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

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 the 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
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.

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.

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 flight/flight/freeze response is successful and we escape the danger, we recover our internal equilibrium and gradually "reign our senses."

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. 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 1989, when the French psychologist Pierre Janet published the first scientific account of traumatic stress, 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. 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 maps don't work, when our actions don't 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, our minds can interfere with every one of them.

Our rational, cognitive brain is actually the youngest part of the brain, occupying 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 tonically 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
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. The emotional brain is at the heart of the central nervous system, and its key task is to look out for your welfare. 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 (seething, a warm twinge to the gut) will interfere with whatever your mind is currently focused on and get you moving — physically and mentally — in a different direction. Even at its most subtle, these sensations have a huge influence on the small and large decisions we make throughout our live: what we choose to eat, where we live, 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 is similar to that 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 two or three quick associations, in contrast with the rational brain, which is organized according to a complex set of options. (The textbook example is leaping 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 fact is over.

Finally we reach the top layer of the brain, the neocortex. We share this layer with other mammals, but it is much thicker in us humans. In the first 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. 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 Noah'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. 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"—we pick up not only another person's movement but her emotions 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 reactivating the capacity to safely mirror, and be mirrored, by others, but also to resist being hijacked by others' negative emotions.

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." 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 this 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. 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 in

...
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)—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 bower 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.

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 someone touches them.

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 vital 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 6 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. 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 tense.

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 incident in which a woman who had been in an anger management program

exults 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 hurt 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 visceral 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, reexperienceing 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 entire crash 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 a car number sixteen of an eighty-seven-car pileup, the worst road disaster in Canadian history.

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 here—I’m on fire!” Helplessly, they saw her die as her car she’d been in was consumed by flames. The next thing they knew, a salt truck was standing on the hood of their car with a fire extinguisher. They 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 the emergency room. Aside from a few cuts, they were found to be physically unharmed.
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, jump, 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 than 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 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 feel intensely ashamed if they become excited by sensations or images that recall their molestations, 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 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 life-saving responses if a truck has just smashed into your car.

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 these areas are deactivated, people lose their sense of time and become trapped in the moment, without a sense of past, present, or future. Two brain systems are relevant for the mental processing of trauma: one 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 sideline 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.

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 tools 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 at all, they develop a surfeit of stimuli coming in and block it out the world. The tragedy is

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that the price of closing down includes filtering out sources of pleasure 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 particular dramatic, since Ute was sitting right next to Stan in the wrecked car. Her mind went blank, 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 Stan, 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.* 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 harrowing 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 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. 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." 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.

For Darwin mammalian emotions are fundamentally rooted in biology. They are the indispensable source of motivation to initiate action. Emotion (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 emotion 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.

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.”

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 heartbeat. As long as we register emotions primarily in our heads, we can remain pretty much in control, but feeling as if our chest is aching or we’ve been punched in the gut is unbearable. We’d 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 tension in the other person’s face, eye movements and pupil dilations, pitch and speed of the voice—as well as the fluctuations in our own inner

landscape—salivation, swallowing, breathing, and heart rate—are linked to a single regulatory system. All are a product of the synchrony between the branches of the autonomic nervous system (ANS): the sympathetic, which is the body’s accelerator, and the parasympathetic, which serves as its brake. 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 (pathos). The SNS moves blood to the muscles for quick action, partly by triggering the adrenal glands to secrete adrenaline, which speeds up the heart 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, a brake on arousal, slowing the heart down, relaxing muscles, and restoring breathing to normal. As Darwin pointed out, “feeding, shelter, and nurturing 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 surge of adrenaline speeds up your heart, which explains why many athletes take a few 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, deep, long breaths out help calm you down. As we breathe, we continue to inhale and exhale, and slow down the heart, and because of that the interval between 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 go—v—more fluctuation, the better—is a sign that the brain and accelerates your arousal system are both functioning properly and in balance. We had learned when we acquired an instrument to measure HRV, and I was in chapter 16 when we can use HRV to help treat PTSD.

THE NEURAL LOVE CODE

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 t
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 attention with another person can shift us out of disorganized and fearful states.

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 astonishingly 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. 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. Our doctor can write a prescription for friendship and love. These are complex, hard-earned capacities. You don’t need a history of trauma to feel self-sacrificing and even panicked at a party with strangers—but trauma can turn a whole world into a gathering of aliens.

Many traumatized people find themselves chronically out of sync with people around them. Some find comfort in groups where they can replay past 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 cost 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 to 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—along 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.
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. 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. Our voice becomes faster and more strident and our heart starts pumping faster. If a dog is in the room, she will sit 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 plummets (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. 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 frightened.

Almost everyone knows what that quintessential fight/flight response, and 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 fight/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.

When fighting or running does not take care of the threat, we activate another 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 the heart and induces shallow breathing. Once this system takes over, a person feels small, and we ourselves, cease to matter. Awareness is shut down, and we no longer even register physical pain.

**WE BECOME HUMAN**

Selye'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 institute 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 suckling, 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. 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's 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 VVC is likely to take over. Your heart slows down, your breathing becomes shallow, and, zombie-like, 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. 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 signals of real danger. When the smoke detectors in 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 will 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, as children, had witnessed their mothers being assaulted by their partners; they had a vastly increased chance to fall victim to domestic violence.

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. 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 or 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 it intuitively. Steve Gross used to run the play program at the Trauma Track. 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 hand them a big smile. The kids rarely responded. Then, a little later, he would turn and "accidentally" drop his ball close to where a kid was sitting. As he leaned over to pick it up, he'd nudge it gently toward the kid, who'd smile and 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 place where the social-engagement system could begin to reemerge. In some way, severely traumatized people may get more out of simply helping to arrange chairs before a meeting or joining others in tapping out a local 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 lead to further dysregulation. Just as your dog cowers if you shout and wag tail when you speak in a high sing-song, we humans respond to harsh voices
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 she was afraid to face the world. I also noticed that her long sleeves only minimally 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 them 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, distant, frightened, and frightening kids who disappeared as suddenly as they arrived. Sherry had grown up taking care of these transient children, often without 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 it and I know I don't have a mother. I know my mother said to me, and the signs were always there. She'd tell you, 'I don't think you belong in this family. I think they gave us a wrong baby.' And she'd say it with a smile on her face. But, of course, we often pretend to joke when they say something serious.'"

Over the years our research team has repeatedly found that chronic
connection that is necessary for therapy to work. Struck by how frozen a
upright 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 mas-
tage table, then moved to the end of the table and gently held Sherry’s fe-
lings. 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 exter-
connection to the body that so many people with histories of trau-
and neglect experience. I discovered that my professional training, with
phasis on understanding and insight, had largely ignored the relevance of t
breathing, body, the foundation of our selves. Sherry knew that pick-
up skin was a destructive thing to do and that it was related to her mother’s
aspect, but understanding the source of the impulse made no difference
ing her control it.

LOSING YOUR BODY

I was alerted to this, I was amazed to discover how many of my pate-
ting they could not feel whole areas of their bodies. Sometimes I’d a
am to close their eyes and tell me what I had put into their outreach-
ths. Whether it was a car key, a quarter, or a can opener, they often cou
even guess what they were holding—sensory perceptions simply
’t working.

I talked this over with my friend Alexander McFarlane in Australia, wh
observed the same phenomenon. In his laboratory in Adelaide he h
the question: How do we know without looking at it that we’re hold-
ing a car key? Recognizing an object in the palm of your hand requires sen-
sing its shape, weight, temperature, texture, and position. Each of tho-
se sensory experiences is transmitted to a different part of the brain
then needs to integrate them into a singular perception. McFarlan
found that people with PTSD often have trouble putting the picture togethe-
When our senses become muffled, we no longer feel fully alive. In a
study called “What Is an Emotion?” (1984), William James, the father of
ian psychology, reported a striking case of “sensory insensitivity” in
an interview: “I have...no human sensations,” she told him. “I’m sur-
nrounded by all that can render life happy and agreeable, still I find it
ly of enjoyment and of feeling is wanting... Of each of my senses, each
of my proper self, is as it were separated from me and can no long
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 Lanious, who scanned Stan andlite 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.

Dr. Lanious 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...
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 Ladus showed me her study, a phrase from my classical high school education came back to me. The mathematician Archimedes, speaking 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. 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 obscure 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.”

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.” 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:

[Primordial 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.]

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 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, saturation, 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 astonishingly 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 or hungry or thirsty tells us to put on a sweater; feeling hungry or thirsty 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." 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 leading 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." 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 and 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 loses its sensual pleasures. This in turn can trigger desperate attempts to counter those feelings by freezing and dissociation.

How do people regain control when their animal brains are stuck in a fight or flight survival mode? If what goes on deep inside our animal brains dictates how we feel, 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 men who put their fists through drywall at the VA were trying to assert agency—to make something happen. But they ended up feeling even out of control, and many of these once-confident men were trapped in the cycle of 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 more our potential to control our lives. Knowing what we feel is the first step.
 constantly bombarded by visceral warning signs, and, in an attempt to control these processes, they often become expert at ignoring their gut feelings and innumbing awareness of what is played out inside. They learn to hic 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, 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 attacks are mediated 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 the cognitive 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. Sandy, a middle-aged 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). Wherever her husband made insensitive remarks, 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 as 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. Traumatized children have fifty times the rate of asthma as their nontraumatized peers. 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." 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. When researchers showed pictures of angry or distressed faces to people with alexithymia, they could not figure out what those people were feeling.

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. 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 Laurent 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.

Because traumatized people often have trouble sensing what is going on in their bodies, they lack a nuanced response to frustration. They either react with a 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 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 blind 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, my 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-obliteration is depersonalization—losing your sense of yourself. Frewen'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 to make a drawing of my mugger 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: “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 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 eerily 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, Lanitis and Freeman, as well as a group of researchers at the University of Groningen in the Netherlands, 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 patient to first notice and then describe the feelings in their bodies—not emotion 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 gesture and movements. I ask them to pay attention to subtle shifts in their bodies such as tension in their cheeks or graving 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 delude patients at this point, and the therapist must be familiar with ways to stem the 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 unhappily 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 need to 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.
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.

The most striking difference between normal controls and survivors of chronic trauma was in activation of the prefrontal cortex in response to a direct 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 own 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.