawrence, a professional couple in their

forties, set out from their home in London, Ontario, to attend a business meeting in Detroit. Halfway through the journey they ran into a wall of dense fog that reduced visibility to zero in a split second. Stan immediately slammed on the brakes, coming to a standstill sideways on the highway, just missing a huge truck. An eighteen-wheeler went flying over the trunk of their car; vans and cars slammed into them and into each other. People who got out of their cars were hit as they ran for their lives. The ear-splitting crashes went on and on—with each jolt from behind they felt this would be the one that killed them. Stan and Ute were trapped in car number thirteen of an eighty-seven-car pileup, the worst road disaster in Canadian history.[15]

Then came the eerie silence. Stan struggled to open the doors and windows, but the eighteen-wheeler that had crushed their trunk was wedged against the car. Suddenly, someone was pounding on their roof. A girl was screaming, "Get me out of here—I'm on fire!" Helplessly, they saw her die as the car she'd been in was consumed by flames. The next thing they knew, a truck driver was standing on the hood of their car with a fire extinguisher. He smashed the windshield to free them, and Stan climbed through the opening. Turning around to help his wife, he saw Ute sitting frozen in her seat. Stan and the truck driver lifted her out and an ambulance took them to an emergency room. Aside from a few cuts, they were found to be physically unscathed.

At home that night, neither Stan nor Ute wanted to go to sleep. They felt that if they let go, they would die. They were irritable, jumpy, and on edge. That night, and for many to come, they drank copious quantities of wine to numb their fear. They could not stop the images that were haunting them or the questions that went on and on: What if they'd left earlier? What if they hadn't stopped for gas? After three months of this, they sought help from Dr. Ruth Lanius, a psychiatrist at the University of Western Ontario.

Dr. Lanius, who had been my student at the Trauma Center a few years earlier, told Stan and Ute she wanted to visualize their brains with an fMRI scan before beginning treatment. The fMRI measures neural activity by tracking changes in blood flow in the brain, and unlike the PET scan, it does not require exposure to radiation. Dr. Lanius used the same kind of script-driven imagery we had used at Harvard, capturing the images, sounds, smells, and other sensations Stan and Ute had experienced while they were trapped in the car.

Stan went first and immediately went into a flashback, just as Marsha had in our Harvard study. He came out of the scanner sweating, with his heart racing and his blood pressure sky high. "This was just the way I felt during the accident," he reported. "I was sure I was going to die, and there was nothing I could do to save myself." Instead of remembering the accident as something that had happened three months earlier, Stan was reliving it.

DISSOCIATION AND RELIVING

Dissociation is the essence of trauma. The overwhelming experience is split off and fragmented, so that the emotions, sounds, images, thoughts, and physical sensations related to the trauma take on a life of their own. The sensory fragments of memory intrude into the present, where they are literally relived. As long as the trauma is not resolved, the stress hormones that the body secretes to protect itself keep circulating, and the defensive movements and emotional responses keep getting replayed. Unlike Stan, however, many people may not be aware of the connection between their "crazy" feelings and reactions and the traumatic events that are being replayed.

They have no idea why they respond to some minor irritation as if they were about to be annihilated.

Flashbacks and reliving are in some ways worse that the trauma itself. A traumatic event has a beginning and an end—at some point it is over. But for people with PTSD a flashback can occur at any time, whether they are awake or asleep. There is no way of knowing when it's going to occur again or how long it will last. People who suffer from flashbacks often organize their lives around trying to protect against them. They may compulsively go to the gym to pump iron (but finding that they are never strong enough), numb themselves with drugs, or try to cultivate an illusory sense of control in highly dangerous situations (like motorcycle racing, bungee jumping, or working as an ambulance driver). Constantly fighting unseen dangers is exhausting and leaves them fatigued, depressed, and weary.

If elements of the trauma are replayed again and again, the accompanying stress hormones engrave those memories ever more deeply in the mind. Ordinary, day-to-day events become less and less compelling. Not being able to deeply take in what is going on around them makes it impossible to feel fully alive. It becomes harder to feel the joys and aggravations of ordinary life, harder to concentrate on the tasks at hand. Not being fully alive in the present keeps them more firmly imprisoned in the past.

Triggered responses manifest in various ways. Veterans may react to the slightest cue—like hitting a bump in the road or seeing a kid playing in the street—as if they were in a war zone. They startle easily and become enraged or numb. Victims of childhood sexual abuse may anesthetize their sexuality and then feel intensely ashamed if they become excited by sensations or images that recall their molestation, even when those sensations are the natural pleasures associated with particular body parts. If trauma survivors are forced to discuss their experiences, one person's blood pressure may increase while another responds with the beginnings of a migraine headache. Still others may shut down emotionally and not feel any obvious changes. However, in the lab we have no problem detecting their racing hearts and the stress hormones churning through their bodies.

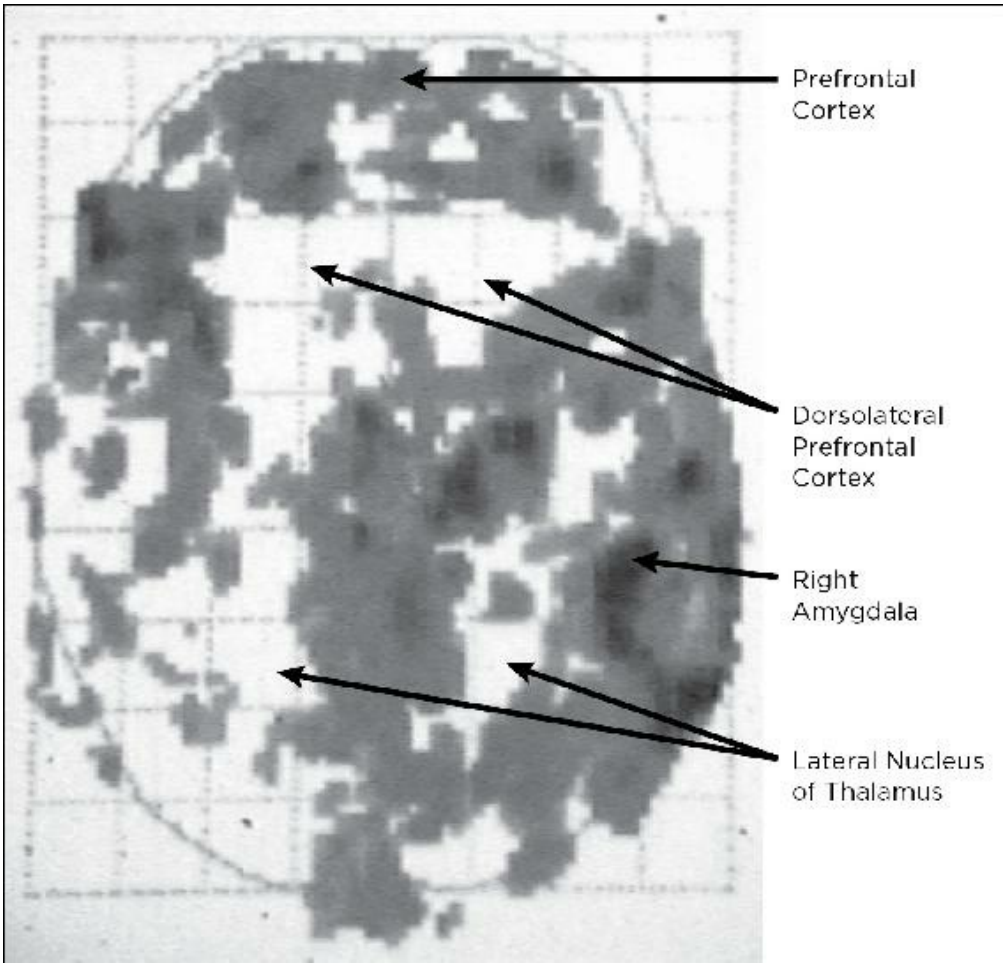
These reactions are irrational and largely outside people's control. Intense and barely controllable urges and emotions make people feel crazy—and makes them feel they don't belong to the human race. Feeling numb during birthday parties for your kids or in response to the death of loved ones makes people feel like monsters. As a result, shame becomes the dominant emotion and hiding the truth the central preoccupation.

They are rarely in touch with the origins of their alienation. That is where therapy comes in —is the beginning of bringing the emotions that were generated by trauma being able to feel, the capacity to observe oneself online. However, the bottom line is that the threat-perception system of the brain has changed, and people's physical reactions are dictated by the imprint of the past.

The trauma that started "out there" is now played out on the battlefield of their own bodies, usually without a conscious connection between what happened back then and what is going on right now inside. The challenge is not so much learning to accept the terrible things that have happened but learning how to gain mastery over one's internal sensations and emotions. Sensing, naming, and identifying what is going on inside is the first step to recovery.

THE SMOKE DETECTOR GOES ON OVERDRIVE

Stan's brain scan shows his flashback in action. This is what reliving trauma looks like in the brain: the brightly lit area in the lower right-hand corner, the blanked-out lower left side, and the four symmetrical white holes around the center. (You may recognize the lit-up amygdala and the off-line left brain from the Harvard study discussed in chapter 3.) Stan's amygdala made no distinction between past and present. It activated just as if the car crash were happening in the scanner, triggering powerful stress hormones and nervous-system responses. These were responsible for his sweating and trembling, his racing heart and elevated blood pressure: entirely normal and potentially lifesaving responses if a truck has just smashed into your car.



Imaging a flashback with fMRI. Notice how much more activity appears on the right side than on the left.

It's important to have an efficient smoke detector: You don't want to get caught unawares by a raging fire. But if you go into a frenzy every time you smell smoke, it becomes intensely disruptive. Yes, you need to detect whether somebody is getting upset with you, but if your amygdala goes into overdrive, you may become chronically scared that people hate you, or you may feel like they are out to get you.

THE TIMEKEEPER COLLAPSES

Both Stan and Ute had become hypersensitive and irritable after the accident, suggesting that their prefrontal cortex was struggling to maintain control in the face of stress. Stan's flashback precipitated a more extreme reaction.

The two white areas in the front of the brain (on top in the picture) are the right and left dorsolateral prefrontal cortex. When those areas are deactivated, people lose their sense of time and become trapped in the moment, without a sense of past, present, or future.[16]

Two brain systems are relevant for the mental processing of trauma: those dealing with emotional intensity and context. Emotional intensity is defined by the smoke alarm, the amygdala, and its counterweight, the watchtower, the medial prefrontal cortex. The context and meaning of an experience are determined by the system that includes the dorsolateral prefrontal cortex (DLPFC) and the hippocampus. The DLPFC is located to the side in the front brain, while the MPFC is in the center. The structures along the midline of the brain are devoted to your inner experience of yourself, those on the side are more concerned with your relationship with your surroundings.

The DLPFC tells us how our present experience relates to the past and how it may affect the future—you can think of it as the timekeeper of the brain. Knowing that whatever is happening is finite and will sooner or later come to an end makes most experiences tolerable. The opposite is also true—situations become intolerable if they feel interminable. Most of us know from sad personal experience that terrible grief is typically accompanied by the sense that this wretched state will last forever, and that we will never get over our loss. Trauma is the ultimate experience of "this will last forever."

Stan's scan reveals why people can recover from trauma only when the brain structures that were knocked out during the original experience—which is why the event registered in the brain as trauma in the first place—are fully online. Visiting the past in therapy should be done while people are, biologically speaking, firmly rooted in the present and feeling as calm, safe, and grounded as possible. ("Grounded" means that you can feel your butt in your chair, see the light coming through the window, feel the tension in your calves, and hear the wind stirring the tree outside.) Being anchored in the present while revisiting the trauma opens the possibility of deeply knowing that the terrible events belong to the past. For that to happen, the brain's watchtower, cook, and timekeeper need to be online. Therapy won't work as long as people keep being pulled back into the past.

THE THALAMUS SHUTS DOWN

Look again at the scan of Stan's flashback and you can see two more white holes in the lower half of the brain. These are his right and left thalamus—blanked out during the flashback as they were during the original trauma. As I've said, the thalamus functions as a "cook"—a relay station that collects sensations from the ears, eyes, and skin and integrates them into the soup that is our autobiographical memory. Breakdown of the thalamus explains why trauma is primarily remembered not as a story, a narrative with a beginning, middle, and end, but as isolated sensory imprints: images, sounds, and physical sensations that are accompanied by intense emotions, usually terror and helplessness.[17]

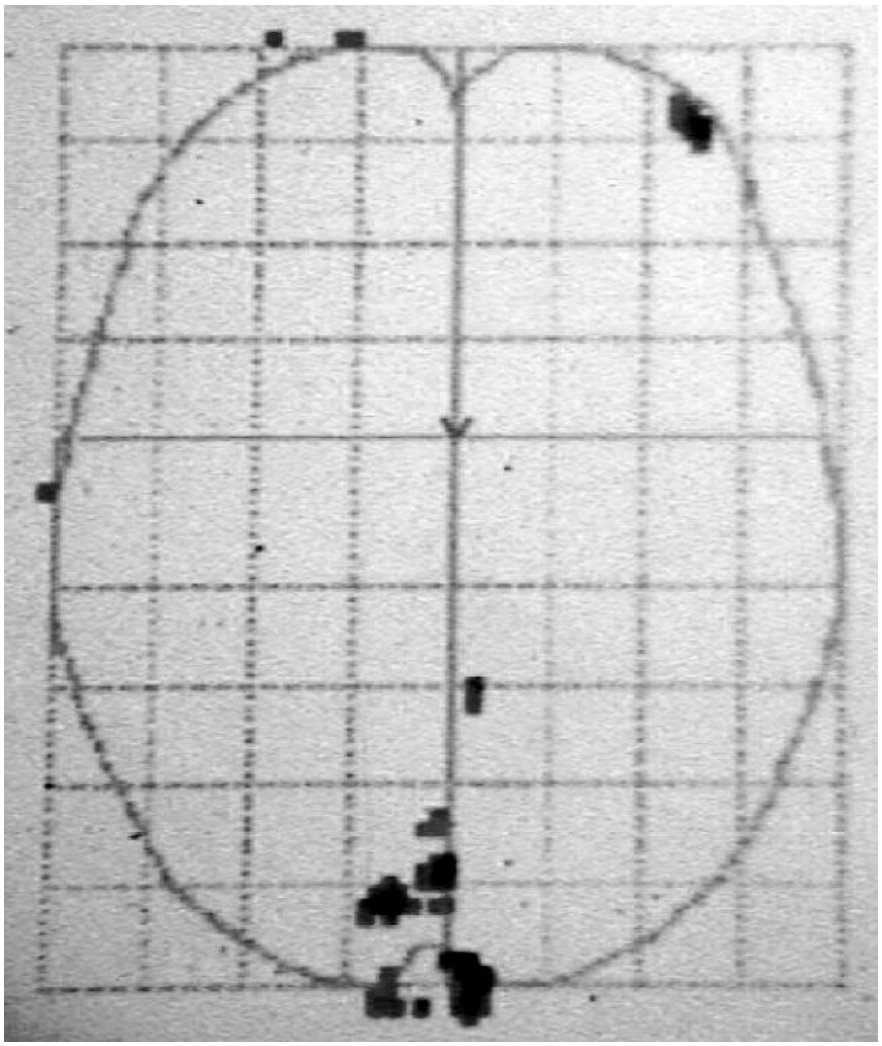
In normal circumstances the thalamus also acts as a filter or gatekeeper. This makes it a

central component of attention, concentration, and new learning—all of which are compromised by trauma. As you sit here reading, you may hear music in the background or traffic rumbling by or feel a faint gnawing in your stomach telling you it's time for a snack. If you are able to stay focused on this page, your thalamus is helping you distinguish between sensory information that is relevant and information that you can safely ignore. In chapter 19, on neurofeedback, I'll discuss some of the tests we use to measure how well this gating system works, as well as ways to strengthen it.

People with PTSD have their floodgates wide open. Lacking a filter, they are on constant sensory overload. In order to cope, they try to shut themselves down and develop tunnel vision and hyperfocus. If they can't shut down naturally, they may enlist drugs or alcohol to block out the world. The tragedy is that the price of closing down includes filtering out sources of pleasure and joy, as well.

DEPERSONALIZATION: SPLIT OFF FROM THE SELF

Let's now look at Ute's experience in the scanner. Not all people react to trauma in exactly the same way, but in this case the difference is particularly dramatic, since Ute was sitting right next to Stan in the wrecked car. She responded to her trauma script by going numb: Her mind went blank, and nearly every area of her brain showed markedly decreased activity. Her heart rate and blood pressure didn't elevate. When asked how she'd felt during the scan, she replied: "I felt just like I felt at the time of the accident: I felt nothing."



Blanking out (dissociation) in response to being reminded of past trauma. In this case almost every area of the brain has decreased activation, interfering with thinking, focus, and orientation.

The medical term for Ute's response is *depersonalization*.[18] Anyone who deals with traumatized men, women, or children is sooner or later confronted with blank stares and absent minds, the outward manifestation of the biological freeze reaction. Depersonalization is one symptom of the massive dissociation created by trauma. Stan's flashbacks came from his thwarted efforts to escape the crash—cued by the script, all his dissociated, fragmented sensations and emotions roared back into the present. But instead of struggling to escape, Ute had dissociated her fear and felt nothing.

I see depersonalization regularly in my office when patients tell me horrendous stories without any feeling. All the energy drains out of the room, and I have to make a valiant effort to keep paying attention. A lifeless patient forces you to work much harder to keep the therapy alive, and I often used to pray for the hour to be over quickly.

After seeing Ute's scan, I started to take a very different approach toward blanked-out patients. With nearly every part of their brains tuned out, they obviously cannot think, feel deeply, remember, or make sense out of what is going on. Conventional talk therapy, in those

circumstances, is virtually useless.

In Ute's case it was possible to guess why she responded so differently from Stan. She was utilizing a survival strategy her brain had learned in childhood to cope with her mother's harsh treatment. Ute's father died when she was nine years old, and her mother subsequently was often nasty and demeaning to her. At some point Ute discovered that she could blank out her mind when her mother yelled at her. Thirty-five years later, when she was trapped in her demolished car, Ute's brain automatically went into the same survival mode—she made herself disappear.

The challenge for people like Ute is to become alert and engaged, a difficult but unavoidable task if they want to recapture their lives. (Ute herself did recover—she wrote a book about her experiences and started a successful journal called *Mental Fitness*.) This is where a bottom-up approach to therapy becomes essential. The aim is actually to change the patient's physiology, his or her relationship to bodily sensations. At the Trauma Center we work with such basic measures as heart rate and breathing patterns. We help patients evoke and notice bodily sensations by tapping acupressure[19] points. Rhythmic interactions with other people are also effective—tossing a beach ball back and forth, bouncing on a Pilates ball, drumming, or dancing to music.

Numbing is the other side of the coin in PTSD. Many untreated trauma survivors start out like Stan, with explosive flashbacks, then numb out later in life. While reliving trauma is dramatic, frightening, and potentially self-destructive, over time a lack of presence can be even more damaging. This is a particular problem with traumatized children. The acting-out kids tend to get attention; the blanked-out ones don't bother anybody and are left to lose their future bit by bit.

LEARNING TO LIVE IN THE PRESENT

The challenge of trauma treatment is not only dealing with the past but, even more, enhancing the quality of day-to-day experience. One reason that traumatic memories become dominant in PTSD is that it's so difficult to feel truly alive right now. When you can't be fully here, you go to the places where you did feel alive—even if those places are filled with horror and misery.

Many treatment approaches for traumatic stress focus on desensitizing patients to their past, with the expectation that reexposure to their traumas will reduce emotional outbursts and flashbacks. I believe that this is based on a misunderstanding of what happens in traumatic stress. We must most of all help our patients to live fully and securely in the present. In order to do that, we need to help bring those brain structures that deserted them when they were overwhelmed by trauma back. Desensitization may make you less reactive, but if you cannot feel satisfaction in ordinary everyday things like taking a walk, cooking a meal, or playing with your kids, life will pass you by.

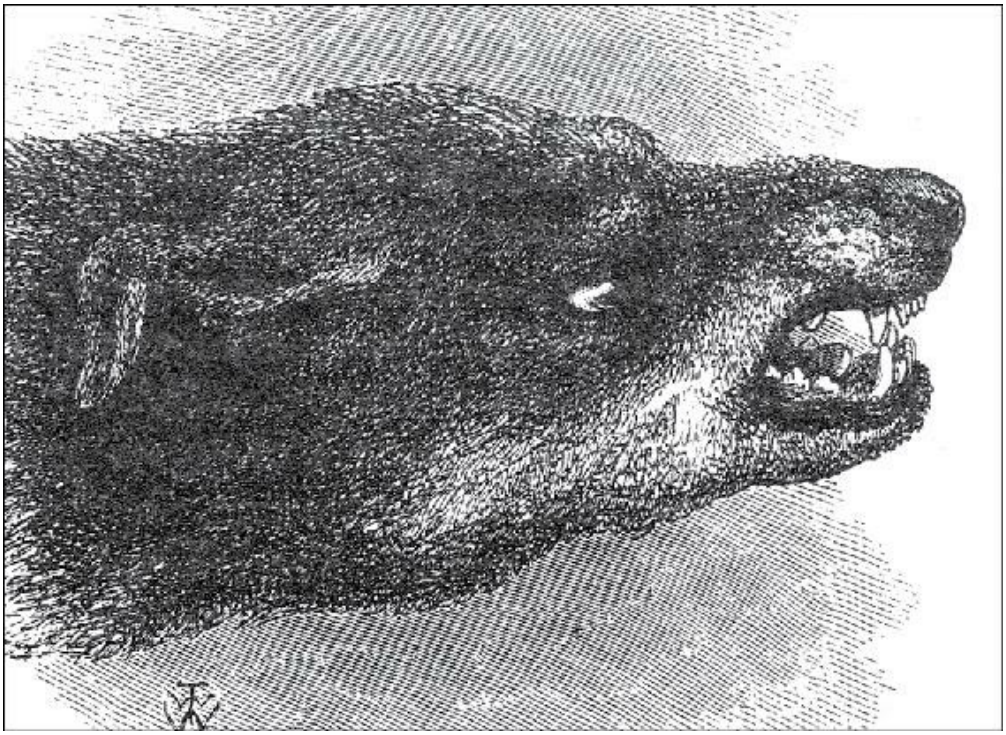
CHAPTER 5

BODY-BRAIN CONNECTIONS

> Life is about rhythm. We vibrate, our hearts are pumping blood. We are a rhythm machine, that's what we are.
>
> **—Mickey Hart**

Toward the end of his career, in 1872, Charles Darwin published *The Expression of the Emotions in Man and Animals*.[1] Until recently most scientific discussion of Darwin's theories has focused on *On the Origin of Species* (1859) and *The Descent of Man* (1871). But *The Expression of the Emotions* turns out to be an extraordinary exploration of the foundations of emotional life, filled with observations and anecdotes drawn from decades of inquiry, as well as close-to-home stories of Darwin's children and household pets. It's also a landmark in book illustration—one of the first books ever to include photographs. (Photography was still a relatively new technology and, like most scientists, Darwin wanted to make use of the latest techniques to make his points.) It's still in print today, readily available in a recent edition with a terrific introduction and commentaries by Paul Ekman, a modern pioneer in the study of emotions.

Darwin starts his discussion by noting the physical organization common to all mammals, including human beings—the lungs, kidneys, brains, digestive organs, and sexual organs that sustain and continue life. Although many scientists today would accuse him of anthropomorphism, Darwin stands with animal lovers when he proclaims: "Man and the higher animals . . . [also] have instincts in common. All have the same senses, intuition, sensation, passions, affections, and emotions, even the more complex ones such as jealousy, suspicion, emulation, gratitude, and magnanimity."[2] He observes that we humans share some of the physical signs of animal emotion. Feeling the hair on the back of your neck stand up when you're frightened or baring your teeth when you're enraged can only be understood as vestiges of a long evolutionary process.



> "When a man sneers or snarls at another, is the corner of the canine or eye tooth raised on the side facing the man whom he addresses?" **—Charles Darwin, 1872**

For Darwin mammalian emotions are fundamentally rooted in biology: They are the indispensable source of motivation to initiate action. Emotions (from the Latin *emovere*—to move out) give shape and direction to whatever we do, and their primary expression is through the muscles of the face and body. These facial and physical movements communicate our mental state and intention to others: Angry expressions and threatening postures caution them to back off. Sadness attracts care and attention. Fear signals helplessness or alerts us to danger.

We instinctively read the dynamic between two people simply from their tension or relaxation, their postures and tone of voice, their changing facial expressions. Watch a movie in a language you don't know, and you can still guess the quality of the relationship between the characters. We often can read other mammals (monkeys, dogs, horses) in the same way.

Darwin goes on to observe that the fundamental purpose of emotions is to initiate movement that will restore the organism to safety and physical equilibrium. Here is his comment on the origin of what today we would call PTSD:

> Behaviors to avoid or escape from danger have clearly evolved to render each organism competitive in terms of survival. But inappropriately prolonged escape or avoidance behavior would put the animal at a disadvantage in that successful species preservation demands reproduction which, in turn, depends upon feeding, shelter and mating activities all of which are reciprocals of avoidance and escape.[3]

In other words: If an organism is stuck in survival mode, its energies are focused on fighting off unseen enemies, which leaves no room for nurture, care, and love. For us humans, it means that as long as the mind is defending itself against invisible assaults, our closest bonds are threatened, along with our ability to imagine, plan, play, learn, and pay attention to other people's needs.

Darwin also wrote about body-brain connections that we are still exploring today. Intense emotions involve not only the mind but also the gut and the heart: "Heart, guts, and brain communicate intimately via the 'pneumogastric' nerve, the critical nerve involved in the expression and management of emotions in both humans and animals. When the mind is strongly excited, it instantly affects the state of the viscera; so that under excitement there will be much mutual action and reaction between these, the two most important organs of the body."[4]

The first time I encountered this passage, I reread it with growing excitement. Of course we experience our most devastating emotions as gut-wrenching feelings and heartbreak. As long as we register emotions primarily in our heads, we can remain pretty much in control, but feeling as if our chest is caving in or we've been punched in the gut is unbearable. We'll do anything to make these awful visceral sensations go away, whether it is clinging desperately to another human being, rendering ourselves insensible with drugs or alcohol, or taking a knife to the skin to replace overwhelming emotions with definable sensations. How many mental health problems, from drug addiction to self-injurious behavior, start as attempts to cope with the unbearable physical pain of our emotions? If Darwin was right, the solution requires finding ways to help people alter the inner sensory landscape of their bodies.

Until recently, this bidirectional communication between body and mind was largely ignored by Western science, even as it had long been central to traditional healing practices in many other parts of the world, notably in India and China. Today it is transforming our understanding of trauma and recovery.

A WINDOW INTO THE NERVOUS SYSTEM

All of the little signs we instinctively register during a conversation—the muscle shifts and tensions in the other person's face, eye movements and pupil dilation, pitch and speed of the voice—as well as the fluctuations in our own inner landscape—salivation, swallowing, breathing, and heart rate—are linked by a single regulatory system.[5] All are a product of the synchrony between the two branches of the autonomic nervous system (ANS): the sympathetic, which acts as the body's accelerator, and the parasympathetic, which serves as its brake.[6] These are the "reciprocals" Darwin spoke of, and working together they play an important role in managing the body's energy flow, one preparing for its expenditure, the other for its conservation.

The sympathetic nervous system (SNS) is responsible for arousal, including the fight-or-flight response (Darwin's "escape or avoidance behavior"). Almost two thousand years ago the Roman physician Galen gave it the name "sympathetic" because he observed that it functioned with the emotions (*sym pathos*). The SNS moves blood to the muscles for quick action, partly by triggering the adrenal glands to squirt out adrenaline, which speeds up the heart rate and increases blood pressure.

The second branch of the ANS is the parasympathetic ("against emotions") nervous system (PNS), which promotes self-preservative functions like digestion and wound healing. It triggers the release of acetylcholine to put a brake on arousal, slowing the heart down, relaxing muscles, and returning breathing to normal. As Darwin pointed out, "feeding, shelter, and mating activities" depend on the PNS.

There is a simple way to experience these two systems for yourself. Whenever you take a deep breath, you activate the SNS. The resulting burst of adrenaline speeds up your heart, which explains why many athletes take a few short, deep breaths before starting competition. Exhaling, in turn, activates the PNS, which slows down the heart. If you take a yoga or a meditation class, your instructor will probably urge you to pay particular attention to the exhalation, since deep, long breaths out help calm you down. As we breathe, we continually speed up and slow down the heart, and because of that the interval between two successive heartbeats is never precisely the same. A measurement called heart rate variability (HRV) can be used to test the flexibility of this system, and good HRV—the more fluctuation, the better—is a sign that the brake and accelerator in your arousal system are both functioning properly and in balance. We had a breakthrough when we acquired an instrument to measure HRV, and I will explain in chapter 16 how we can use HRV to help treat PTSD.

THE NEURAL LOVE CODE[7]

In 1994 Stephen Porges, who was a researcher at the University of Maryland at the time we started our investigation of HRV, and who is now at the University of North Carolina, introduced

the Polyvagal Theory, which built on Darwin's observations and added another 140 years of scientific discoveries to those early insights. (*Polyvagal* refers to the many branches of the vagus nerve—Darwin's "pneumogastric nerve"—which connects numerous organs, including the brain, lungs, heart, stomach, and intestines.) The Polyvagal Theory provided us with a more sophisticated understanding of the biology of safety and danger, one based on the subtle interplay between the visceral experiences of our own bodies and the voices and faces of the people around us. It explained why a kind face or a soothing tone of voice can dramatically alter the way we feel. It clarified why knowing that we are seen and heard by the important people in our lives can make us feel calm and safe, and why being ignored or dismissed can precipitate rage reactions or mental collapse. It helped us understand why focused attunement with another person can shift us out of disorganized and fearful states.[8]

In short, Porges's theory made us look beyond the effects of fight or flight and put social relationships front and center in our understanding of trauma. It also suggested new approaches to healing that focus on strengthening the body's system for regulating arousal.

Human beings are astoundingly attuned to subtle emotional shifts in the people (and animals) around them. Slight changes in the tension of the brow, wrinkles around the eyes, curvature of the lips, and angle of the neck quickly signal to us how comfortable, suspicious, relaxed, or frightened someone is.[9] Our mirror neurons register their inner experience, and our own bodies make internal adjustments to whatever we notice. Just so, the muscles of our own faces give others clues about how calm or excited we feel, whether our heart is racing or quiet, and whether we're ready to pounce on them or run away. When the message we receive from another person is "You're safe with me," we relax. If we're lucky in our relationships, we also feel nourished, supported, and restored as we look into the face and eyes of the other.

Our culture teaches us to focus on personal uniqueness, but at a deeper level we barely exist as individual organisms. Our brains are built to help us function as members of a tribe. We are part of that tribe even when we are by ourselves, whether listening to music (that other people created), watching a basketball game on television (our own muscles tensing as the players run and jump), or preparing a spreadsheet for a sales meeting (anticipating the boss's reactions). Most of our energy is devoted to connecting with others.

If we look beyond the list of specific symptoms that entail formal psychiatric diagnoses, we find that almost all mental suffering involves either trouble in creating workable and satisfying relationships or difficulties in regulating arousal (as in the case of habitually becoming enraged, shut down, overexcited, or disorganized). Usually it's a combination of both. The standard medical focus on trying to discover the right drug to treat a particular "disorder" tends to distract us from grappling with how our problems interfere with our functioning as members of our tribe.

SAFETY AND RECIPROCITY

A few years ago I heard Jerome Kagan, a distinguished emeritus professor of child psychology at Harvard, say to the Dalai Lama that for every act of cruelty in this world there are hundreds of small acts of kindness and connection. His conclusion: "To be benevolent rather than malevolent is probably a true feature of our species." Being able to feel safe with other people is probably the single most important aspect of mental health; safe connections are fundamental to meaningful and satisfying lives. Numerous studies of disaster response around the globe have

shown that social support is the most powerful protection against becoming overwhelmed by stress and trauma.

Social support is not the same as merely being in the presence of others. The critical issue is *reciprocity*: being truly heard and seen by the people around us, feeling that we are held in someone else's mind and heart. For our physiology to calm down, heal, and grow we need a visceral feeling of safety. No doctor can write a prescription for friendship and love: These are complex and hard-earned capacities. You don't need a history of trauma to feel self-conscious and even panicked at a party with strangers—but trauma can turn the whole world into a gathering of aliens.

Many traumatized people find themselves chronically out of sync with the people around them. Some find comfort in groups where they can replay their combat experiences, rape, or torture with others who have similar backgrounds or experiences. Focusing on a shared history of trauma and victimization alleviates their searing sense of isolation, but usually at the price of having to deny their individual differences: Members can belong only if they conform to the common code.

Isolating oneself into a narrowly defined victim group promotes a view of others as irrelevant at best and dangerous at worst, which eventually only leads to further alienation. Gangs, extremist political parties, and religious cults may provide solace, but they rarely foster the mental flexibility needed to be fully open to what life has to offer and as such cannot liberate their members from their traumas. Well-functioning people are able to accept individual differences and acknowledge the humanity of others.

In the past two decades it has become widely recognized that when adults or children are too skittish or shut down to derive comfort from human beings, relationships with other mammals can help. Dogs and horses and even dolphins offer less complicated companionship while providing the necessary sense of safety. Dogs and horses, in particular, are now extensively used to treat some groups of trauma patients.[10]

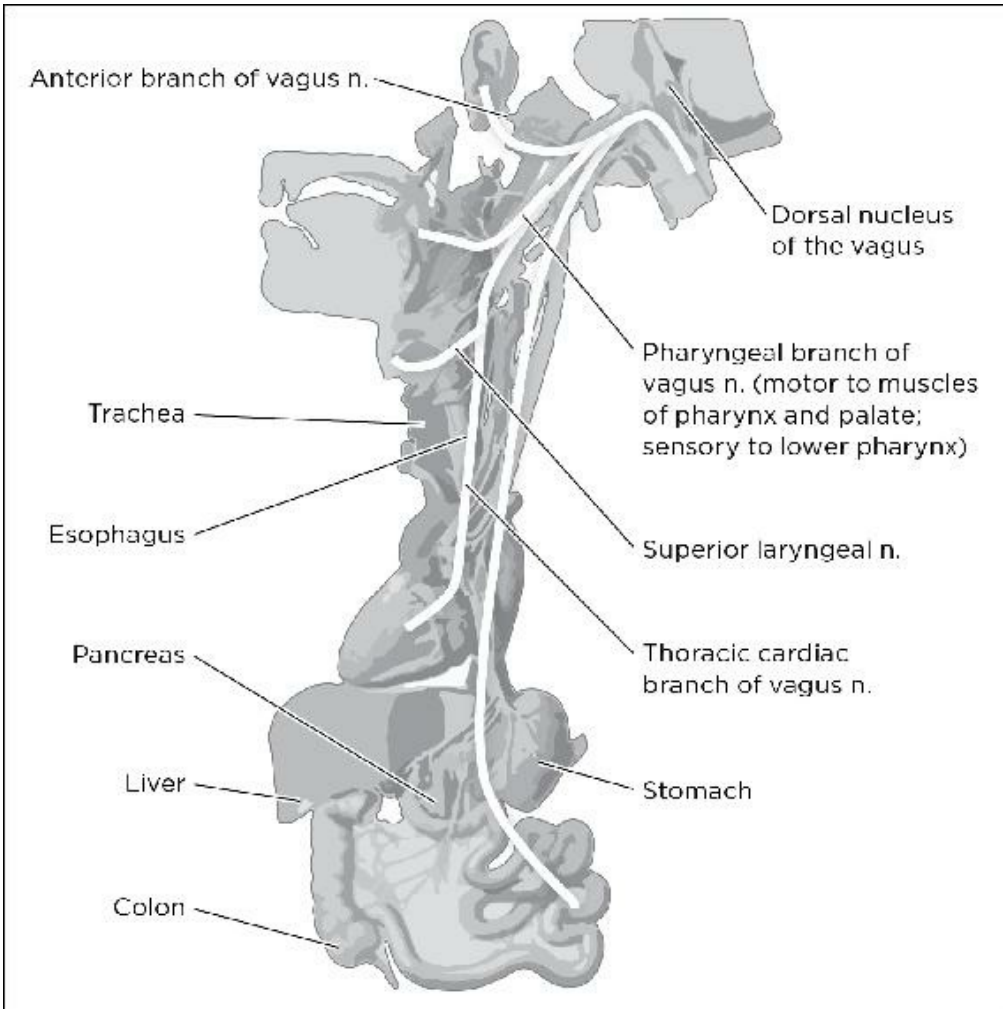
THREE LEVELS OF SAFETY

After trauma the world is experienced with a different nervous system that has an altered perception of risk and safety. Porges coined the word "neuroception" to describe the capacity to evaluate relative danger and safety in one's environment. When we try to help people with faulty neuroception, the great challenge is finding ways to reset their physiology, so that their survival mechanisms stop working against them. This means helping them to respond appropriately to danger but, even more, to recover the capacity to experience safety, relaxation, and true reciprocity.

I have extensively interviewed and treated six people who survived plane crashes. Two reported having lost consciousness during the incident; even though they were not physically injured, they collapsed mentally. Two went into a panic and stayed frantic until well after we had started treatment. Two remained calm and resourceful and helped evacuate fellow passengers from the burning wreckage. I've found a similar range of responses in survivors of rape, car crashes, and torture. In the previous chapter we saw the radically different reactions of Stan and Ute as they relived the highway disaster they'd experienced side by side. What accounts for this spectrum of responses: focused, collapsed, or frantic?

Porges's theory provides an explanation: The autonomic nervous system regulates three fundamental physiological states. The level of safety determines which one of these is activated at any particular time. Whenever we feel threatened, we instinctively turn to the first level, *social engagement*. We call out for help, support, and comfort from the people around us. But if no one comes to our aid, or we're in immediate danger, the organism reverts to a more primitive way to survive: *fight or flight.* We fight off our attacker, or we run to a safe place. However, if this fails —we can't get away, we're held down or trapped—the organism tries to preserve itself by shutting down and expending as little energy as possible. We are then in a state of *freeze* or *collapse*.

This is where the many-branched vagus nerve comes in, and I'll describe its anatomy briefly because it's central to understanding how people deal with trauma. The social-engagement system depends on nerves that have their origin in the brain stem regulatory centers, primarily the vagus—also known as the tenth cranial nerve—together with adjoining nerves that activate the muscles of the face, throat, middle ear, and voice box or larynx. When the "ventral vagal complex" (VVC) runs the show, we smile when others smile at us, we nod our heads when we agree, and we frown when friends tell us of their misfortunes. When the VVC is engaged, it also sends signals down to our heart and lungs, slowing down our heart rate and increasing the depth of breathing. As a result, we feel calm and relaxed, centered, or pleasurably aroused.



The many-branched vagus. The vagus nerve (which Darwin called the pneumogastric nerve) registers heartbreak and gut-wrenching feelings. When a person becomes upset, the throat gets dry, the voice becomes tense, the heart speeds up, and respiration becomes rapid and shallow.

COURTESY OF NED KALIN, MD

Three responses to threat.

1. The social engagement system: an alarmed monkey signals danger and calls for help. VVC.
2. Fight or flight: Teeth bared, the face of rage and terror. SNS.
3. Collapse: The body signals defeat and withdraws. DVC.

Any threat to our safety or social connections triggers changes in the areas innervated by the VVC. When something distressing happens, we automatically signal our upset in our facial expressions and tone of voice, changes meant to beckon others to come to our assistance.[11] However, if no one responds to our call for help, the threat increases, and the older limbic brain jumps in. The sympathetic nervous system takes over, mobilizing muscles, heart, and lungs for fight or flight.[12] Our voice becomes faster and more strident and our heart starts pumping faster. If a dog is in the room, she will stir and growl, because she can smell the activation of our sweat glands.

Finally, if there's no way out, and there's nothing we can do to stave off the inevitable, we will activate the ultimate emergency system: the dorsal vagal complex (DVC). This system reaches down below the diaphragm to the stomach, kidneys, and intestines and drastically reduces metabolism throughout the body. Heart rate plunges (we feel our heart "drop"), we can't breathe, and our gut stops working or empties (literally "scaring the shit out of" us). This is the point at which we disengage, collapse, and freeze.

FIGHT OR FLIGHT VERSUS COLLAPSE

As we saw in Stan's and Ute's brain scans, trauma is expressed not only as fight or flight but also as shutting down and failing to engage in the present. A different level of brain activity is involved for each response: the mammalian fight-or-flight system, which is protective and keeps us from shutting down, and the reptilian brain, which produces the collapse response. You can see the difference between these two systems at any big pet store. Kittens, puppies, mice and gerbils constantly play around, and when they're tired they huddle together, skin to skin, in a pile. In contrast, the snakes and lizards lie motionless in the corners of their cages, unresponsive to the environment.[13] This sort of immobilization, generated by the reptilian brain, characterizes many chronically traumatized people, as opposed to the mammalian panic and rage that make more recent trauma survivors so frightened and frightening.

Almost everyone knows what that quintessential fight/flight response, road rage, feels like: A sudden threat precipitates an intense impulse to move and attack. Danger turns off our social-engagement system, decreases our responsiveness to the human voice, and increases our sensitivity to threatening sounds. Yet for many people panic and rage are preferable to the opposite: shutting down and becoming dead to the world. Activating flight/flight at least makes them feel energized. That is why so many abused and traumatized people feel fully alive in the face of actual danger, while they go numb in situations that are more complex but objectively safe, like birthday parties or family dinners.

When fighting or running does not take care of the threat, we activate the last resort—the reptilian brain, the ultimate emergency system. This system is most likely to engage when we are physically immobilized, as when we are pinned down by an attacker or when a child has no escape from a terrifying caregiver. Collapse and disengagement are controlled by the DVC, an evolutionarily ancient part of the parasympathetic nervous system that is associated with digestive symptoms like diarrhea and nausea. It also slows down the heart and induces shallow breathing. Once this system takes over, other people, and we ourselves, cease to matter. Awareness is shut down, and we may no longer even register physical pain.

HOW WE BECOME HUMAN

In Porges's grand theory the VVC evolved in mammals to support an increasingly complex social life. All mammals, including human beings, band together to mate, nurture their young, defend against common enemies, and coordinate hunting and food acquisition. The more efficiently the VVC synchronizes the activity of the sympathetic and parasympathetic nervous systems, the better the physiology of each individual will be attuned to that of other members of the tribe.

Thinking about the VVC in this way illuminates how parents naturally help their kids to regulate themselves. Newborn babies are not very social; they sleep most of the time and wake up when they're hungry or wet. After having been fed they may spend a little time looking around, fussing, or staring, but they will soon be asleep again, following their own internal rhythms. Early in life they are pretty much at the mercy of the alternating tides of their sympathetic and parasympathetic nervous systems, and their reptilian brain runs most of the show.

But day by day, as we coo and smile and cluck at them, we stimulate the growth of synchronicity in the developing VVC. These interactions help to bring our babies' emotional arousal systems into sync with their surroundings. The VVC controls sucking, swallowing, facial expression, and the sounds produced by the larynx. When these functions are stimulated in an infant, they are accompanied by a sense of pleasure and safety, which helps create the foundation for all future social behavior.[14] As my friend Ed Tronick taught me a long time ago, the brain is a cultural organ—experience shapes the brain.

Being in tune with other members of our species via the VVC is enormously rewarding. What begins as the attuned play of mother and child continues with the rhythmicity of a good basketball game, the synchrony of tango dancing, and the harmony of choral singing or playing a piece of jazz or chamber music—all of which foster a deep sense of pleasure and connection.

We can speak of trauma when that system fails: when you beg for your life, but the assailant ignores your pleas; when you are a terrified child lying in bed, hearing your mother scream as her boyfriend beats her up; when you see your buddy trapped under a piece of metal that you're not strong enough to lift; when you want to push away the priest who is abusing you, but you're afraid you'll be punished. Immobilization is at the root of most traumas. When that occurs the DVC is likely to take over: Your heart slows down, your breathing becomes shallow, and, zombielike, you lose touch with yourself and your surroundings. You dissociate, faint and collapse.

DEFEND OR RELAX?

Steve Porges helped me realize that the natural state of mammals is to be somewhat on guard. However, in order to feel emotionally close to another human being, our defensive system must temporarily shut down. In order to play, mate, and nurture our young, the brain needs to turn off its natural vigilance.

Many traumatized individuals are too hypervigilant to enjoy the ordinary pleasures that life has to offer, while others are too numb to absorb new experiences—or to be alert to signs of real danger. When the smoke detectors of the brain malfunction, people no longer run when they should be trying to escape or fight back when they should be defending themselves. The

landmark ACE (Adverse Childhood Experiences) study, which I'll discuss in more detail in chapter 9, showed that women who had an early history of abuse and neglect were seven times more likely to be raped in adulthood. Women who, as children, had witnessed their mothers being assaulted by their partners had a vastly increased chance to fall victim to domestic violence.[15]

Many people feel safe as long as they can limit their social contact to superficial conversations, but actual physical contact can trigger intense reactions. However, as Porges points out, achieving any sort of deep intimacy—a close embrace, sleeping with a mate, and sex—requires allowing oneself to experience immobilization without fear.[16] It is especially challenging for traumatized people to discern when they are actually safe and to be able to activate their defenses when they are in danger. This requires having experiences that can restore the sense of physical safety, a topic to which we'll return many times in the chapters that follow.

NEW APPROACHES TO TREATMENT

If we understand that traumatized children and adults get stuck in fight/flight or in chronic shut-down, how do we help them to deactivate these defensive maneuvers that once ensured their survival?

Some gifted people who work with trauma survivors know how to do this intuitively. Steve Gross used to run the play program at the Trauma Center. Steve often walked around the clinic with a brightly colored beach ball, and when he saw angry or frozen kids in the waiting room, he would flash them a big smile. The kids rarely responded. Then, a little later, he would return and "accidentally" drop his ball close to where a kid was sitting. As Steve leaned over to pick it up, he'd nudge it gently toward the kid, who'd usually give a halfhearted push in return. Gradually Steve got a back-and-forth going, and before long you'd see smiles on both faces.

From simple, rhythmically attuned movements, Steve had created a small, safe place where the social-engagement system could begin to reemerge. In the same way, severely traumatized people may get more out of simply helping to arrange chairs before a meeting or joining others in tapping out a musical rhythm on the chair seats than they would from sitting in those same chairs and discussing the failures in their life.

One thing is certain: Yelling at someone who is already out of control can only lead to further dysregulation. Just as your dog cowers if you shout and wags his tail when you speak in a high singsong, we humans respond to harsh voices with fear, anger, or shutdown and to playful tones by opening up and relaxing. We simply cannot help but respond to these indicators of safety or danger.

Sadly, our educational system, as well as many of the methods that profess to treat trauma, tend to bypass this emotional-engagement system and focus instead on recruiting the cognitive capacities of the mind. Despite the well-documented effects of anger, fear, and anxiety on the ability to reason, many programs continue to ignore the need to engage the safety system of the brain before trying to promote new ways of thinking. The last things that should be cut from school schedules are chorus, physical education, recess, and anything else involving movement, play, and joyful engagement. When children are oppositional, defensive, numbed out, or enraged, it's also important to recognize that such "bad behavior" may repeat action patterns that were established to survive serious threats, even if they are intensely upsetting or off-putting.

Porges's work has had a profound effect on how my Trauma Center colleagues and I organize the treatment of abused children and traumatized adults. It's true that we would probably have developed a therapeutic yoga program for women at some point, given that yoga had proved so successful in helping them calm down and get in touch with their dissociated bodies. We would also have been likely to experiment with a theater program in the Boston inner-city schools, with a karate program for rape survivors called impact model mugging, and with play techniques and body modalities like sensory stimulation that have now been used with survivors around the world. (All of these and more will be explored in part 5.)

But the polyvagal theory helped us understand and explain *why* all these disparate, unconventional techniques worked so well. It enabled us to become more conscious of combining top-down approaches (to activate social engagement) with bottom-up methods (to calm the physical tensions in the body). We were more open to the value of other age-old, nonpharmacological approaches to health that have long been practiced outside Western medicine, ranging from breath exercises (pranayama) and chanting to martial arts like qigong to drumming and group singing and dancing. All rely on interpersonal rhythms, visceral awareness, and vocal and facial communication, which help shift people out of fight/flight states, reorganize their perception of danger, and increase their capacity to manage relationships.

The body keeps the score:[17] If the memory of trauma is encoded in the viscera, in heartbreaking and gut-wrenching emotions, in autoimmune disorders and skeletal/muscular problems, and if mind/brain/visceral communication is the royal road to emotion regulation, this demands a radical shift in our therapeutic assumptions.

CHAPTER 6

LOSING YOUR BODY, LOSING YOUR SELF

> Be patient toward all that is unsolved in your heart and try to love the questions themselves. . . . Live the questions now. Perhaps you will gradually, without noticing it, live along some distant day into the answer.
>
> **—Rainer Maria Rilke, *Letters to a Young Poet***

Sherry walked into my office with her shoulders slumped, her chin nearly touching her chest. Even before we spoke a word, her body was telling me that she was afraid to face the world. I also noticed that her long sleeves only partially covered the scabs on her forearms. After sitting down, she told me in a high-pitched monotone that she couldn't stop herself from picking at the skin on her arms and chest until she bled.

As far back as Sherry could remember, her mother had run a foster home, and their house was often packed with as many as fifteen strange, disruptive, frightened, and frightening kids who disappeared as suddenly as they arrived. Sherry had grown up taking care of these transient children, feeling that there was no room for her and her needs. "I know I wasn't wanted," she told me. "I'm not sure when I first realized that, but I've thought about things that my mother said to me, and the signs were always there. She'd tell me, 'You know, I don't think you belong in this family. I think they gave us the wrong baby.' And she'd say it with a smile on her face. But, of course, people often pretend to joke when they say something serious."

Over the years our research team has repeatedly found that chronic emotional abuse and neglect can be just as devastating as physical abuse and sexual molestation.[1] Sherry turned out to be a living example of these findings: Not being seen, not being known, and having nowhere to turn to feel safe is devastating at any age, but it is particularly destructive for young children, who are still trying to find their place in the world.

Sherry had graduated from college, but she now worked in a joyless clerical job, lived alone with her cats, and had no close friends. When I asked her about men, she told me that her only "relationship" had been with a man who'd kidnapped her while she was on a college vacation in Florida. He'd held her captive and raped her repeatedly for five consecutive days. She remembered having been curled up, terrified and frozen for most of that time, until she realized she could try to get away. She escaped by simply walking out while he was in the bathroom.

When she called her mother collect for help, her mother refused to take the call. Sherry finally managed to get home with assistance from a domestic violence shelter.

Sherry told me that she'd started to pick at her skin because it gave her some relief from feeling numb. The physical sensations made her feel more alive but also deeply ashamed—she knew she was addicted to these actions but could not stop them. She'd consulted many mental health professionals before me and had been questioned repeatedly about her "suicidal behavior." She'd also been subjected to involuntary hospitalization by a psychiatrist who refused to treat her unless she could promise that she would never pick at herself again. However, in my experience, patients who cut themselves or pick at their skin like Sherry, are seldom suicidal but are trying to make themselves feel better in the only way they know.

This is a difficult concept for many people to understand. As I discussed in the previous chapter, the most common response to distress is to seek out people we like and trust to help us and give us the courage to go on. We may also calm down by engaging in a physical activity like biking or going to the gym. We start learning these ways of regulating our feelings from the first moment someone feeds us when we're hungry, covers us when we're cold, or rocks us when we're hurt or scared.

But if no one has ever looked at you with loving eyes or broken out in a smile when she sees you; if no one has rushed to help you (but instead said, "Stop crying, or I'll give you something to cry about"), then you need to discover other ways of taking care of yourself. You are likely to experiment with anything—drugs, alcohol, binge eating, or cutting—that offers some kind of relief.

While Sherry dutifully came to every appointment and answered my questions with great sincerity, I did not feel we were making the sort of vital connection that is necessary for therapy to work. Struck by how frozen and uptight she was, I suggested that she see Liz, a massage therapist I had worked with previously. During their first meeting Liz positioned Sherry on the massage table, then moved to the end of the table and gently held Sherry's feet. Lying there with her eyes closed, Sherry suddenly yelled in a panic: "Where are you?" Somehow Sherry had lost track of Liz, even though Liz was right there, with her hands on Sherry's feet.

Sherry was one of the first patients who taught me about the extreme disconnection from the body that so many people with histories of trauma and neglect experience. I discovered that my professional training, with its focus on understanding and insight, had largely ignored the relevance of the living, breathing body, the foundation of our selves. Sherry knew that picking her skin was a destructive thing to do and that it was related to her mother's neglect, but understanding the source of the impulse made no difference in helping her control it.

LOSING YOUR BODY

Once I was alerted to this, I was amazed to discover how many of my patients told me they could not feel whole areas of their bodies. Sometimes I'd ask them to close their eyes and tell me what I had put into their outstretched hands. Whether it was a car key, a quarter, or a can opener, they often could not even guess what they were holding—their sensory perceptions simply weren't working.

I talked this over with my friend Alexander McFarlane in Australia, who had observed the same phenomenon. In his laboratory in Adelaide he had studied the question: How do we know

without looking at it that we're holding a car key? Recognizing an object in the palm of your hand requires sensing its shape, weight, temperature, texture, and position. Each of those distinct sensory experiences is transmitted to a different part of the brain, which then needs to integrate them into a single perception. McFarlane found that people with PTSD often have trouble putting the picture together.[2]

When our senses become muffled, we no longer feel fully alive. In an article called "What Is an Emotion?" (1884),[3] William James, the father of American psychology, reported a striking case of "sensory insensibility" in a woman he interviewed: "I have . . . no human sensations," she told him. "[I am] surrounded by all that can render life happy and agreeable, still to me the faculty of enjoyment and of feeling is wanting. . . . Each of my senses, each part of my proper self, is as it were separated from me and can no longer afford me any feeling; this impossibility seems to depend upon a void which I feel in the front of my head, and to be due to the diminution of the sensibility over the whole surface of my body, for it seems to me that I never actually reach the objects which I touch. All this would be a small matter enough, but for its frightful result, which is that of the impossibility of any other kind of feeling and of any sort of enjoyment, although I experience a need and desire of them that render my life an incomprehensible torture."

This response to trauma raises an important question: How can traumatized people learn to integrate ordinary sensory experiences so that they can live with the natural flow of feeling and feel secure and complete in their bodies?

HOW DO WE KNOW WE'RE ALIVE?

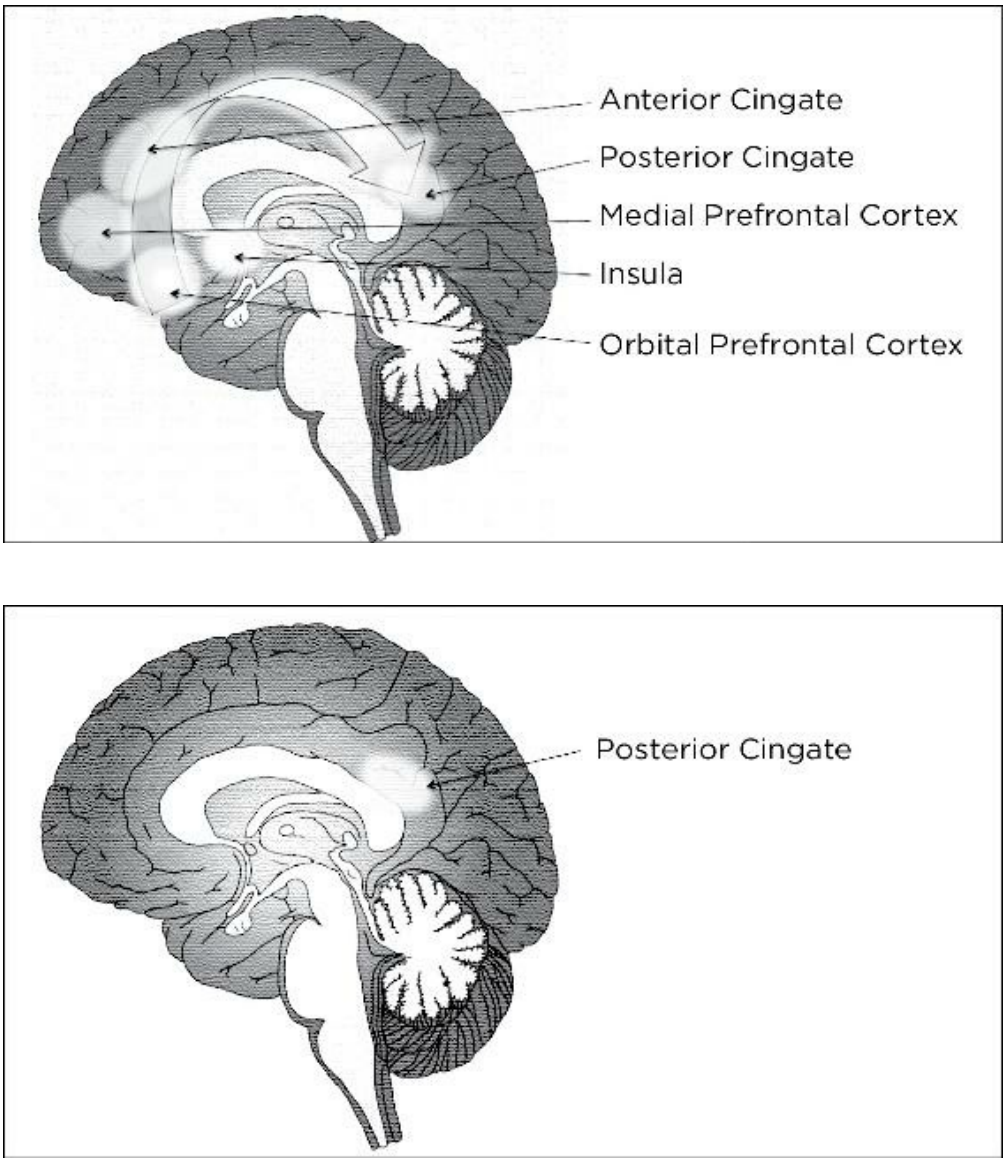
Most early neuroimaging studies of traumatized people were like those we've seen in chapter 3; they focused on how subjects reacted to specific reminders of the trauma. Then, in 2004, my colleague Ruth Lanius, who scanned Stan and Ute Lawrence's brains, posed a new question: What happens in the brains of trauma survivors when they are *not* thinking about the past? Her studies on the idling brain, the "default state network" (DSN), opened up a whole new chapter in understanding how trauma affects self-awareness, specifically sensory self-awareness.[4]

Dr. Lanius recruited a group of sixteen "normal" Canadians to lie in a brain scanner while thinking about nothing in particular. This is not easy for anyone to do—as long as we are awake, our brains are churning—but she asked them to focus their attention on their breathing and try to empty their minds as much as possible. She then repeated the same experiment with eighteen people who had histories of severe, chronic childhood abuse.

What is your brain doing when you have nothing in particular on your mind? It turns out that you pay attention to yourself: The default state activates the brain areas that work together to create your sense of "self."

When Ruth looked at the scans of her normal subjects, she found activation of DSN regions that previous researchers had described. I like to call this the Mohawk of self-awareness, the midline structures of the brain, starting out right above our eyes, running through the center of the brain all the way to the back. All these midline structures are involved in our sense of self. The largest bright region at the back of the brain is the posterior cingulate, which gives us a physical sense of where we are—our internal GPS. It is strongly connected to the medial prefrontal cortex (MPFC), the watchtower I discussed in chapter 4. (This connection doesn't

show up on the scan because the fMRI can't measure it.) It is also connected with brain areas that register sensations coming from the rest of the body: the insula, which relays messages from the viscera to the emotional centers; the parietal lobes, which integrate sensory information; and the anterior cingulate, which coordinates emotions and thinking. All of these areas contribute to consciousness.



Locating the self. The Mohawk of self-awareness. Starting from the front of the brain (at right), this consists of: the orbital prefrontal cortex, the medial prefrontal cortex, the anterior cingulate, the posterior cingulate, and the insula. In individuals with histories of chronic trauma the same regions show sharply decreased activity, making it difficult to register internal states and assessing the personal relevance of incoming information.

The contrast with the scans of the eighteen chronic PTSD patients with severe early-life trauma was startling. There was almost no activation of any of the self-sensing areas of the brain:

The MPFC, the anterior cingulate, the parietal cortex, and the insula did not light up at all; the only area that showed a slight activation was the posterior cingulate, which is responsible for basic orientation in space.

There could be only one explanation for such results: In response to the trauma itself, and in coping with the dread that persisted long afterward, these patients had learned to shut down the brain areas that transmit the visceral feelings and emotions that accompany and define terror. Yet in everyday life, those same brain areas are responsible for registering the entire range of emotions and sensations that form the foundation of our self-awareness, our sense of who we are. What we witnessed here was a tragic adaptation: In an effort to shut off terrifying sensations, they also deadened their capacity to feel fully alive.

The disappearance of medial prefrontal activation could explain why so many traumatized people lose their sense of purpose and direction. I used to be surprised by how often my patients asked me for advice about the most ordinary things, and then by how rarely they followed it. Now I understood that their relationship with their own inner reality was impaired. How could they make decisions, or put any plan into action, if they couldn't define what they wanted or, to be more precise, what the sensations in their bodies, the basis of all emotions, were trying to tell them?

The lack of self-awareness in victims of chronic childhood trauma is sometimes so profound that they cannot recognize themselves in a mirror. Brain scans show that this is not the result of mere inattention: The structures in charge of self-recognition may be knocked out along with the structures related to self-experience.

When Ruth Lanius showed me her study, a phrase from my classical high school education came back to me. The mathematician Archimedes, teaching about the lever, is supposed to have said: "Give me a place to stand and I will move the world." Or, as the great twentieth-century body therapist Moshe Feldenkrais put it: "You can't do what you want till you know what you're doing." The implications are clear: to feel present you have to know where you are and be aware of what is going on with you. If the self-sensing system breaks down we need to find ways to reactivate it.

THE SELF-SENSING SYSTEM

It was fascinating to see how much Sherry benefited from her massage therapy. She felt more relaxed and adventurous in her day-to-day life and she was also more relaxed and open with me. She became truly involved in her therapy and was genuinely curious about her behavior, thoughts, and feelings. She stopped picking at her skin, and when summer came she started to spend evenings sitting outside on her stoop, chatting with her neighbors. She even joined a church choir, a wonderful experience of group synchrony.

It was at about this time that I met Antonio Damasio at a small think tank that Dan Schacter, the chair of the psychology department at Harvard, had organized. In a series of brilliant scientific articles and books Damasio clarified the relationship among body states, emotions, and survival. A neurologist who has treated hundreds of people with various forms of brain damage, he became fascinated with consciousness and with identifying the areas of the brain necessary for knowing what you feel. He has devoted his career to mapping out what is responsible for our experience of "self." *The Feeling of What Happens* is, for me, his most important book, and

reading it was a revelation.[5] Damasio starts by pointing out the deep divide between our sense of self and the sensory life of our bodies. As he poetically explains, “Sometimes we use our minds not to discover facts, but to hide them. . . . One of the things the screen hides most effectively is the body, our own body, by which I mean the ins of it, its interiors. Like a veil thrown over the skin to secure its modesty, the screen partially removes from the mind the inner states of the body, those that constitute the flow of life as it wanders in the journey of each day.”[6]

He goes on to describe how this “screen” can work in our favor by enabling us to attend to pressing problems in the outside world. Yet it has a cost: “It tends to prevent us from sensing the possible origin and nature of what we call self.”[7] Building on the century-old work of William James, Damasio argues that the core of our self-awareness rests on the physical sensations that convey the inner states of the body:

> [P]rimordial feelings provide a direct experience of one’s own living body, wordless, unadorned, and connected to nothing but sheer existence. These primordial feelings reflect the current state of the body along varied dimensions, . . . along the scale that ranges from pleasure to pain, and they originate at the level of the brain stem rather than the cerebral cortex. All feelings of emotion are complex musical variations on primordial feelings.[8]

Our sensory world takes shape even before we are born. In the womb we feel amniotic fluid against our skin, we hear the faint sounds of rushing blood and a digestive tract at work, we pitch and roll with our mother’s movements. After birth, physical sensation defines our relationship to ourselves and to our surroundings. We start off *being* our wetness, hunger, satiation, and sleepiness. A cacophony of incomprehensible sounds and images presses in on our pristine nervous system. Even after we acquire consciousness and language, our bodily sensing system provides crucial feedback on our moment-to-moment condition. Its constant hum communicates changes in our viscera and in the muscles of our face, torso, and extremities that signal pain and comfort, as well as urges such as hunger and sexual arousal. What is taking place around us also affects our physical sensations. Seeing someone we recognize, hearing particular sounds—a piece of music, a siren—or sensing a shift in temperature all change our focus of attention and, without our being aware of it, prime our subsequent thoughts and actions.

As we have seen, the job of the brain is to constantly monitor and evaluate what is going on within and around us. These evaluations are transmitted by chemical messages in the bloodstream and electrical messages in our nerves, causing subtle or dramatic changes throughout the body and brain. These shifts usually occur entirely without conscious input or awareness: The subcortical regions of the brain are astoundingly efficient in regulating our breathing, heartbeat, digestion, hormone secretion, and immune system. However, these systems can become overwhelmed if we are challenged by an ongoing threat, or even the perception of threat. This accounts for the wide array of physical problems researchers have documented in traumatized people.

Yet our conscious self also plays a vital role in maintaining our inner equilibrium: We need to register and act on our physical sensations to keep our bodies safe. Realizing we’re cold compels us to put on a sweater; feeling hungry or spacey tells us our blood sugar is low and spurs us to get a snack; the pressure of a full bladder sends us to the bathroom. Damasio points

out that all of the brain structures that register background feelings are located near areas that control basic housekeeping functions, such as breathing, appetite, elimination, and sleep/wake cycles: “This is because the consequences of having emotion and attention are entirely related to the fundamental business of managing life within the organism. It is not possible to manage life and maintain homeostatic balance without data on the current state of the organism’s body.”[9] Damasio calls these housekeeping areas of the brain the “proto-self,” because they create the “wordless knowledge” that underlies our conscious sense of self.

THE SELF UNDER THREAT

In 2000 Damasio and his colleagues published an article in the world’s foremost scientific publication, *Science*, which reported that reliving a strong negative emotion causes significant changes in the brain areas that receive nerve signals from the muscles, gut, and skin—areas that are crucial for regulating basic bodily functions. The team’s brain scans showed that recalling an emotional event from the past causes us to actually reexperience the visceral sensations felt during the original event. Each type of emotion produced a characteristic pattern, distinct from the others. For example, a particular part of the brain stem was “active in sadness and anger, but not in happiness or fear.”[10] All of these brain regions are below the limbic system, to which emotions are traditionally assigned, yet we acknowledge their involvement every time we use one of the common expressions that link strong emotions with the body: “You make me sick”; “It made my skin crawl”; “I was all choked up”; “My heart sank”; “He makes me bristle.”

The elementary self system in the brain stem and limbic system is massively activated when people are faced with the threat of annihilation, which results in an overwhelming sense of fear and terror accompanied by intense physiological arousal. To people who are reliving a trauma, nothing makes sense; they are trapped in a life-or-death situation, a state of paralyzing fear or blind rage. Mind and body are constantly aroused, as if they are in imminent danger. They startle in response to the slightest noises and are frustrated by small irritations. Their sleep is chronically disturbed, and food often loses its sensual pleasures. This in turn can trigger desperate attempts to shut those feelings down by freezing and dissociation.[11]

How do people regain control when their animal brains are stuck in a fight for survival? If what goes on deep inside our animal brains dictates how we feel, and if our body sensations are orchestrated by subcortical (subconscious) brain structures, how much control over them can we actually have?

AGENCY: OWNING YOUR LIFE

“Agency” is the technical term for the feeling of being in charge of your life: knowing where you stand, knowing that you have a say in what happens to you, knowing that you have some ability to shape your circumstances. The veterans who put their fists through drywall at the VA were trying to assert their agency—to make something happen. But they ended up feeling even more out of control, and many of these once-confident men were trapped in a cycle between frantic activity and immobility.

Agency starts with what scientists call interoception, our awareness of our subtle sensory, body-based feelings: the greater that awareness, the greater our potential to control our lives.

Knowing *what* we feel is the first step to knowing *why* we feel that way. If we are aware of the constant changes in our inner and outer environment, we can mobilize to manage them. But we can't do this unless our watchtower, the MPFC, learns to observe what is going on inside us. This is why mindfulness practice, which strengthens the MPFC, is a cornerstone of recovery from trauma.[12]

After I saw the wonderful movie *March of the Penguins*, I found myself thinking about some of my patients. The penguins are stoic and endearing, and it's tragic to learn how, from time immemorial, they have trudged seventy miles inland from the sea, endured indescribable hardships to reach their breeding grounds, lost numerous viable eggs to exposure, and then, almost starving, dragged themselves back to the ocean. If penguins had our frontal lobes, they would have used their little flippers to build igloos, devised a better division of labor, and reorganized their food supplies. Many of my patients have survived trauma through tremendous courage and persistence, only to get into the same kinds of trouble over and over again. Trauma has shut down their inner compass and robbed them of the imagination they need to create something better.

The neuroscience of selfhood and agency validates the kinds of somatic therapies that my friends Peter Levine[13] and Pat Ogden[14] have developed. I'll discuss these and other sensorimotor approaches in more detail in part V, but in essence their aim is threefold:

- to draw out the sensory information that is blocked and frozen by trauma;
- to help patients befriend (rather than suppress) the energies released by that inner experience;
- to complete the self-preserving physical actions that were thwarted when they were trapped, restrained, or immobilized by terror.

Our gut feelings signal what is safe, life sustaining, or threatening, even if we cannot quite explain why we feel a particular way. Our sensory interiority continuously sends us subtle messages about the needs of our organism. Gut feelings also help us to evaluate what is going on around us. They warn us that the guy who is approaching feels creepy, but they also convey that a room with western exposure surrounded by daylilies makes us feel serene. If you have a comfortable connection with your inner sensations—if you can trust them to give you accurate information—you will feel in charge of your body, your feelings, and your self.

However, traumatized people chronically feel unsafe inside their bodies: The past is alive in the form of gnawing interior discomfort. Their bodies are constantly bombarded by visceral warning signs, and, in an attempt to control these processes, they often become expert at ignoring their gut feelings and in numbing awareness of what is played out inside. They learn to hide from their selves.

The more people try to push away and ignore internal warning signs, the more likely they are to take over and leave them bewildered, confused, and ashamed. People who cannot comfortably notice what is going on inside become vulnerable to respond to any sensory shift either by shutting down or by going into a panic—they develop a fear of fear itself.

We now know that panic symptoms are maintained largely because the individual develops a fear of the bodily sensations associated with panic attacks. The attack may be triggered by something he or she knows is irrational, but fear of the sensations keeps them escalating into a

full-body emergency. “Scared stiff” and “frozen in fear” (collapsing and going numb) describe precisely what terror and trauma feel like. They are its visceral foundation. The experience of fear derives from primitive responses to threat where escape is thwarted in some way. People’s lives will be held hostage to fear until that visceral experience changes.

The price for ignoring or distorting the body’s messages is being unable to detect what is truly dangerous or harmful for you and, just as bad, what is safe or nourishing. Self-regulation depends on having a friendly relationship with your body. Without it you have to rely on external regulation—from medication, drugs like alcohol, constant reassurance, or compulsive compliance with the wishes of others.

Many of my patients respond to stress not by noticing and naming it but by developing migraine headaches or asthma attacks.[15] Sandy, a middle-aged visiting nurse, told me she’d felt terrified and lonely as a child, unseen by her alcoholic parents. She dealt with this by becoming deferential to everybody she depended on (including me, her therapist). Whenever her husband made an insensitive remark, she would come down with an asthma attack. By the time she noticed that she couldn’t breathe, it was too late for an inhaler to be effective, and she had to be taken to the emergency room.

Suppressing our inner cries for help does not stop our stress hormones from mobilizing the body. Even though Sandy had learned to ignore her relationship problems and block out her physical distress signals, they showed up in symptoms that demanded her attention. Her therapy focused on identifying the link between her physical sensations and her emotions, and I also encouraged her to enroll in a kickboxing program. She had no emergency room visits during the three years she was my patient.

Somatic symptoms for which no clear physical basis can be found are ubiquitous in traumatized children and adults. They can include chronic back and neck pain, fibromyalgia, migraines, digestive problems, spastic colon/irritable bowel syndrome, chronic fatigue, and some forms of asthma.[16] Traumatized children have fifty times the rate of asthma as their nontraumatized peers.[17] Studies have shown that many children and adults with fatal asthma attacks were not aware of having breathing problems before the attacks.

ALEXITHYMIA: NO WORDS FOR FEELINGS

I had a widowed aunt with a painful trauma history who became an honorary grandmother to our children. She came on frequent visits that were marked by much doing—making curtains, rearranging kitchen shelves, sewing children’s clothes—and very little talking. She was always eager to please, but it was difficult to figure out what *she* enjoyed. After several days of exchanging pleasantries, conversation would come to a halt, and I’d have to work hard to fill the long silences. On the last day of her visits I’d drive her to the airport, where she’d give me a stiff good-bye hug while tears streamed down her face. Without a trace of irony she’d then complain that the cold wind at Logan International Airport made her eyes water. Her body felt the sadness that her mind couldn’t register—she was leaving our young family, her closest living relatives.

Psychiatrists call this phenomenon alexithymia—Greek for not having words for feelings. Many traumatized children and adults simply cannot describe what they are feeling because they cannot identify what their physical sensations mean. They may look furious but deny that they are angry; they may appear terrified but say that they are fine. Not being able to discern what is

going on inside their bodies causes them to be out of touch with their needs, and they have trouble taking care of themselves, whether it involves eating the right amount at the right time or getting the sleep they need.

Like my aunt, alexithymics substitute the language of action for that of emotion. When asked, "How would you feel if you saw a truck coming at you at eighty miles per hour?" most people would say, "I'd be terrified" or "I'd be frozen with fear." An alexithymic might reply, "How would I feel? I don't know. . . . I'd get out of the way."[18] They tend to register emotions as physical problems rather than as signals that something deserves their attention. Instead of feeling angry or sad, they experience muscle pain, bowel irregularities, or other symptoms for which no cause can be found. About three quarters of patients with anorexia nervosa, and more than half of all patients with bulimia, are bewildered by their emotional feelings and have great difficulty describing them.[19] When researchers showed pictures of angry or distressed faces to people with alexithymia, they could not figure out what those people were feeling.[20]

One of the first people who taught me about alexithymia was the psychiatrist Henry Krystal, who worked with more than a thousand Holocaust survivors in his effort to understand massive psychic trauma.[21] Krystal, himself a concentration camp survivor, found that many of his patients were professionally successful, but their intimate relationships were bleak and distant. Suppressing their feelings had made it possible to attend to the business of the world, but at a price. They learned to shut down their once overwhelming emotions, and, as a result, they no longer recognized what they were feeling. Few of them had any interest in therapy.

Paul Frewen at the University of Western Ontario did a series of brain scans of people with PTSD who suffered from alexithymia. One of the participants told him: "I don't know what I feel, it's like my head and body aren't connected. I'm living in a tunnel, a fog, no matter what happens it's the same reaction—numbness, nothing. Having a bubble bath and being burned or raped is the same feeling. My brain doesn't feel." Frewen and his colleague Ruth Lanius found that the more people were out of touch with their feelings, the less activity they had in the self-sensing areas of the brain.[22]

Because traumatized people often have trouble sensing what is going on in their bodies, they lack a nuanced response to frustration. They either react to stress by becoming "spaced out" or with excessive anger. Whatever their response, they often can't tell what is upsetting them. This failure to be in touch with their bodies contributes to their well-documented lack of self-protection and high rates of revictimization[23] and also to their remarkable difficulties feeling pleasure, sensuality, and having a sense of meaning.

People with alexithymia can get better only by learning to recognize the relationship between their physical sensations and their emotions, much as colorblind people can only enter the world of color by learning to distinguish and appreciate shades of gray. Like my aunt and Henry Krystal's patients, they usually are reluctant to do that: Most seem to have made an unconscious decision that it is better to keep visiting doctors and treating ailments that don't heal than to do the painful work of facing the demons of the past.

DEPERSONALIZATION

One step further down on the ladder to self-oblivion is depersonalization—losing your sense of yourself. Ute's brain scan in chapter 4 is, in its very blankness, a vivid illustration of

depersonalization. Depersonalization is common during traumatic experiences. I was once mugged late at night in a park close to my home and, floating above the scene, saw myself lying in the snow with a small head wound, surrounded by three knife-wielding teenagers. I dissociated the pain of their stab wounds on my hands and did not feel the slightest fear as I calmly negotiated for the return of my emptied wallet.

I did not develop PTSD, partly, I think, because I was intensely curious about having an experience I had studied so closely in others, and partly because I had the delusion that I would be able make a drawing of my muggers to show to the police. Of course, they were never caught, but my fantasy of revenge must have given me a satisfying sense of agency.

Traumatized people are not so fortunate and feel separated from their bodies. One particularly good description of depersonalization comes from the German psychoanalyst Paul Schilder, writing in Berlin in 1928:[24] "To the depersonalized individual the world appears strange, peculiar, foreign, dream-like. Objects appear at times strangely diminished in size, at times flat. Sounds appear to come from a distance. . . . The emotions likewise undergo marked alteration. Patients complain that they are capable of experiencing neither pain nor pleasure. . . . They have become strangers to themselves."

I was fascinated to learn that a group of neuroscientists at the University of Geneva[25] had induced similar out-of-body experiences by delivering mild electric current to a specific spot in the brain, the temporal parietal junction. In one patient this produced a sensation that she was hanging from the ceiling, looking down at her body; in another it induced an eerie feeling that someone was standing behind her. This research confirms what our patients tell us: that the self can be detached from the body and live a phantom existence on its own. Similarly, Lanius and Frewen, as well as a group of researchers at the University of Groningen in the Netherlands,[26] did brain scans on people who dissociated their terror and found that the fear centers of the brain simply shut down as they recalled the event.

BEFRIENDING THE BODY

Trauma victims cannot recover until they become familiar with and befriend the sensations in their bodies. Being frightened means that you live in a body that is always on guard. Angry people live in angry bodies. The bodies of child-abuse victims are tense and defensive until they find a way to relax and feel safe. In order to change, people need to become aware of their sensations and the way that their bodies interact with the world around them. Physical self-awareness is the first step in releasing the tyranny of the past.

How can people open up to and explore their internal world of sensations and emotions? In my practice I begin the process by helping my patients to first notice and then describe the feelings in their bodies—not emotions such as anger or anxiety or fear but the physical sensations beneath the emotions: pressure, heat, muscular tension, tingling, caving in, feeling hollow, and so on. I also work on identifying the sensations associated with relaxation or pleasure. I help them become aware of their breath, their gestures and movements. I ask them to pay attention to subtle shifts in their bodies, such as tightness in their chests or gnawing in their bellies, when they talk about negative events that they claim did not bother them.

Noticing sensations for the first time can be quite distressing, and it may precipitate flashbacks in which people curl up or assume defensive postures. These are somatic

reenactments of the undigested trauma and most likely represent the postures they assumed when the trauma occurred. Images and physical sensations may deluge patients at this point, and the therapist must be familiar with ways to stem torrents of sensation and emotion to prevent them from becoming retraumatized by accessing the past. (Schoolteachers, nurses, and police officers are often very skilled at soothing terror reactions because many of them are confronted almost daily with out-of-control or painfully disorganized people.)

All too often, however, drugs such as Abilify, Zyprexa, and Seroquel, are prescribed instead of teaching people the skills to deal with such distressing physical reactions. Of course, medications only blunt sensations and do nothing to resolve them or transform them from toxic agents into allies.

The most natural way for human beings to calm themselves when they are upset is by clinging to another person. This means that patients who have been physically or sexually violated face a dilemma: They desperately crave touch while simultaneously being terrified of body contact. The mind needs to be reeducated to feel physical sensations, and the body needs to be helped to tolerate and enjoy the comforts of touch. Individuals who lack emotional awareness are able, with practice, to connect their physical sensations to psychological events. Then they can slowly reconnect with themselves.[27]

CONNECTING WITH YOURSELF, CONNECTING WITH OTHERS

I'll end this chapter with one final study that demonstrates the cost of losing your body. After Ruth Lanius and her group scanned the idling brain, they focused on another question from everyday life: What happens in chronically traumatized people when they make face-to-face contact?

Many patients who come to my office are unable to make eye contact. I immediately know how distressed they are by their difficulty meeting my gaze. It always turns out that they feel disgusting and that they can't stand having me see how despicable they are. It never occurred to me that these intense feelings of shame would be reflected in abnormal brain activation. Ruth Lanius once again showed that mind and brain are indistinguishable—what happens in one is registered in the other.

Ruth bought an expensive device that presents a video character to a person lying in a scanner. (In this case, the cartoon resembled a kindly Richard Gere.) The figure can approach either head on (looking directly at the person) or at a forty-five-degree angle with an averted gaze. This made it possible to compare the effects of direct eye contact on brain activation with those of an averted gaze.[28]

The most striking difference between normal controls and survivors of chronic trauma was in activation of the prefrontal cortex in response to a direct eye gaze. The prefrontal cortex (PFC) normally helps us to assess the person coming toward us, and our mirror neurons help to pick up his intentions. However, the subjects with PTSD did not activate any part of their frontal lobe, which means they could not muster any curiosity about the stranger. They just reacted with intense activation deep inside their emotional brains, in the primitive areas known as the Periaqueductal Gray, which generates startle, hypervigilance, cowering, and other self-protective behaviors. There was no activation of any part of the brain involved in social engagement. In response to being looked at they simply went into survival mode.

What does this mean for their ability to make friends and get along with others? What does it mean for their therapy? Can people with PTSD trust a therapist with their deepest fears? To have genuine relationships you have to be able to experience others as separate individuals, each with his or her particular motivations and intentions. While you need to be able to stand up for yourself, you also need to recognize that other people have their own agendas. Trauma can make all that hazy and gray.

PART THREE

THE MINDS OF CHILDREN

CHAPTER 7

GETTING ON THE SAME WAVELENGTH: ATTACHMENT AND ATTUNEMENT

> The roots of resilience . . . are to be found in the sense of being understood by and existing in the mind and heart of a loving, attuned, and self-possessed other.
>
> **—Diana Fosha**

The Children's Clinic at the Massachusetts Mental Health Center was filled with disturbed and disturbing kids. They were wild creatures who could not sit still and who hit and bit other children, and sometimes even the staff. They would run up to you and cling to you one moment and run away, terrified, the next. Some masturbated compulsively; others lashed out at objects, pets, and themselves. They were at once starving for affection and angry and defiant. The girls in particular could be painfully compliant. Whether oppositional or clingy, none of them seemed able to explore or play in ways typical for children their age. Some of them had hardly developed a sense of self—they couldn't even recognize themselves in a mirror.

At the time, I knew very little about children, apart from what my two preschoolers were teaching me. But I was fortunate in my colleague Nina Fish-Murray, who had studied with Jean Piaget in Geneva, in addition to raising five children of her own. Piaget based his theories of child development on meticulous, direct observation of children themselves, starting with his own infants, and Nina brought this spirit to the incipient Trauma Center at MMHC.

Nina was married to the former chairman of the Harvard psychology department, Henry Murray, one of the pioneers of personality theory, and she actively encouraged any junior faculty members who shared her interests. She was fascinated by my stories about combat veterans because they reminded her of the troubled kids she worked with in the Boston public schools. Nina's privileged position and personal charm gave us access to the Children's Clinic, which was run by child psychiatrists who had little interest in trauma.

Henry Murray had, among other things, become famous for designing the widely used Thematic Apperception Test. The TAT is a so-called projective test, which uses a set of cards to discover how people's inner reality shapes their view of the world. Unlike the Rorschach cards we used with the veterans, the TAT cards depict realistic but ambiguous and somewhat troubling

scenes: a man and a woman gloomily staring away from each other, a boy looking at a broken violin. Subjects are asked to tell stories about what is going on in the photo, what has happened previously, and what happens next. In most cases their interpretations quickly reveal the themes that preoccupy them.

Nina and I decided to create a set of test cards specifically for children, based on pictures we cut out of magazines in the clinic waiting room. Our first study compared twelve six- to eleven-year-olds at the children's clinic with a group of children from a nearby school who matched them as closely as possible in age, race, intelligence, and family constellation.[1] What differentiated our patients was the abuse they had suffered within their families. They included a boy who was severely bruised from repeated beatings by his mother; a girl whose father had molested her at the age of four; two boys who had been repeatedly tied to a chair and whipped; and a girl who, at the age of five, had seen her mother (a prostitute) raped, dismembered, burned, and put into the trunk of a car. The mother's pimp was suspected of sexually abusing the girl.

The children in our control group also lived in poverty in a depressed area of Boston where they regularly witnessed shocking violence. While the study was being conducted, one boy at their school threw gasoline at a classmate and set him on fire. Another boy was caught in crossfire while walking to school with his father and a friend. He was wounded in the groin, and his friend was killed. Given their exposure to such a high baseline level of violence, would their responses to the cards differ from those of the hospitalized children?

One of our cards depicted a family scene: two smiling kids watching dad repair a car. Every child who looked at it commented on the danger to the man lying underneath the vehicle. While the control children told stories with benign endings—the car would get fixed, and maybe dad and the kids would drive to McDonald's—the traumatized kids came up with gruesome tales. One girl said that the little girl in the picture was about to smash in her father's skull with a hammer. A nine-year-old boy who had been severely physically abused told an elaborate story about how the boy in the picture kicked away the jack, so that the car mangled his father's body and his blood spurted all over the garage.

As they told us these stories, our patients got very excited and disorganized. We had to take considerable time out at the water cooler and going for walks before we could show them the next card. It was little wonder that almost all of them had been diagnosed with ADHD, and most were on Ritalin—though the drug certainly didn't seem to dampen their arousal in this situation.

The abused kids gave similar responses to a seemingly innocuous picture of a pregnant woman silhouetted against a window. When we showed it to the seven-year-old girl who'd been sexually abused at age four, she talked about penises and vaginas and repeatedly asked Nina questions like "How many people have you humped?" Like several of the other sexually abused girls in the study, she became so agitated that we had to stop. A seven-year-old girl from the control group picked up the wistful mood of the picture: Her story was about a widowed lady sadly looking out the window, missing her husband. But in the end, the lady found a loving man to be a good father to her baby.

In card after card we saw that, despite their alertness to trouble, the children who had not been abused still trusted in an essentially benign universe; they could imagine ways out of bad situations. They seemed to feel protected and safe within their own families. They also felt loved by at least one of their parents, which seemed to make a substantial difference in their eagerness to engage in schoolwork and to learn.

The responses of the clinic children were alarming. The most innocent images stirred up intense feelings of danger, aggression, sexual arousal, and terror. We had not selected these photos because they had some hidden meaning that sensitive people could uncover; they were ordinary images of everyday life. We could only conclude that for abused children, the whole world is filled with triggers. As long as they can imagine only disastrous outcomes to relatively benign situations, anybody walking into a room, any stranger, any image, on a screen or on a billboard might be perceived as a harbinger of catastrophe. In this light the bizarre behavior of the kids at the children's clinic made perfect sense.[2]

To my amazement, staff discussions on the unit rarely mentioned the horrific real-life experiences of the children and the impact of those traumas on their feelings, thinking, and self-regulation. Instead, their medical records were filled with diagnostic labels: "conduct disorder" or "oppositional defiant disorder" for the angry and rebellious kids; or "bipolar disorder." ADHD

was a “comorbid” diagnosis for almost all. Was the underlying trauma being obscured by this blizzard of diagnoses?

Now we faced two big challenges. One was to learn whether the different worldview of normal children could account for their resilience and, on a deeper level, how each child actually creates her map of the world. The other, equally crucial, question was: Is it possible to help the minds and brains of brutalized children to redraw their inner maps and incorporate a sense of trust and confidence in the future?

MEN WITHOUT MOTHERS

The scientific study of the vital relationship between infants and their mothers was started by upper-class Englishmen who were torn from their families as young boys to be sent off to boarding schools, where they were raised in regimented same-sex settings. The first time I visited the famed Tavistock Clinic in London I noticed a collection of black-and-white photographs of these great twentieth-century psychiatrists hanging on the wall going up the main staircase: John Bowlby, Wilfred Bion, Harry Guntrip, Ronald Fairbairn, and Donald Winnicott. Each of them, in his own way, had explored how our early experiences become prototypes for all our later connections with others, and how our most intimate sense of self is created in our minute-to-minute exchanges with our caregivers.

Scientists study what puzzles them most, so that they often become experts in subjects that others take for granted. (Or, as the attachment researcher Beatrice Beebe once told me, “most research is me-search.”) These men who studied the role of mothers in children’s lives had themselves been sent off to school at a vulnerable age, sometime between six and ten, long before they should have faced the world alone. Bowlby himself told me that just such boarding-school experiences probably inspired George Orwell’s novel *1984*, which brilliantly expresses how human beings may be induced to sacrifice everything they hold dear and true—including their sense of self—for the sake of being loved and approved of by someone in a position of authority.

Since Bowlby was close friends with the Murrays, I had a chance to talk with him about his work whenever he visited Harvard. He was born into an aristocratic family (his father was surgeon to the King’s household), and he trained in psychology, medicine, and psychoanalysis at the temples of the British establishment. After attending Cambridge University, he worked with delinquent boys in London’s East End, a notoriously rough and crime-ridden neighborhood that was largely destroyed during the Blitz. During and after his service in World War II, he observed the effects of wartime evacuations and group nurseries that separated young children from their families. He also studied the effect of hospitalization, showing that even brief separations (parents back then were not allowed to visit overnight) compounded the children’s suffering. By the late 1940s Bowlby had become *persona non grata* in the British psychoanalytic community, as a result of his radical claim that children’s disturbed behavior was a response to actual life experiences—to neglect, brutality, and separation—rather than the product of infantile sexual fantasies. Undaunted, he devoted the rest of his life to developing what came to be called attachment theory.[3]

A SECURE BASE

As we enter this world we scream to announce our presence. Someone immediately engages with us, bathes us, swaddles us, and fills our stomachs, and, best of all, our mother may put us on her belly or breast for delicious skin-to-skin contact. We are profoundly social creatures; our lives consist of finding our place within the community of human beings. I love the expression of the great French psychiatrist Pierre Janet: “Every life is a piece of art, put together with all means available.”

As we grow up, we gradually learn to take care of ourselves, both physically and emotionally, but we get our first lessons in self-care from the way that we are cared *for*. Mastering the skill of self-regulation depends to a large degree on how harmonious our early interactions with our caregivers are. Children whose parents are reliable sources of comfort and strength have a lifetime advantage—a kind of buffer against the worst that fate can hand them.

John Bowlby realized that children are captivated by faces and voices and are exquisitely sensitive to facial expression, posture, tone of voice, physiological changes, tempo of movement and incipient action. He saw this inborn capacity as a product of evolution, essential to the survival of these helpless creatures. Children are also programmed to choose one particular adult (or at most a few) with whom their natural communication system develops. This creates a primary attachment bond. The more responsive the adult is to the child, the deeper the attachment and the more likely the child will develop healthy ways of responding to the people around him.

Bowlby would often visit Regent’s Park in London, where he would make systematic observations of the interactions between children and their mothers. While the mothers sat quietly on park benches, knitting or reading the paper, the kids would wander off to explore, occasionally looking over their shoulders to ascertain that Mum was still watching. But when a neighbor stopped by and absorbed his mother’s interest with the latest gossip, the kids would run back and stay close, making sure he still had her attention. When infants and young children notice that their mothers are not fully engaged with them, they become nervous. When their mothers disappear from sight, they may cry and become inconsolable, but as soon as their mothers return, they quiet down and resume their play.

Bowlby saw attachment as the secure base from which a child moves out into the world. Over the subsequent five decades research has firmly established that having a safe haven promotes self-reliance and instills a sense of sympathy and helpfulness to others in distress. From the intimate give-and-take of the attachment bond children learn that other people have feelings and thoughts that are both similar to and different from theirs. In other words, they get “in sync” with their environment and with the people around them and develop the self-awareness, empathy, impulse control, and self-motivation that make it possible to become contributing members of the larger social culture. These qualities were painfully missing in the kids at our Children’s Clinic.

THE DANCE OF ATTUNEMENT

Children become attached to whoever functions as their primary caregiver. But the nature of that attachment—whether it is secure or insecure—makes a huge difference over the course of a child’s life. Secure attachment develops when caregiving includes emotional attunement. Attunement starts at the most subtle physical levels of interaction between babies and their

caretakers, and it gives babies the feeling of being met and understood. As Edinburgh-based attachment researcher Colwyn Trevarthen says: “The brain coordinates rhythmic body movements and guides them to act in sympathy with other people’s brains. Infants hear and learn musicality from their mother’s talk, even before birth.”[4]

In chapter 4 I described the discovery of mirror neurons, the brain-to-brain links that give us our capacity for empathy. Mirror neurons start functioning as soon as babies are born. When researcher Andrew Meltzoff at the University of Oregon pursed his lips or stuck out his tongue at six-hour-old babies, they promptly mirrored his actions.[5] (Newborns can focus their eyes only on objects within eight to twelve inches—just enough see the person who is holding them). Imitation is our most fundamental social skill. It assures that we automatically pick up and reflect the behavior of our parents, teachers, and peers.

Most parents relate to their babies so spontaneously that they are barely aware of how attunement unfolds. But an invitation from a friend, the attachment researcher Ed Tronick, gave me the chance to observe that process more closely. Through a one-way mirror at Harvard’s Laboratory of Human Development, I watched a mother playing with her two-month-old son, who was propped in an infant seat facing her.

They were cooing to each other and having a wonderful time—until the mother leaned in to nuzzle him and the baby, in his excitement, yanked on her hair. The mother was caught unawares and yelped with pain, pushing away his hand while her face contorted with anger. The baby let go immediately, and they pulled back physically from each other. For both of them the source of delight had become a source of distress. Obviously frightened, the baby brought his hands up to his face to block out the sight of his angry mother. The mother, in turn, realizing that her baby was upset, refocused on him, making soothing sounds in an attempt to smooth things over. The infant still had his eyes covered, but his craving for connection soon reemerged. He started peeking out to see if the coast was clear, while his mother reached toward him with a concerned expression. As she started to tickle his belly, he dropped his arms and broke into a happy giggle, and harmony was reestablished. Infant and mother were attuned again. This entire sequence of delight, rupture, repair, and new delight took slightly less than twelve seconds.

Tronick and other researchers have now shown that when infants and caregivers are in sync on an emotional level, they’re also in sync physically.[6] Babies can’t regulate their own emotional states, much less the changes in heart rate, hormone levels, and nervous-system activity that accompany emotions. When a child is in sync with his caregiver, his sense of joy and connection is reflected in his steady heartbeat and breathing and a low level of stress hormones. His body is calm; so are his emotions. The moment this music is disrupted—as it often is in the course of a normal day—all these physiological factors change as well. You can tell equilibrium has been restored when the physiology calms down.

We soothe newborns, but parents soon start teaching their children to tolerate higher levels of arousal, a job that is often assigned to fathers. (I once heard the psychologist John Gottman say, “Mothers stroke, and fathers poke.”) Learning how to manage arousal is a key life skill, and parents must do it for babies before babies can do it for themselves. If that gnawing sensation in his belly makes a baby cry, the breast or bottle arrives. If he’s scared, someone holds and rocks him until he calms down. If his bowels erupt, someone comes to make him clean and dry. Associating intense sensations with safety, comfort, and mastery is the foundation of self-regulation, self-soothing, and self-nurture, a theme to which I return throughout this book.

A secure attachment combined with the cultivation of competency builds an *internal locus of control,* the key factor in healthy coping throughout life.[7] Securely attached children learn what makes them feel good; they discover what makes them (and others) feel bad, and they acquire a sense of agency: that their actions can change how they feel and how others respond. Securely attached kids learn the difference between situations they can control and situations where they need help. They learn that they can play an active role when faced with difficult situations. In contrast, children with histories of abuse and neglect learn that their terror, pleading, and crying do not register with their caregiver. Nothing they can do or say stops the beating or brings attention and help. In effect they're being conditioned to give up when they face challenges later in life.

BECOMING REAL

Bowlby's contemporary, the pediatrician and psychoanalyst Donald Winnicott, is the father of modern studies of attunement. His minute observations of mothers and children started with the way mothers hold their babies. He proposed that these physical interactions lay the groundwork for a baby's sense of self—and, with that, a lifelong sense of identity. The way a mother holds her child underlies "the ability to feel the body as the place where the psyche lives."[8] This visceral and kinesthetic sensation of how our bodies are met lays the foundation for what we experience as "real."[9]

Winnicott thought that the vast majority of mothers did just fine in their attunement to their infants—it does not require extraordinary talent to be what he called a "good enough mother."[10] But things can go seriously wrong when mothers are unable to tune in to their baby's physical reality. If a mother cannot meet her baby's impulses and needs, "the baby learns to become the mother's idea of what the baby is." Having to discount its inner sensations, and trying to adjust to its caregiver's needs, means the child perceives that "something is wrong" with the way it is. Children who lack physical attunement are vulnerable to shutting down the direct feedback from their bodies, the seat of pleasure, purpose, and direction.

In the years since Bowlby's and Winnicott's ideas were introduced, attachment research around the world has shown that the vast majority of children are securely attached. When they grow up, their history of reliable, responsive caregiving will help to keep fear and anxiety at bay. Barring exposure to some overwhelming life event—trauma—that breaks down the self-regulatory system, they will maintain a fundamental state of emotional security throughout their lives. Secure attachment also forms a template for children's relationships. They pick up what others are feeling and early on learn to tell a game from reality, and they develop a good nose for phony situations or dangerous people. Securely attached children usually become pleasant playmates and have lots of self-affirming experiences with their peers. Having learned to be in tune with other people, they tend to notice subtle changes in voices and faces and to adjust their behavior accordingly. They learn to live within a shared understanding of the world and are likely to become valued members of the community.

This upward spiral can, however, be reversed by abuse or neglect. Abused kids are often very sensitive to changes in voices and faces, but they tend to respond to them as threats rather than as cues for staying in sync. Dr. Seth Pollak of the University of Wisconsin showed a series of faces to a group of normal eight-year-olds and compared their responses with those of a group

of abused children the same age. Looking at this spectrum of angry to sad expressions, the abused kids were hyperalert to the slightest features of anger.[11]

This is one reason abused children so easily become defensive or scared. Imagine what it's like to make your way through a sea of faces in the school corridor, trying to figure out who might assault you. Children who overreact to their peers' aggression, who don't pick up on other kids' needs, who easily shut down or lose control of their impulses, are likely to be shunned and left out of sleepovers or play dates. Eventually they may learn to cover up their fear by putting up a tough front. Or they may spend more and more time alone, watching TV or playing computer games, falling even further behind on interpersonal skills and emotional self-regulation.

The need for attachment never lessens. Most human beings simply cannot tolerate being disengaged from others for any length of time. People who cannot connect through work, friendships, or family usually find other ways of bonding, as through illnesses, lawsuits, or family feuds. Anything is preferable to that godforsaken sense of irrelevance and alienation.

A few years ago, on Christmas Eve, I was called to examine a fourteen-year-old boy at the Suffolk County Jail. Jack had been arrested for breaking into the house of neighbors who were away on vacation. The burglar alarm was howling when the police found him in the living room.

The first question I asked Jack was who he expected would visit him in jail on Christmas. "Nobody," he told me. "Nobody ever pays attention to me." It turned out that he had been caught during break-ins numerous times before. He knew the police, and they knew him. With delight in his voice, he told me that when the cops saw him standing in the middle of the living room, they yelled, "Oh my God, it's Jack again, that little motherfucker." Somebody recognized him; somebody knew his name. A little while later Jack confessed, "You know, that is what makes it worthwhile." Kids will go to almost any length to feel seen and connected.

LIVING WITH THE PARENTS YOU HAVE

Children have a biological instinct to attach—they have no choice. Whether their parents or caregivers are loving and caring or distant, insensitive, rejecting, or abusive, children will develop a coping style based on their attempt to get at least some of their needs met.

We now have reliable ways to assess and identify these coping styles, thanks largely to the work of two American scientists, Mary Ainsworth and Mary Main, and their colleagues, who conducted thousands of hours of observation of mother-infant pairs over many years. Based on these studies, Ainsworth created a research tool called the Strange Situation, which looks at how an infant reacts to temporary separation from the mother. Just as Bowlby had observed, securely attached infants are distressed when their mother leaves them, but they show delight when she

returns, and after a brief check-in for reassurance, they settle down and resume their play.

But with infants who are insecurely attached, the picture is more complex. Children whose primary caregiver is unresponsive or rejecting learn to deal with their anxiety in two distinct ways. The researchers noticed that some seemed chronically upset and demanding with their mothers, while others were more passive and withdrawn. In both groups contact with the mothers failed to settle them down—they did not return to play contentedly, as happens in secure attachment.

In one pattern, called "avoidant attachment," the infants look like nothing really bothers them—they don't cry when their mother goes away and they ignore her when she comes back. However, this does not mean that they are unaffected. In fact, their chronically increased heart rates show that they are in a constant state of hyperarousal. My colleagues and I call this pattern "dealing but not feeling."[12] Most mothers of avoidant infants seem to dislike touching their children. They have trouble snuggling and holding them, and they don't use their facial expressions and voices to create pleasurable back-and-forth rhythms with their babies.

In another pattern, called "anxious" or "ambivalent" attachment, the infants constantly draw attention to themselves by crying, yelling, clinging, or screaming: They are "feeling but not dealing."[13] They seem to have concluded that unless they make a spectacle, nobody is going to pay attention to them. They become enormously upset when they do not know where their mother is but derive little comfort from her return. And even though they don't seem to enjoy her company, they stay passively or angrily focused on her, even in situations when other children would rather play.[14]

Attachment researchers think that the three "organized" attachment strategies (secure, avoidant, and anxious) work because they elicit the best care a particular caregiver is capable of providing. Infants who encounter a consistent pattern of care—even if it's marked by emotional distance or insensitivity—can adapt to maintain the relationship. That does not mean that there are no problems: Attachment patterns often persist into adulthood. Anxious toddlers tend to grow into anxious adults, while avoidant toddlers are likely to become adults who are out of touch with their own feelings and those of others. (As in, "There's nothing wrong with a good spanking. I got hit and it made me the success I am today.") In school avoidant children are likely to bully other kids, while the anxious children are often their victims.[15] However, development is not linear, and many life experiences can intervene to change these outcomes.

But there is another group that is less stably adapted, a group that makes up the bulk of the children we treat and a substantial proportion of the adults who are seen in psychiatric clinics. Some twenty years ago, Mary Main and her colleagues at Berkeley began to identify a group of children (about 15 percent of those they studied) who seemed to be unable to figure out how to engage with their caregivers. The critical issue turned out to be that the caregivers themselves were a source of distress or terror to the children.[16]

Children in this situation have no one to turn to, and they are faced with an unsolvable dilemma; their mothers are simultaneously necessary for survival and a source of fear.[17] They "can neither approach (the secure and ambivalent 'strategies'), shift [their] attention (the avoidant 'strategy'), nor flee."[18] If you observe such children in a nursery school or attachment laboratory, you see them look toward their parents when they enter the room and then quickly turn away. Unable to choose between seeking closeness and avoiding the parent, they may rock on their hands and knees, appear to go into a trance, freeze with their arms raised, or get up to

greet their parent and then fall to the ground. Not knowing who is safe or whom they belong to, they may be intensely affectionate with strangers or may trust nobody. Main called this pattern "disorganized attachment." Disorganized attachment is "fright without solution."[19]

BECOMING DISORGANIZED WITHIN

Conscientious parents often become alarmed when they discover attachment research, worrying that their occasional impatience or their ordinary lapses in attunement may permanently damage their kids. In real life there are bound to be misunderstandings, inept responses, and failures of communication. Because mothers and fathers miss cues or are simply preoccupied with other matters, infants are frequently left to their own devices to discover how they can calm themselves down. Within limits this is not a problem. Kids need to learn to handle frustrations and disappointments. With "good enough" caregivers, children learn that broken connections can be repaired. The critical issue is whether they can incorporate a feeling of being viscerally safe with their parents or other caregivers.[20]

In a study of attachment patterns in over two thousand infants in "normal" middle-class environments, 62 percent were found to be secure, 15 percent avoidant, 9 percent anxious (also known as ambivalent), and 15 percent disorganized.[21] Interestingly, this large study showed that the child's gender and basic temperament have little effect on attachment style; for example, children with "difficult" temperaments are not more likely to develop a disorganized style. Kids from lower socioeconomic groups are more likely to be disorganized,[22] with parents often severely stressed by economic and family instability.

Children who don't feel safe in infancy have trouble regulating their moods and emotional responses as they grow older. By kindergarten, many disorganized infants are either aggressive or spaced out and disengaged, and they go on to develop a range of psychiatric problems.[23] They also show more physiological stress, as expressed in heart rate, heart rate variability,[24] stress hormone responses, and lowered immune factors.[25] Does this kind of biological dysregulation automatically reset to normal as a child matures or is moved to a safe environment? So far as we know, it does not.

Parental abuse is not the only cause of disorganized attachment: Parents who are preoccupied with their own trauma, such as domestic abuse or rape or the recent death of a parent or sibling, may also be too emotionally unstable and inconsistent to offer much comfort and protection.[26,27] While all parents need all the help they can get to help raise secure children, traumatized parents, in particular, need help to be attuned to their children's needs.

Caregivers often don't realize that they are out of tune. I vividly remember a videotape Beatrice Beebe showed me.[28] It featured a young mother playing with her three-month-old infant. Everything was going well until the baby pulled back and turned his head away, signaling that he needed a break. But the mother did not pick up on his cue, and she intensified her efforts to engage him by bringing her face closer to his and increasing the volume of her voice. When he recoiled even more, she kept bouncing and poking him. Finally he started to scream, at which point the mother put him down and walked away, looking crestfallen. She obviously felt terrible, but she had simply missed the relevant cues. It's easy to imagine how this kind of misattunement, repeated over and over again, can gradually lead to a chronic disconnection.

(Anyone who's raised a colicky or hyperactive baby knows how quickly stress rises when nothing seems to make a difference.) Chronically failing to calm her baby down and establish an enjoyable face-to-face interaction, the mother is likely to come to perceive him as a difficult child who makes her feel like a failure, and give up on trying to comfort her child.

In practice it often is difficult to distinguish the problems that result from disorganized attachment from those that result from trauma: They are often intertwined. My colleague Rachel Yehuda studied rates of PTSD in adult New Yorkers who had been assaulted or raped.[29] Those whose mothers were Holocaust survivors with PTSD had a significantly higher rate of developing serious psychological problems after these traumatic experiences. The most reasonable explanation is that their upbringing had left them with a vulnerable physiology, making it difficult for them to regain their equilibrium after being violated. Yehuda found a similar vulnerability in the children of pregnant women who were in the World Trade Center that fatal day in 2001.[30]

Similarly, the reactions of children to painful events are largely determined by how calm or stressed their parents are. My former student Glenn Saxe, now chairman of the Department of Child and Adolescent Psychiatry at NYU, showed that when children were hospitalized for treatment of severe burns, the development of PTSD could be predicted by how safe they felt with their mothers.[31] The security of their attachment to their mothers predicted the amount of morphine that was required to control their pain—the more secure the attachment, the less painkiller was needed.

Another colleague, Claude Chemtob, who directs the Family Trauma Research Program at NYU Langone Medical Center, studied 112 New York City children who had directly witnessed the terrorist attacks on 9/11.[32] Children whose mothers were diagnosed with PTSD or depression during follow-up were six times more likely to have significant emotional problems and eleven times more likely to be hyperaggressive in response to their experience. Children whose fathers had PTSD showed behavioral problems as well, but Chemtob discovered that this effect was indirect and was transmitted via the mother. (Living with an irascible, withdrawn, or terrified spouse is likely to impose a major psychological burden on the partner, including depression.)

If you have no internal sense of security, it is difficult to distinguish between safety and danger. If you feel chronically numbed out, potentially dangerous situations may make you feel alive. If you conclude that you must be a terrible person (because why else would your parents have you treated that way?), you start expecting other people to treat you horribly. You probably deserve it, and anyway, there is nothing you can do about it. When disorganized people carry self-perceptions like these, they are set up to be traumatized by subsequent experiences.[33]

THE LONG-TERM EFFECTS OF DISORGANIZED ATTACHMENT

In the early 1980s my colleague Karlen Lyons-Ruth, a Harvard attachment researcher, began to videotape face-to-face interactions between mothers and their infants at six months, twelve months and eighteen months. She taped them again when the children were five years old and once more when they were seven or eight.[34] All were from high-risk families: 100 percent met federal poverty guidelines, and almost half the mothers were single parents.

Disorganized attachment showed up in two different ways: One group of mothers seemed to be too preoccupied with their own issues to attend to their infants. They were often intrusive and

hostile; they alternated between rejecting their infants and acting as if they expected them to respond to *their* needs. Another group of mothers seemed helpless and fearful. They often came across as sweet or fragile, but they didn't know how to be the adult in the relationship and seemed to want their children to comfort them. They failed to greet their children after having been away and did not pick them up when the children were distressed. The mothers didn't seem to be doing these things deliberately—they simply didn't know how to be attuned to their kids and respond to their cues and thus failed to comfort and reassure them. The hostile/intrusive mothers were more likely to have childhood histories of physical abuse and/or of witnessing domestic violence, while the withdrawn/dependent mothers were more likely to have histories of sexual abuse or parental loss (but not physical abuse).[35]

I have always wondered how parents come to abuse their kids. After all, raising healthy offspring is at the very core of our human sense of purpose and meaning. What could drive parents to deliberately hurt or neglect their children? Karlen's research provided me with one answer: Watching her videos, I could see the children becoming more and more inconsolable, sullen, or resistant to their misattuned mothers. At the same time, the mothers became increasingly frustrated, defeated, and helpless in their interactions. Once the mother comes to see the child not as her partner in an attuned relationship but as a frustrating, enraging, disconnected stranger, the stage is set for subsequent abuse.

About eighteen years later, when these kids were around twenty years old, Lyons-Ruth did a follow-up study to see how they were coping. Infants with seriously disrupted emotional communication patterns with their mothers at eighteen months grew up to become young adults with an unstable sense of self, self-damaging impulsivity (including excessive spending, promiscuous sex, substance abuse, reckless driving, and binge eating), inappropriate and intense anger, and recurrent suicidal behavior.

Karlen and her colleagues had expected that hostile/intrusive behavior on the part of the mothers would be the most powerful predictor of mental instability in their adult children, but they discovered otherwise. Emotional withdrawal had the most profound and long-lasting impact. Emotional distance and role reversal (in which mothers expected the kids to look after them) were specifically linked to aggressive behavior against self and others in the young adults.

DISSOCIATION: KNOWING AND NOT KNOWING

Lyons-Ruth was particularly interested in the phenomenon of dissociation, which is manifested in feeling lost, overwhelmed, abandoned, and disconnected from the world and in seeing oneself as unloved, empty, helpless, trapped, and weighed down. She found a "striking and unexpected" relationship between maternal disengagement and misattunement during the first two years of life and dissociative symptoms in early adulthood. Lyons-Ruth concludes that infants who are not truly seen and known by their mothers are at high risk to grow into adolescents who are unable to know and to see."[36]

Infants who live in secure relationships learn to communicate not only their frustrations and distress but also their emerging selves—their interests, preferences, and goals. Receiving a sympathetic response cushions infants (and adults) against extreme levels of frightened arousal. But if your caregivers ignore your needs, or resent your very existence, you learn to anticipate rejection and withdrawal. You cope as well as you can by blocking out your mother's hostility or

neglect and act as if it doesn't matter, but your body is likely to remain in a state of high alert, prepared to ward off blows, deprivation, or abandonment. Dissociation means simultaneously knowing and not knowing.[37]

Bowlby wrote: "What cannot be communicated to the [m]other cannot be communicated to the self."[38] If you cannot tolerate what you know or feel what you feel, the only option is denial and dissociation.[39] Maybe the most devastating long-term effect of this shutdown is not feeling real inside, a condition we saw in the kids in the Children's Clinic and that we see in the children and adults who come to the Trauma Center. When you don't feel real nothing matters, which makes it impossible to protect yourself from danger. Or you may resort to extremes in an effort to feel *something*—even cutting yourself with a razor blade or getting into fistfights with strangers.

Karlen's research showed that dissociation is learned early: Later abuse or other traumas did not account for dissociative symptoms in young adults.[40] Abuse and trauma accounted for many other problems, but not for chronic dissociation or aggression against self. The critical underlying issue was that these patients didn't know how to feel safe. Lack of safety within the early caregiving relationship led to an impaired sense of inner reality, excessive clinging, and self-damaging behavior: Poverty, single parenthood, or maternal psychiatric symptoms did not predict these symptoms.

This does not imply that child abuse is irrelevant[41], but that the quality of early caregiving is critically important in preventing mental health problems, independent of other traumas.[42] For that reason treatment needs to address not only the imprints of specific traumatic events but also the consequences of not having been mirrored, attuned to, and given consistent care and affection: dissociation and loss of self-regulation.

RESTORING SYNCHRONY

Early attachment patterns create the inner maps that chart our relationships throughout life, not only in terms of what we expect from others, but also in terms of how much comfort and pleasure we can experience in their presence. I doubt that the poet e. e. cummings could have written his joyous lines "i like my body when it is with your body. . . . muscles better and nerves more" if his earliest experiences had been frozen faces and hostile glances.[43] Our relationship maps are implicit, etched into the emotional brain and not reversible simply by understanding how they were created. You may realize that your fear of intimacy has something to do with your mother's postpartum depression or with the fact that she herself was molested as a child, but that alone is unlikely to open you to happy, trusting engagement with others.

However, that realization may help you to start exploring other ways to connect in relationships—both for your own sake and in order to not pass on an insecure attachment to your own children. In part 5 I'll discuss a number of approaches to healing damaged attunement systems through training in rhythmicity and reciprocity.[44] Being in synch with oneself and with others requires the integration of our body-based senses—vision, hearing, touch, and balance. If this did not happen in infancy and early childhood, there is an increased chance of later sensory integration problems (to which trauma and neglect are by no means the only pathways).

Being in synch means resonating through sounds and movements that connect, which are embedded in the daily sensory rhythms of cooking and cleaning, going to bed and waking up.

Being in synch may mean sharing funny faces and hugs, expressing delight or disapproval at the right moments, tossing balls back and forth, or singing together. At the Trauma Center, we have developed programs to coach parents in connection and attunement, and my patients have told me about many other ways to get themselves in synch, ranging from choral singing and ballroom dancing to joining basketball teams, jazz bands and chamber music groups. All of these foster a sense of attunement and communal pleasure.

CHAPTER 8

TRAPPED IN RELATIONSHIPS: THE COST OF ABUSE AND NEGLECT

> The "night sea journey" is the journey into the parts of ourselves that are split off, disavowed, unknown, unwanted, cast out, and exiled to the various subterranean worlds of consciousness. . . . The goal of this journey is to reunite us with ourselves. Such a homecoming can be surprisingly painful, even brutal. In order to undertake it, we must first agree to *exile nothing*.
>
> **—Stephen Cope**

Marilyn was a tall, athletic-looking woman in her midthirties who worked as an operating-room nurse in a nearby town. She told me that a few months earlier she'd started to play tennis at her sports club with a Boston fireman named Michael. She usually steered clear of men, she said, but she had gradually become comfortable enough with Michael to accept his invitations to go out for pizza after their matches. They'd talk about tennis, movies, their nephews and nieces—nothing too personal. Michael clearly enjoyed her company, but she told herself he didn't really know her.

One Saturday evening in August, after tennis and pizza, she invited him to stay over at her apartment. She described feeling "uptight and unreal" as soon as they were alone together. She remembered asking him to go slow but had very little sense of what had happened after that. After a few glasses of wine and a rerun of *Law & Order*, they apparently fell asleep together on top of her bed. At around two in the morning, Michael turned over in his sleep. When Marilyn felt his body touch hers, she exploded—pounding him with her fists, scratching and biting, screaming, "You bastard, you bastard!" Michael, startled awake, grabbed his belongings and fled. After he left, Marilyn sat on her bed for hours, stunned by what had happened. She felt deeply humiliated and hated herself for what she had done, and now she'd come to me for help in dealing with her terror of men and her inexplicable rage attacks.

My work with veterans had prepared me to listen to painful stories like Marilyn's without trying to jump in immediately to fix the problem. Therapy often starts with some inexplicable behavior: attacking a boyfriend in the middle of the night, feeling terrified when somebody looks

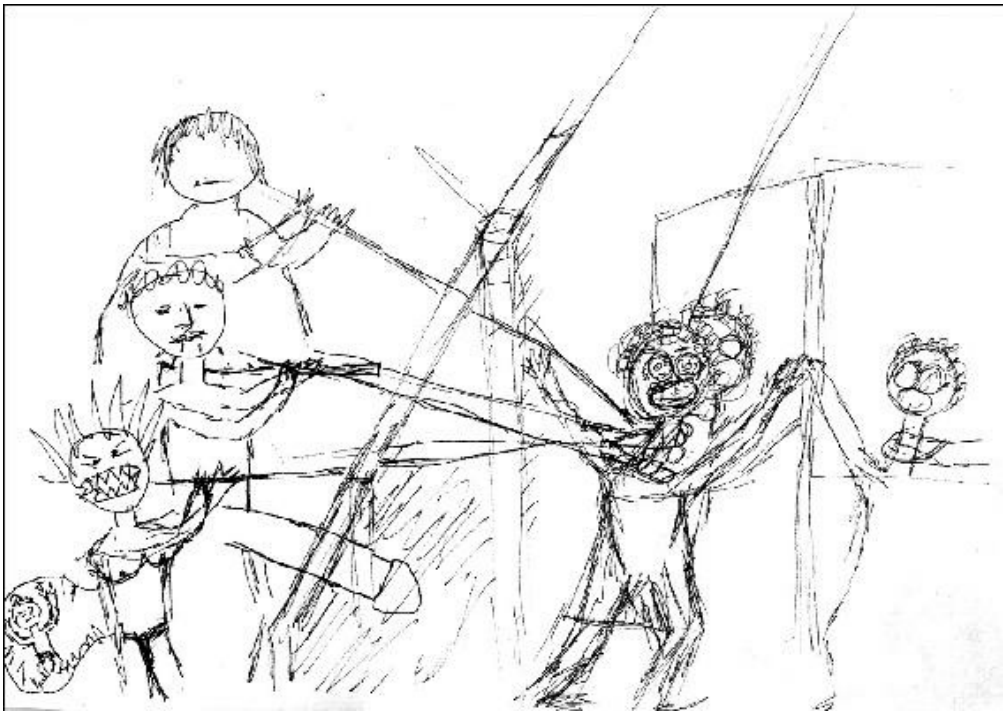
you in the eye, finding yourself covered with blood after cutting yourself with a piece of glass, or deliberately vomiting up every meal. It takes time and patience to allow the reality behind such symptoms to reveal itself.

TERROR AND NUMBNESS

As we talked, Marilyn told me that Michael was the first man she'd taken home in more than five years, but this was not the first time she'd lost control when a man spent the night with her. She repeated that she always felt uptight and spaced out when she was alone with a man, and there had been other times when she'd "come to" in her apartment, cowering in a corner, unable to remember clearly what had happened.

Marilyn also said she felt as if she was just "going through the motions" of having a life. Except for when she was at the club playing tennis or at work in the operating room, she usually felt numb. A few years earlier she'd found that she could relieve her numbness by scratching herself with a razor blade, but she had become frightened when she found that she was cutting herself more and more deeply, and more and more often, to get relief. She had tried alcohol, too, but that reminded her of her dad and his out-of-control drinking, which made her feel disgusted with herself. So, instead, she played tennis fanatically, whenever she could. That made her feel alive.

When I asked her about her past, Marilyn said she guessed that she "must have had" a happy childhood, but she could remember very little from before age twelve. She told me she'd been a timid adolescent, until she had a violent confrontation with her alcoholic father when she was sixteen and ran away from home. She worked her way through community college and went on to get a degree in nursing without any help from her parents. She felt ashamed that during this time she'd slept around, which she described as "looking for love in all the wrong places."



As I often did with new patients, I asked her to draw a family portrait, and when I saw her drawing (reproduced above), I decided to go slowly. Clearly Marilyn was harboring some terrible memories, but she could not allow herself to recognize what her own picture revealed. She had drawn a wild and terrified child, trapped in some kind of cage and threatened not only by three nightmarish figures—one with no eyes—but also by a huge erect penis protruding into her space. And yet this woman said she "must have had" a happy childhood.

As the poet W. H. Auden wrote:

Truth, like love and sleep, resents
Approaches that are too intense.[1]

I call this Auden's rule, and in keeping with it I deliberately did not push Marilyn to tell me what she remembered. In fact, I've learned that it's not important for me to know every detail of a patient's trauma. What is critical is that the patients themselves learn to tolerate feeling what they feel and knowing what they know. This may take weeks or even years. I decided to start Marilyn's treatment by inviting her to join an established therapy group where she could find support and acceptance before facing the engine of her distrust, shame, and rage.

As I expected, Marilyn arrived at the first group meeting looking terrified, much like the girl in her family portrait; she was withdrawn and did not reach out to anybody. I'd chosen this group for her because its members had always been helpful and accepting of new members who were too scared to talk. They knew from their own experience that unlocking secrets is a gradual process. But this time they surprised me, asking so many intrusive questions about Marilyn's love life that I recalled her drawing of the little girl under assault. It was almost as though Marilyn had unwittingly enlisted the group to repeat her traumatic past. I intervened to help her

set some boundaries about what she'd talk about, and she began to settle in.

Three months later Marilyn told the group that she had stumbled and fallen a few times on the sidewalk between the subway and my office. She worried that her eyesight was beginning to fail: She'd also been missing a lot of tennis balls recently. I thought again about her drawing and the wild child with the huge, terrified eyes. Was this some sort of "conversion reaction," in which patients express their conflicts by losing function in some part of their body? Many soldiers in both world wars had suffered paralysis that couldn't be traced to physical injuries, and I had seen cases of "hysterical blindness" in Mexico and India.

Still, as a physician, I wasn't about to conclude without further assessment that this was "all in her head." I referred her to colleagues at the Massachusetts Eye and Ear Infirmary and asked them to do a very thorough workup. Several weeks later the tests came back. Marilyn had lupus erythematosus of her retina, an autoimmune disease that was eroding her vision, and she would need immediate treatment. I was appalled: Marilyn was the third person that year whom I'd suspected of having an incest history and who was then diagnosed with an autoimmune disease—a disease in which the body starts attacking itself.

After making sure that Marilyn was getting the proper medical care, I consulted with two of my colleagues at Massachusetts General, psychiatrist Scott Wilson and Richard Kradin, who ran the immunology laboratory there. I told them Marilyn's story, showed them the picture she'd drawn, and asked them to collaborate on a study. They generously volunteered their time and the considerable expense of a full immunology workup. We recruited twelve women with incest histories who were not taking any medications, plus twelve women who had never been traumatized and who also did not take meds—a surprisingly difficult control group to find. (Marilyn was not in the study; we generally do not ask our clinical patients to be part of our research efforts.)

When the study was completed and the data analyzed, Rich reported that the group of incest survivors had abnormalities in their CD45 RA-to-RO ratio, compared with their nontraumatized peers. CD45 cells are the "memory cells" of the immune system. Some of them, called RA cells, have been activated by past exposure to toxins; they quickly respond to environmental threats they have encountered before. The RO cells, in contrast, are kept in reserve for new challenges; they are turned on to deal with threats the body has not met previously. The RA-to-RO ratio is the balance between cells that recognize known toxins and cells that wait for new information to activate. In patients with histories of incest, the proportion of RA cells that are ready to pounce is larger than normal. This makes the immune system oversensitive to threat, so that it is prone to mount a defense when none is needed, even when this means attacking the body's own cells.

Our study showed that, on a deep level, the bodies of incest victims have trouble distinguishing between danger and safety. This means that the imprint of past trauma does not consist only of distorted perceptions of information coming from the outside; the organism itself also has a problem knowing how to feel safe. The past is impressed not only on their minds, and in misinterpretations of innocuous events (as when Marilyn attacked Michael because he accidentally touched her in her sleep), but also on the very core of their beings: in the safety of their bodies.[2]

A TORN MAP OF THE WORLD

How do people learn what is safe and what is not safe, what is inside and what is outside, what should be resisted and what can safely be taken in? The best way we can understand the impact of child abuse and neglect is to listen to what people like Marilyn can teach us. One of the things that became clear as I came to know her better was that she had her own unique view of how the world functions.

As children, we start off at the center of our own universe, where we interpret everything that happens from an egocentric vantage point. If our parents or grandparents keep telling us we're the cutest, most delicious thing in the world, we don't question their judgment—we must be exactly that. And deep down, no matter what else we learn about ourselves, we will carry that sense with us: that we are basically adorable. As a result, if we later hook up with somebody who treats us badly, we will be outraged. It won't feel right: It's not familiar; it's not like home. But if we are abused or ignored in childhood, or grow up in a family where sexuality is treated with disgust, our inner map contains a different message. Our sense of our self is marked by contempt and humiliation, and we are more likely to think "he (or she) has my number" and fail to protest if we are mistreated.

Marilyn's past shaped her view of every relationship. She was convinced that men didn't give a damn about other people's feelings and that they got away with whatever they wanted. Women couldn't be trusted either. They were too weak to stand up for themselves, and they'd sell their bodies to get men to take care of them. If you were in trouble, they wouldn't lift a finger to help you. This worldview manifested itself in the way Marilyn approached her colleagues at work: She was suspicious of the motives of anyone who was kind to her and called them on the slightest deviation from the nursing regulations. As for herself: She was a bad seed, a fundamentally toxic person who made bad things happen to those around her.

When I first encountered patients like Marilyn, I used to challenge their thinking and try to help them see the world in a more positive, flexible way. One day a woman named Kathy set me straight. A group member had arrived late to a session because her car had broken down, and Kathy immediately blamed herself: "I saw how rickety your car was last week; I knew I should have offered you a ride." Her self-criticism escalated to the point that, only a few minutes later, she was taking responsibility for her sexual abuse: "I brought it on myself: I was seven years old and I loved my daddy. I wanted him to love me, and I did what he wanted me to do. It was my own fault." When I intervened to reassure her, saying, "Come on, you were just a little girl—it was your father's responsibility to maintain the boundaries," Kathy turned toward me. "You know, Bessel," she said, "I know how important it is for you to be a good therapist, so when you make stupid comments like that, I usually thank you profusely. After all, I am an incest survivor—I was trained to take care of the needs of grown-up, insecure men. But after two years I trust you enough to tell you that those comments make me feel terrible. Yes, it's true; I instinctively blame myself for everything bad that happens to the people around me. I know that isn't rational, and I feel really dumb for feeling this way, but I do. When you try to talk me into being more reasonable I only feel even more lonely and isolated—and it confirms the feeling that nobody in the whole world will ever understand what it feels like to be me."

I genuinely thanked her for her feedback, and I've tried ever since not to tell my patients that they should not feel the way they do. Kathy taught me that my responsibility goes much deeper: I have to help them reconstruct their inner map of the world.

As I discussed in the previous chapter, attachment researchers have shown that our earliest caregivers don't only feed us, dress us, and comfort us when we are upset; they shape the way

our rapidly growing brain perceives reality. Our interactions with our caregivers convey what is safe and what is dangerous: whom we can count on and who will let us down; what we need to do to get our needs met. This information is embodied in the warp and woof of our brain circuitry and forms the template of how we think of ourselves and the world around us. These inner maps are remarkably stable across time.

This doesn't mean, however, that our maps can't be modified by experience. A deep love relationship, particularly during adolescence, when the brain once again goes through a period of exponential change, truly can transform us. So can the birth of a child, as our babies often teach us how to love. Adults who were abused or neglected as children can still learn the beauty of intimacy and mutual trust or have a deep spiritual experience that opens them to a larger universe. In contrast, previously uncontaminated childhood maps can become so distorted by an adult rape or assault that all roads are rerouted into terror or despair. These responses are not reasonable and therefore cannot be changed simply by reframing irrational beliefs. Our maps of the world are encoded in the emotional brain, and changing them means having to reorganize that part of the central nervous system, the subject of the treatment section of this book.

Nonetheless, learning to recognize irrational thoughts and behavior can be a useful first step. People like Marilyn often discover that their assumptions are not the same as those of their friends. If they are lucky, their friends and colleagues will tell them in words, rather than in actions, that their distrust and self-hatred make collaboration difficult. But that rarely happens, and Marilyn's experience was typical: After she assaulted Michael, he had absolutely no interest in working things out, and she lost both his friendship and her favorite tennis partner. It is at this point that smart and courageous people like Marilyn, who maintain their curiosity and determination in the face of repeated defeats, start looking for help.

Generally the rational brain can override the emotional brain, as long as our fears don't hijack us. (For example, your fear at being flagged down by the police can turn instantly to gratitude when the cop warns you that there's an accident ahead.) But the moment we feel trapped, enraged, or rejected, we are vulnerable to activating old maps and to follow their directions. Change begins when we learn to "own" our emotional brains. That means learning to observe and tolerate the heartbreaking and gut-wrenching sensations that register misery and humiliation. Only after learning to bear what is going on inside can we start to befriend, rather than obliterate, the emotions that keep our maps fixed and immutable.

LEARNING TO REMEMBER

About a year into Marilyn's group, another member, Mary, asked permission to talk about what had happened to her when she was thirteen years old. Mary worked as a prison guard, and she was involved in a sadomasochistic relationship with another woman. She wanted the group to know her background in the hope that they would become more tolerant of her extreme reactions, such as her tendency to shut down or blow up in response to the slightest provocation.

Struggling to get the words out, Mary told us that one evening, when she was thirteen years old, she was raped by her older brother and a gang of his friends. The rape resulted in pregnancy, and her mother gave her an abortion at home, on the kitchen table. The group sensitively tuned in to what Mary was sharing and comforted her through her sobbing. I was profoundly moved by their empathy—they were consoling Mary in a way that they must have wished somebody had

comforted them when they first confronted their traumas.

When time ran out, Marilyn asked if she could take a few more minutes to talk about what she had experienced during the session. The group agreed, and she told us: “Hearing that story, I wonder if I may have been sexually abused myself.” My mouth must have dropped open. Based on her family drawing, I had always assumed that she was aware, at least on some level, that this was the case. She had reacted like an incest victim in her response to Michael, and she chronically behaved as if the world were a terrifying place.

Yet even though she’d drawn a girl who was being sexually molested, she—or at least her cognitive, verbal self—had no idea what had actually happened to her. Her immune system, her muscles, and her fear system all had kept the score, but her conscious mind lacked a story that could communicate the experience. She reenacted her trauma in her life, but she had no narrative to refer to. As we will see in chapter 12, traumatic memory differs in complex ways from normal recall, and it involves many layers of mind and brain.

Triggered by Mary’s story, and spurred on by the nightmares that followed, Marilyn began individual therapy with me in which she started to deal with her past. At first she experienced waves of intense, free-floating terror. She tried stopping for several weeks, but when she found she could no longer sleep and had to take time off from work, she continued our sessions. As she told me later: “My only criterion for whether a situation is harmful is feeling, ‘This is going to kill me if I don’t get out.’”

I began to teach Marilyn calming techniques, such as focusing on breathing deeply—in and out, in and out, at six breaths a minute—while following the sensations of the breath in her body. This was combined with tapping acupressure points, which helped her not to become overwhelmed. We also worked on mindfulness: Learning to keep her mind alive while allowing her body to feel the feelings that she had come to dread slowly enabled Marilyn to stand back and observe her experience, rather than being immediately hijacked by her feelings. She had tried to dampen or abolish those feelings with alcohol and exercise, but now she began to feel safe enough to begin to remember what had happened to her as a girl. As she gained ownership over her physical sensations, she also began to be able to tell the difference between past and present: Now if she felt someone’s leg brush against her in the night, she might be able to recognize it as Michael’s leg, the leg of the handsome tennis partner she’d invited to her apartment. That leg did not belong to anyone else, and its touch didn’t mean someone was trying to molest her. Being still enabled her to know—fully, physically know—that she was a thirty-four-year-old woman and not a little girl.

When Marilyn finally began to access her memories, they emerged as flashbacks of the wallpaper in her childhood bedroom. She realized that this was what she had focused on when her father raped her when she was eight years old. His molestation had scared her beyond her capacity to endure, so she had needed to push it out of her memory bank. After all, she had to keep living with this man, her father, who had assaulted her. Marilyn remembered having turned to her mother for protection, but when she ran to her and tried to hide herself by burying her face in her mother’s skirt, she was met with only a limp embrace. At times her mother remained silent; at others she cried or angrily scolded Marilyn for “making Daddy so angry.” The terrified child found no one to protect her, to offer strength or shelter.

As Roland Summit wrote in his classic study *The Child Sexual Abuse Accommodation Syndrome*: “Initiation, intimidation, stigmatization, isolation, helplessness and self-blame depend on a terrifying reality of child sexual abuse. Any attempts by the child to divulge the secret will

be countered by an adult conspiracy of silence and disbelief. ‘Don’t worry about things like that; that could never happen in our family.’ ‘How could you ever think of such a terrible thing?’ ‘Don’t let me ever hear you say anything like that again!’ The average child never asks and never tells.”[3]

After forty years of doing this work I still regularly hear myself saying, “That’s unbelievable,” when patients tell me about their childhoods. They often are as incredulous as I am—how could parents inflict such torture and terror on their own child? Part of them continues to insist that they must have made the experience up or that they are exaggerating. All of them are ashamed about what happened to them, and they blame themselves—on some level they firmly believe that these terrible things were done to them because they are terrible people.

Marilyn now began to explore how the powerless child had learned to shut down and comply with whatever was asked of her. She had done so by making herself disappear: The moment she heard her father’s footsteps in the corridor outside her bedroom, she would “put her head in the clouds.” Another patient of mine who had a similar experience made a drawing that depicts how that process works. When her father started to touch her, she made herself disappear; she floated up to the ceiling, looking down on some other little girl in the bed.[4] She was glad that it was not really her—it was some other girl who was being molested.

Looking at these heads separated from their bodies by an impenetrable fog really opened my eyes to the experience of dissociation, which is so common among incest victims. Marilyn herself later realized that, as an adult, she had continued to float up to the ceiling when she found herself in a sexual situation. In the period when she’d been more sexually active, a partner would occasionally tell her how amazing she’d been in bed—that he’d barely recognized her, that she’d

even talked differently. Usually she did not remember what had happened, but at other times she'd become angry and aggressive. She had no sense of who she really was sexually, so she gradually withdrew from dating altogether—until Michael.

HATING YOUR HOME

Children have no choice who their parents are, nor can they understand that parents may simply be too depressed, enraged, or spaced out to be there for them or that their parents' behavior may have little to do with them. Children have no choice but to organize themselves to survive within the families they have. Unlike adults, they have no other authorities to turn to for help—their parents *are* the authorities. They cannot rent an apartment or move in with someone else: Their very survival hinges on their caregivers.

Children sense—even if they are not explicitly threatened—that if they talked about their beatings or molestation to teachers they would be punished. Instead, they focus their energy on *not* thinking about what has happened and not feeling the residues of terror and panic in their bodies. Because they cannot tolerate knowing what they have experienced, they also cannot understand that their anger, terror, or collapse has anything to do with that experience. They don't talk; they act and deal with their feelings by being enraged, shut down, compliant, or defiant.

Children are also programmed to be fundamentally loyal to their caretakers, even if they are abused by them. Terror increases the need for attachment, even if the source of comfort is also the source of terror. I have never met a child below the age of ten who was tortured at home (and who had broken bones and burned skin to show for it) who, if given the option, would not have chosen to stay with his or her family rather than being placed in a foster home. Of course, clinging to one's abuser is not exclusive to childhood. Hostages have put up bail for their captors, expressed a wish to marry them, or had sexual relations with them; victims of domestic violence often cover up for their abusers. Judges often tell me how humiliated they feel when they try to protect victims of domestic violence by issuing restraining orders, only to find out that many of them secretly allow their partners to return.

It took Marilyn a long time before she was ready to talk about her abuse: She was not ready to violate her loyalty to her family—deep inside she felt that she still needed them to protect her against her fears. The price of this loyalty is unbearable feelings of loneliness, despair, and the inevitable rage of helplessness. Rage that has nowhere to go is redirected against the self, in the form of depression, self-hatred, and self-destructive actions. One of my patients told me, "It is like hating your home, your kitchen and pots and pans, your bed, your chairs, your table, your rugs." Nothing feels safe—least of all your own body.

Learning to trust is a major challenge. One of my other patients, a schoolteacher whose grandfather raped her repeatedly before she was six, sent me the following e-mail: "I started mulling the danger of opening up with you in traffic on the way home after our therapy appointment, and then, as I merged into Route 124, I realized that I had broken the rule of not getting attached, to you and to my students."

During our next meeting she told me she had also been raped by her lab instructor in college. I asked her whether she had sought help and made a complaint against him. "I couldn't make myself cross the road to the clinic," she replied. "I was desperate for help, but as I stood there, I

felt very deeply that I would only be hurt even more. And that might well have been true. Of course, I had to hide what had happened from my parents—and from everyone else."

After I told her that I was concerned about what was going on with her, she wrote me another e-mail: "I'm trying to remind myself that I didn't do anything to deserve such treatment. I don't think I have ever had anyone look at me like that and say they were worried about me, and I am holding on to it like a treasure: the idea that I am worth being worried about by someone I respect and who does understand how deeply I am struggling now."

In order to know who we are—to have an identity—we must know (or at least feel that we know) what is and what was "real." We must observe what we see around us and label it correctly; we must also be able to trust our memories and be able to tell them apart from our imagination. Losing the ability to make these distinctions is one sign of what psychoanalyst William Niederland called "soul murder." Erasing awareness and cultivating denial are often essential to survival, but the price is that you lose track of who you are, of what you are feeling, and of what and whom you can trust.[5]

REPLAYING THE TRAUMA

One memory of Marilyn's childhood trauma came to her in a dream in which she felt as if she were being choked and was unable to breathe. A white tea towel was wrapped around her hands, and then she was lifted up with the towel around her neck, so that she could not touch the ground with her feet. She woke in a panic, thinking that she was surely going to die. Her dream reminded me of the nightmares war veterans had reported to me: seeing the precise, unadulterated images of faces and body parts they had encountered in battle. These dreams were so terrifying that they tried to not fall asleep at night; only daytime napping, which was not associated with nocturnal ambushes, felt halfway safe.

During this stage of therapy Marilyn was repeatedly flooded with images and sensations related to the choking dream. She remembered sitting in the kitchen as a four-year-old with swollen eyes, a sore neck, and a bloody nose, while her father and brother laughed at her and called her a stupid, stupid girl. One day Marilyn reported, "As I was brushing my teeth last evening, I was overcome with feelings of thrashing around. I was like a fish out of water, violently turning my body as I fought against the lack of air. I sobbed and choked as I brushed my teeth. Panic was rising up out of my chest with the feeling of thrashing. I had to use every bit of strength I had not to scream, 'NONONONONONO,' as I stood over the sink." She went to bed and fell asleep but woke up like clockwork every two hours during the rest of the night.

Trauma is not stored as a narrative with an orderly beginning, middle, and end. As I'll discuss in detail in chapters 11 and 12, memories initially return as they did for Marilyn: as flashbacks that contain fragments of the experience, isolated images, sounds, and body sensations that initially have no context other than fear and panic. When Marilyn was a child, she had no way of giving voice to the unspeakable, and it would have made no difference anyway—nobody was listening.

Like so many survivors of childhood abuse, Marilyn exemplified the power of the life force, the will to live and to own one's life, the energy that counteracts the annihilation of trauma. I gradually came to realize that the only thing that makes it possible to do the work of healing trauma is awe at the dedication to survival that enabled my patients to endure their abuse and