

Hanson, R. (2009). Part 1: The Causes of Suffering & Part 2: Happiness. In *The Buddha's Brain: The Practical Neuroscience of Happiness, Love, and Wisdom* (pp. 23–118 in print edition). Oakland, CA: New Harbinger.

PART ONE  
THE CAUSES OF SUFFERING

## chapter 2

# The Evolution of Suffering

*Nothing in biology makes sense except in light of evolution.*

—Theodosius Dobzhansky

There's a lot about life that's wonderful, but it has its hard parts, too. Look at the faces around you—they probably hold a fair amount of strain, disappointment, and worry. And you know your own frustrations and sorrows as well. The pangs of living range from subtle loneliness and dismay, to moderate stress, hurt, and anger, and then to intense trauma and anguish. This whole range is what we mean by the word, *suffering*. A lot of suffering is mild but chronic, such as a background sense of anxiety, irritability, or lack of fulfillment. It's natural to want less of this. And in its place, more contentment, love, and peace.

To make any problem better, you need to understand its causes. That's why all the great physicians, psychologists, and spiritual teachers have been master diagnosticians. For example, in his Four Noble Truths, the Buddha identified an ailment (suffering), diagnosed its cause (craving: a compelling sense of need for something), specified its cure (freedom from craving), and prescribed a treatment (the Eightfold Path).

This chapter examines suffering in light of evolution in order to diagnose its sources in your brain. When you understand *why* you feel nervous, annoyed, hassled, driven, blue, or inadequate, those feelings have less power over you. This by itself can bring some relief. Your understanding will also help you make better use of the “prescriptions” in the rest of this book.

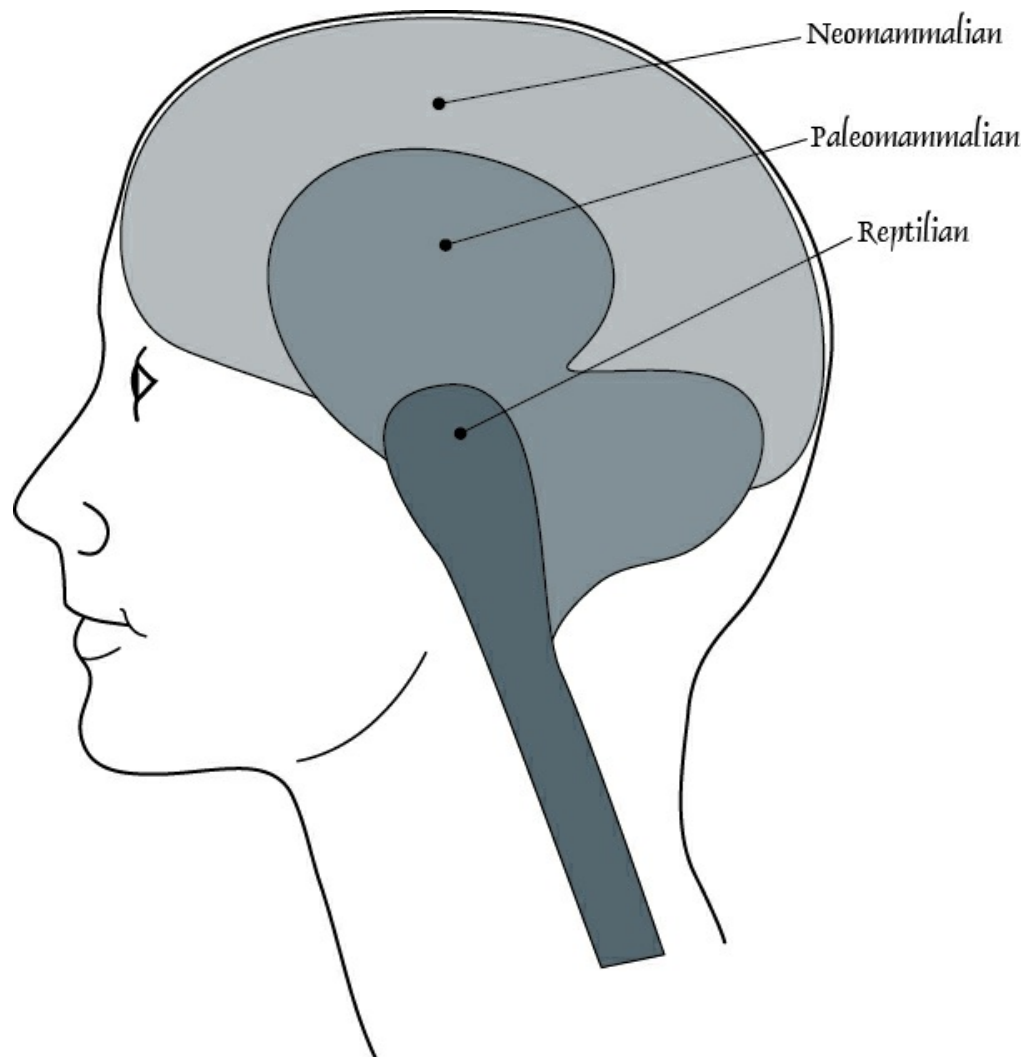
## **The Evolving Brain**

- Life began around 3.5 billion years ago. Multicelled creatures first

appeared about 650 million years ago. (When you get a cold, remember that microbes had nearly a three-billion-year head-start!) By the time the earliest jellyfish arose about 600 million years ago, animals had grown complex enough that their sensory and motor systems needed to communicate with each other; thus the beginnings of neural tissue. As animals evolved, so did their nervous systems, which slowly developed a central headquarters in the form of a brain.

- Evolution builds on preexisting capabilities. Life's progression can be seen inside your own brain, in terms of what Paul MacLean (1990) referred to as the reptilian, paleomammalian, and neomammalian levels of development (see figure 2; all figures are somewhat inexact and for illustrative purposes only).
- Cortical tissues that are relatively recent, complex, conceptualizing, slow, and motivationally diffuse sit atop *subcortical* and *brain-stem* structures that are ancient, simplistic, concrete, fast, and motivationally intense. (The subcortical region lies in the center of your brain, beneath the cortex and on top of the brain stem; the brain stem roughly corresponds to the "reptilian brain" seen in figure 2.) As you go through your day, there's a kind of lizard-squirrel-monkey brain in your head shaping your reactions from the bottom up.

- Figure 2: The Evolving Brain



- Nonetheless, the modern cortex has great influence over the rest of the brain, and it's been shaped by evolutionary pressures to develop ever-improving abilities to parent, bond, communicate, cooperate, and love (Dunbar and Shultz 2007).
- The cortex is divided into two “hemispheres” connected by the *corpus callosum*. As we evolved, the left hemisphere (in most people) came to focus on sequential and linguistic processing while the right hemisphere specialized in holistic and visual-spatial processing; of course, the two halves of your brain work closely together. Many neural structures are duplicated so that there is one in each hemisphere; nonetheless, the usual convention is to refer to a structure

in the singular (e.g., the hippocampus).

### **Three Survival Strategies**

Over hundreds of millions of years of evolution, our ancestors developed three fundamental strategies for survival:

- Creating separations—in order to form boundaries between themselves and the world, and between one mental state and another
- Maintaining stability—in order to keep physical and mental systems in a healthy balance
- Approaching opportunities and avoiding threats—in order to gain things that promote offspring, and escape or resist things that don't

These strategies have been extraordinarily effective for survival. But Mother Nature doesn't care how they *feel*. To motivate animals, including ourselves, to follow these strategies and pass on their genes, neural networks evolved to create pain and distress under certain conditions: when separations break down, stability is shaken, opportunities disappoint, and threats loom. Unfortunately, these conditions happen all the time, because:

- Everything is connected.
- Everything keeps changing.
- Opportunities routinely remain unfulfilled or lose their luster, and many threats are inescapable (e.g., aging and death)

Let's see how all this makes you suffer.

### **Not So Separate**

The parietal *lobes* of the brain are located in the upper back of the head (a "lobe" is a rounded swelling of the cortex). For most people, the left lobe establishes that the body is distinct from the world, and the right lobe indicates where the body is compared to features in its environment. The result is an automatic, underlying assumption along the lines of *I am separate and independent*. Although this is true in some ways, in many important

ways it is not.

## **Not So Distinct**

To live, an organism must *metabolize*: it must exchange matter and energy with its environment. Consequently, over the course of a year, many of the atoms in your body are replaced by new ones. The energy you use to get a drink of water comes from sunshine working its way up to you through the food chain—in a real sense, light lifts the cup to your lips. The apparent wall between your body and the world is more like a picket fence.

And between your mind and the world, it's like a line painted on the sidewalk. Language and culture enter and pattern your mind from the moment of birth (Han and Northoff 2008). Empathy and love naturally attune you to other people, so your mind moves into resonance with theirs (Siegel 2007). These flows of mental activity go both ways as you influence others.

Within your mind, there are hardly any lines at all. All its contents flow into each other, sensations becoming thoughts feelings desires actions and more sensations. This stream of consciousness correlates with a cascade of fleeting neural assemblies, each assembly dispersing into the next one, often in less than a second (Dehaene, Sergent, and Changeux 2003; Thompson and Varela 2001).

## **Not So Independent**

I'm here because a Serbian nationalist assassinated Archduke Ferdinand, catalyzing World War I—which in turn led to the unlikely meeting of my mom and dad at an Army dance in 1944. Of course, there are ten thousand reasons why *anyone* is here today. How far back should we go? My son—born with his umbilical cord wrapped around his neck—is here due to medical technologies developed over hundreds of years.

Or we could go *way* back: Most of the atoms in your body—including the oxygen in your lungs and the iron in your blood—were born inside a star. In the early universe, hydrogen was just about the only element. Stars are giant fusion reactors that pound together hydrogen atoms, making heavier elements and releasing lots of energy in the process. The ones that went nova spewed

their contents far and wide. By the time our solar system started to form, roughly nine billion years after the universe began, enough large atoms existed to make our planet, to make the hands that hold this book and the brain that understands these words. Truly, you're here because a lot of stars blew up. Your body is made of stardust.

Your mind also depends on countless preceding causes. Think of the life events and people that have shaped your views, personality, and emotions. Imagine having been switched at birth and raised by poor shopkeepers in Kenya or a wealthy oil family in Texas; how different would your mind be today?

### **The Suffering of Separation**

Since we are each connected and interdependent with the world, our attempts to be separate and independent are regularly frustrated, which produces painful signals of disturbance and threat. Further, even when our efforts are temporarily successful, they still lead to suffering. When you regard the world as “not me at all,” it is potentially unsafe, leading you to fear and resist it. Once you say, “I am *this* body apart from the world,” the body's frailties become your own. If you think it weighs too much or doesn't look right, you suffer. If it's threatened by illness, aging, and death—as all bodies are—you suffer.

### **Not So Permanent**

Your body, brain, and mind contain vast numbers of systems that must maintain a healthy equilibrium. The problem, though, is that changing conditions continually disturb these systems, resulting in signals of threat, pain, and distress—in a word, suffering.

### **We Are Dynamically Changing Systems**

Let's consider a single neuron, one that releases the neurotransmitter serotonin (see figures 3 and 4). This tiny neuron is both part of the nervous

system and a complex system in its own right that requires multiple subsystems to keep it running. When it fires, tendrils at the end of its axon expel a burst of molecules into the synapses—the connections—it makes with other neurons. Each tendril contains about two hundred little bubbles called *vesicles* that are full of the neurotransmitter serotonin (Robinson 2007). Every time the neuron fires, five to ten vesicles spill open. Since a typical neuron fires around ten times a second, the serotonin vesicles of each tendril are emptied out every few seconds.

Consequently, busy little molecular machines must either manufacture new serotonin or recycle loose serotonin floating around the neuron. Then they need to build vesicles, fill them with serotonin, and move them close to where the action is, at the tip of each tendril. That's a lot of processes to keep in balance, with many things that could go wrong—and serotonin metabolism is just one of the thousands of systems in your body.

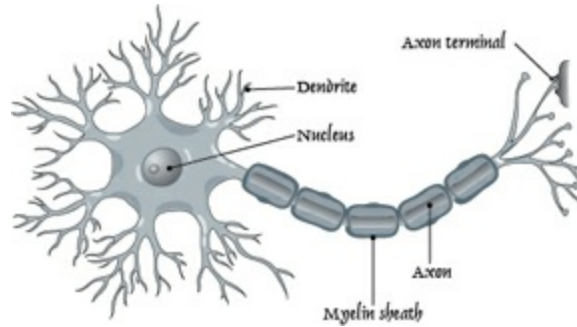
## A Typical Neuron

- Neurons are the basic building blocks of the nervous system; their main function is to communicate with each other across tiny junctions called synapses. While there are many sorts of neurons, their basic design is pretty similar.
- The cell body sends out spikes called *dendrites* which receive neurotransmitters from other neurons. (Some neurons communicate directly with each other through electrical impulses.)
- Simplifying some, the millisecond-by-millisecond sum of all the excitatory and inhibitory signals a neuron receives determines whether or not it will fire.
- When a neuron fires, an electrochemical wave ripples down its *axon*, the fiber extending toward the neurons it sends signals to. This releases neurotransmitters into its synapses with receiving neurons, either inhibiting them or exciting them to fire in turn.
- Nerve signals are sped up by *myelin*, a fatty substance that insulates axons.

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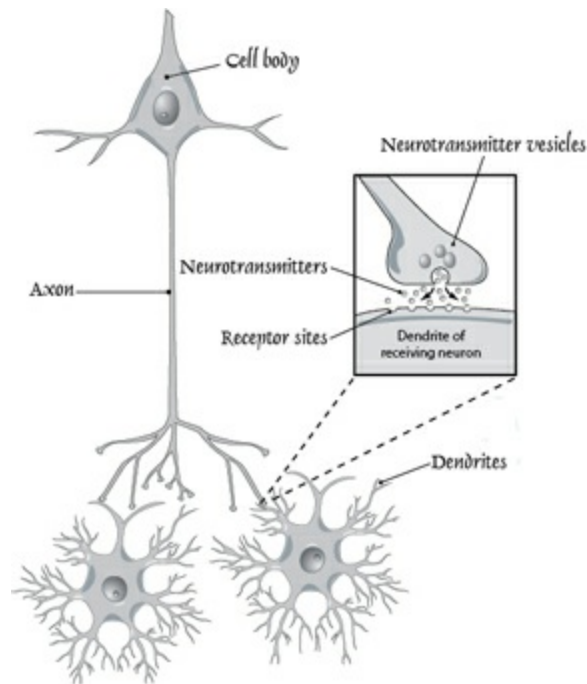
Figure 1: A (Simplified) Neuron





- The gray matter of your brain is composed largely of the cell bodies of neurons. There is also white matter, made up of the axons and the *glial* cells; glial cells perform metabolic support functions such as wrapping axons in myelin and recycling neurotransmitters. Neuronal cell bodies are like 100 billion on-off switches connected by their axonal “wires” in an intricate network inside your head.

- Figure 4: A Synapse (magnified in the inset)



## **The Challenges of Maintaining an Equilibrium**

For you to stay healthy, each system in your body and mind must balance two conflicting needs. On the one hand, it must remain open to inputs during ongoing transactions with its local environment (Thompson 2007); closed systems are dead systems. On the other hand, each system must also preserve a fundamental stability, staying centered around a good set-point and within certain ranges—not too hot, nor too cold. For example, inhibition from the prefrontal cortex (PFC) and arousal from the limbic system must balance each other: too much inhibition and you feel numb inside, too much arousal and you feel overwhelmed.

## **Signals of Threat**

To keep each of your systems in balance, sensors register its state (as the thermometer does inside a thermostat) and send signals to regulators to restore equilibrium if the system gets out of range (i.e., turn the furnace on or off). Most of this regulation stays out of your awareness. But some signals for corrective action are so important that they bubble up into consciousness. For example, if your body gets too cold, you feel chilled; if it gets too hot, you feel like you're baking.

These consciously experienced signals are unpleasant, in part because they carry a sense of threat—a call to restore equilibrium before things slide too far too fast down the slippery slope. The call may come softly, with a sense of unease, or loudly, with alarm, even panic. However it comes, it mobilizes your brain to do whatever it takes to get you back in balance.

This mobilization usually comes with feelings of craving; these range from quiet longings to a desperate sense of compulsion. It is interesting that the word for craving in Pali—the language of early Buddhism—is *tanha*, the root of which means thirst. The word “thirst” conveys the visceral power of threat signals, even when they have nothing to do with life or limb, such as the possibility of being rejected. Threat signals are effective precisely because they're unpleasant—because they make you suffer, sometimes a little, sometimes a lot. You want them to stop.

## **Everything Keeps Changing**

Occasionally, threat signals do stop for a while—just as long as every system stays in balance. But since the world is always changing, there are endless disturbances in the equilibria of your body, mind, and relationships. The regulators of the systems of your life, from the molecular bottom all the way up to the interpersonal top, must keep trying to impose static order on inherently unstable processes.

Consider the impermanence of the physical world, from the volatility of quantum particles to our own Sun, which will someday swell into a red giant and swallow the Earth. Or consider the turbulence of your nervous system; for example, regions in the PFC that support consciousness are updated five to eight times a second (Cunningham and Zelazo 2007).

This neurological instability underlies all states of mind. For example, every thought involves a momentary partitioning of streaming neural traffic into a coherent assembly of synapses that must soon disperse into fertile disorder to allow other thoughts to emerge (Atmanspacher and Graben 2007). Observe even a single breath, and you will experience its sensations changing, dispersing, and disappearing soon after they arise.

*Everything* changes. That's the universal nature of outer reality and inner experience. Therefore, there's no end to disturbed equilibria as long as you live. But to help you survive, your brain keeps trying to stop the river, struggling to hold dynamic systems in place, to find fixed patterns in this variable world, and to construct permanent plans for changing conditions. Consequently, your brain is forever chasing after the moment that has just passed, trying to understand and control it.

It's as if we live at the edge of a waterfall, with each moment rushing at us—experienced only and always *now* at the lip—and then zip, it's over the edge and gone. But the brain is forever clutching at what has just surged by.

## **Not So Pleasant or Painful**

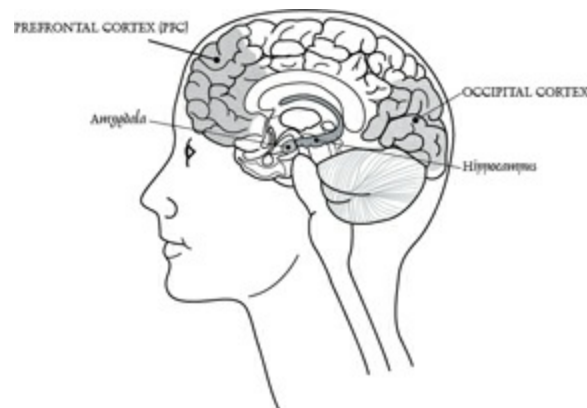
In order to pass on their genes, our animal ancestors had to choose correctly many times a day whether to approach something or avoid it. Today, humans approach and avoid mental states as well as physical objects; for example, we pursue self-worth and push away shame. Nonetheless, for all its

sophistication, human approaching and avoiding draws on much the same neural circuitry used by a monkey to look for bananas or a lizard to hide under a rock.

## The Feeling Tone of Experience

How does your brain decide if something should be approached or avoided? Let's say you're walking in the woods; you round a bend and suddenly see a curvy shape on the ground right smack in front of you. To simplify a complex process, during the first few tenths of a second, light bouncing off this curved object is sent to the *occipital* cortex (which handles visual information) for processing into a meaningful image (see figure 5). Then the occipital cortex sends representations of this image in two directions: to the hippocampus, for evaluation as a potential threat or opportunity, and to the PFC and other parts of the brain for more sophisticated—and time-consuming—analysis.

Figure 5: You See a Potential Threat or Opportunity



Just in case, your hippocampus immediately compares the image to its short list of jump-first-think-later dangers. It quickly finds curvy shapes on its danger list, causing it to send a high-priority alert to your *amygdala*: “Watch out!” The amygdala—which is like an alarm bell—then pulses both a general warning throughout your brain and a special fast-track signal to your fight-or-flight neural and hormonal systems (Rasia-Filho, Londero, and Achaval 2000). We’ll explore the details of the fight-or-flight cascade in the next

chapter; the point here is that a second or so after you spot the curving shape, you jump back in alarm.

Meanwhile, the powerful but relatively slow PFC has been pulling information out of long-term memory to figure out whether the darn thing is a snake or a stick. As a few more seconds tick by, the PFC zeros in on the object's inert nature—and the fact that several people ahead of you walked past it without saying anything—and concludes that it's only a stick.

Throughout this episode, everything you experienced was either pleasant, unpleasant, or neutral. At first there were neutral or pleasant sights as you strolled along the path, then unpleasant fear at a potential snake, and finally pleasant relief at the realization that it was just a stick. That aspect of experience—whether it is pleasant, unpleasant, or neutral—is called, in Buddhism, its *feeling tone* (or, in Western psychology, its *hedonic tone*). The feeling tone is produced mainly by your amygdala (LeDoux 1995) and then broadcast widely. It's a simple but effective way to tell your brain as a whole what to do each moment: approach pleasant carrots, avoid unpleasant sticks, and move on from anything else.

## **Key Neurochemicals**

These are the major chemicals inside your brain that affect neural activity; they have many functions, and we've listed here the ones that are relevant to this book.

### **Primary Neurotransmitters**

- Glutamate—excites receiving neurons.
- GABA—inhibits receiving neurons.

### **Neuromodulators**

These substances—sometimes also called neurotransmitters—influence the primary neurotransmitters. Because they're released widely within the brain, they have a powerful effect.

- Serotonin—regulates mood, sleep, and digestion; most antidepressants aim at increasing its effects.
- Dopamine—involved with rewards and attention; promotes approach behaviors.
- Norepinephrine—alerts and arouses.
- Acetylcholine—promotes wakefulness and learning.

## Neuropeptides

These neuromodulators are built from *peptides*, a particular kind of organic molecule.

- Opioids—buffer stress, provide soothing and reduce pain, and produce pleasure (e.g., runner’s high); these include endorphins.
- Oxytocin—promotes nurturing behaviors toward children and bonding in couples; associated with blissful closeness and love; women have more oxytocin than men.
- Vasopressin—supports pair bonding; in men it may promote aggressiveness toward sexual rivals.

## Other Neurochemicals

- Cortisol—released by the adrenal glands during the stress response; stimulates the amygdala and inhibits the hippocampus.
- Estrogen—the brains of both men and women contain estrogen receptors; affects libido, mood, and memory.

## Chasing Carrots

Two major neural systems keep you chasing carrots. The first system is based on the neurotransmitter dopamine. Dopamine-releasing neurons become more active when you encounter things that are linked to rewards in the past—for example, if you get a message from a good friend you haven’t seen for a few months. These neurons also rev up when you encounter something that could offer rewards in the future—such as your friend saying

she wants to take you to lunch. In your mind, this neural activity produces a motivating sense of desire: you want to call her back. When you do have lunch, a part of your brain called the *cingulate cortex* (about the size of your finger, on the interior edge of each hemisphere) tracks whether the rewards you expected—fun with your friend, good food—actually arrive (Eisenberger and Lieberman 2004). If they do, dopamine levels stay steady. But if you're disappointed—maybe your friend is in a bad mood—the cingulate sends out a signal that lowers dopamine levels. Falling dopamine registers in subjective experience as an unpleasant feeling tone—a dissatisfaction and discontent—that stimulates craving (broadly defined) for something that will restore its levels.

The second system, based on several other neuromodulators, is the biochemical source of the pleasant feeling tones that come from the actual—and anticipated—carrots in life. When these “pleasure chemicals”—natural opioids (including endorphins), oxytocin, and norepinephrine—surge into your synapses, they strengthen the neural circuits that are active, making them more likely to fire together in the future. Imagine a toddler trying to eat a spoonful of pudding. After many misses, his perceptual-motor neurons finally get it right, leading to waves of pleasure chemicals which help cement the synaptic connections that created the specific movements that slipped the spoon into his mouth.

In essence, this pleasure system highlights whatever triggered it, prompts you to pursue those rewards again, and strengthens the behaviors that make you successful in getting them. It works hand in hand with the dopamine-based system. For example, slaking your thirst feels good both because the discontent of low dopamine leaves, and because the pleasure chemical-based joy of cool water on a hot day arrives.

### **Approaching Involves Suffering**

These two neural systems are necessary for survival. Additionally, you can use them for positive aims that have nothing to do with passing on genes. For example, you could increase your motivation to keep doing something healthy (e.g., exercise) by being really mindful of its rewards, such as feelings of vitality and strength.

But reaching for what's pleasant can also make you suffer:

- Desiring itself can be an unpleasant experience; even mild longing is subtly uncomfortable.
- When you can't have things you desire, it's natural to feel frustrated, disappointed, and discouraged—perhaps even hopeless and despairing.
- When you do fulfill a desire, the rewards that follow are often not that great. They're okay, but look closely at your experience: Is the cookie really that tasty—especially after the third bite? Was the satisfaction of the good job review that intense or long lasting?
- When rewards are in fact pretty great, many of them still come at a stiff price—big desserts are an obvious example. Also consider the rewards of gaining recognition, winning an argument, or getting others to act a particular way. What is the cost/benefit ratio, *really*?
- Even if you do get what you want, it's genuinely great, and it doesn't cost much—the gold standard—every pleasant experience must inevitably change and end. Even the best ones of all. You are routinely separated from things you enjoy. And someday that separation will be permanent. Friends drift away, children leave home, careers end, and eventually your own final breath comes and goes. Everything that begins must also cease. Everything that comes together must also disperse. Experiences are thus incapable of being completely satisfying. They are an unreliable basis for true happiness.

To use an analogy from the Thai meditation master Ajahn Chah: if getting upset about something unpleasant is like being bitten by a snake, grasping for what's pleasant is like grabbing the snake's tail; sooner or later, it will still bite you.

### **Sticks Are Stronger than Carrots**

So far, we've discussed carrots and sticks as if they were equals. But actually, sticks are usually more powerful, since your brain is built more for avoiding than for approaching. That's because it's the negative experiences, not the positive ones, that have generally had the most impact on survival.

For example, imagine our mammalian ancestors dodging dinosaurs in a worldwide Jurassic Park 70 million years ago. Constantly looking over their



shoulders, alert to the slightest crackle of brush, ready to freeze or bolt or attack depending on the situation. The quick and the dead. If they missed out on a carrot—a chance at food or mating, perhaps—they usually had other opportunities later. But if they failed to duck a stick—like a predator—then they’d probably be killed, with no chance at any carrots in the future. The ones that lived to pass on their genes paid a *lot* of attention to negative experiences.

Let’s explore six ways your brain keeps you dodging sticks.

### **VIGILANCE AND ANXIETY**

When you’re awake and not doing anything in particular, the baseline resting state of your brain activates a “default network,” and one of its functions seems to be tracking your environment and body for possible threats (Raichle et al. 2001). This basic awareness is often accompanied by a background feeling of anxiety that keeps you vigilant. Try walking through a store for a few minutes without the least whiff of caution, unease, or tension. It’s very difficult.

This makes sense because our mammalian, primate, and human ancestors were prey as well as predators. In addition, most primate social groups have been full of aggression from males and females alike (Sapolsky 2006). And in the hominid and then human hunter-gatherer bands of the past couple million years, violence has been a leading cause of death for men (Bowles 2006). We became anxious for good reason: there was a lot to fear.

### **SENSITIVITY TO NEGATIVE INFORMATION**

The brain typically detects negative information faster than positive information. Take facial expressions, a primary signal of threat or opportunity for a social animal like us: fearful faces are perceived much more rapidly than happy or neutral ones, probably fast-tracked by the amygdala (Yang, Zald, and Blake 2007). In fact, even when researchers make fearful faces invisible to conscious awareness, the amygdala still lights up (Jiang and He 2006). The brain is *drawn* to bad news.

### **HIGH-PRIORITY STORAGE**

When an event is flagged as negative, the hippocampus makes sure it's stored carefully for future reference. Once burned, twice shy. Your brain is like Velcro for negative experiences and Teflon for positive ones—even though most of your experiences are probably neutral or positive.

#### **NEGATIVE TRUMPS POSITIVE**

Negative events generally have more impact than positive ones. For example, it's easy to acquire feelings of learned helplessness from a few failures, but hard to undo those feelings, even with many successes (Seligman 2006). People will do more to avoid a loss than to acquire a comparable gain (Baumeister et al. 2001). Compared to lottery winners, accident victims usually take longer to return to their original baseline of happiness (Brickman, Coates, and Janoff-Bulman 1978). Bad information about a person carries more weight than good information (Peeters and Czapinski 1990), and in relationships, it typically takes about five positive interactions to overcome the effects of a single negative one (Gottman 1995).

#### **LINGERING TRACES**

Even if you've unlearned a negative experience, it still leaves an indelible trace in your brain (Quirk, Repa, and LeDoux 1995). That residue lies waiting, ready to reactivate if you ever encounter a fear-provoking event like the previous one.

#### **VICIOUS CYCLES**

Negative experiences create vicious cycles by making you pessimistic, overreactive, and inclined to go negative yourself.

### **Avoiding Involves Suffering**

As you can see, your brain has a built-in “negativity bias” (Vaish, Grossman, and Woodward 2008) that primes you for avoidance. This bias makes you suffer in a variety of ways. For starters, it generates an unpleasant background of anxiety, which for some people can be quite intense; anxiety also makes it harder to bring attention inward for self-awareness or

contemplative practice, since the brain keeps scanning to make sure there is no problem. The negativity bias fosters or intensifies other unpleasant emotions, such as anger, sorrow, depression, guilt, and shame. It highlights past losses and failures, it downplays present abilities, and it exaggerates future obstacles. Consequently, the mind continually tends to render unfair verdicts about a person's character, conduct, and possibilities. The weight of those judgments can really wear you down.

## **In the Simulator**

In Buddhism, it's said that suffering is the result of craving expressed through the Three Poisons: greed, hatred, and delusion. These are strong, traditional terms that cover a broad range of thoughts, words, and deeds, including the most fleeting and subtle. Greed is a grasping after carrots, while hatred is an aversion to sticks; both involve craving more pleasure and less pain. Delusion is a holding onto ignorance about the way things really are—for example, not seeing how they're connected and changing.

## **Virtual Reality**

Sometimes these poisons are conspicuous; much of the time, however, they operate in the background of your awareness, firing and wiring quietly along. They do this by using your brain's extraordinary capacity to *represent* both inner experience and the outer world. For example, the blind spots in your left and right visual fields don't look like holes out there in the world; rather, your brain fills them in, much like photo software shades in the red eyes of people looking toward a flash. In fact, much of what you see "out there" is actually manufactured "in here" by your brain, painted in like computer-generated graphics in a movie. Only a small fraction of the inputs to your occipital lobe comes directly from the external world; the rest comes from internal memory stores and perceptual-processing modules (Raichle 2006). Your brain *simulates* the world—each of us lives in a virtual reality that's close enough to the real thing that we don't bump into the furniture.

Inside this simulator—whose neural substrate appears to be centered in the upper-middle of your PFC (Gusnard et al. 2001)—mini-movies run

continuously. These brief clips are the building blocks of much conscious mental activity (Niedenthal 2007; Pitcher et al. 2008). For our ancestors, running simulations of past events promoted survival, as it strengthened the learning of successful behaviors by repeating their neural firing patterns. Simulating future events also promoted survival by enabling our ancestors to compare possible outcomes—in order to pick the best approach—and to ready potential sensory-motor sequences for immediate action. Over the past three million years, the brain has tripled in size; much of this expansion has improved the capabilities of the simulator, suggesting its benefits for survival.

### **Simulations Make You Suffer**

The brain continues to produce simulations today, even when they have nothing to do with staying alive. Watch yourself daydream or go back over a relationship problem, and you'll see the clips playing—little packets of simulated experiences, usually just seconds long. If you observe them closely, you'll spot several troubling things:

- By its very nature, the simulator pulls you out of the present moment. There you are, following a presentation at work, running an errand, or meditating, and suddenly your mind is a thousand miles away, caught up in a mini-movie. But it's only in the present moment that we find real happiness, love, or wisdom.
- In the simulator, pleasures usually seem pretty great, whether you're considering a second cupcake or imagining the response you'll get to a report at work. But what do you *actually* feel when you enact the mini-movie in real life? Is it as pleasant as promised up there on the screen? Usually not. In truth, most everyday rewards aren't as intense as those conjured up in the simulator.
- Clips in the simulator contain lots of beliefs: *Of course he'll say X if I say Y....It's obvious that they let me down.* Sometimes these are explicitly verbalized, but much of the time they're implicit, built into the plotline. In reality, are the explicit and implicit beliefs in your simulations *true*? Sometimes yes, but often no. Mini-movies keep us stuck by their simplistic view of the past and by their defining out of

existence real possibilities for the future, such as new ways to reach out to others or dream big dreams. Their beliefs are the bars of an invisible cage, trapping you in a life that's smaller than the one you could actually have. It's like being a zoo animal that's released into a large park—yet still crouches within the confines of its old pen.

- In the simulator, upsetting events from the past play again and again, which unfortunately strengthens the neural associations between an event and its painful feelings. The simulator also forecasts threatening situations in your future. But in fact, most of those worrisome events never materialize. And of the ones that do, often the discomfort you experience is milder and briefer than predicted. For example, imagine speaking from your heart: this may trigger a mini-movie ending in rejection and you feeling bad. But in fact, when you do speak from the heart, doesn't it typically go pretty well, with you ending up feeling quite good?

In sum, the simulator takes you out of the present moment and sets you chasing after carrots that aren't really so great while ignoring more important rewards (such as contentment and inner peace). Its mini-movies are full of limiting beliefs. Besides reinforcing painful emotions, they have you ducking sticks that never actually come your way or aren't really all that bad. And the simulator does this hour after hour, day after day, even in your dreams—steadily building neural structure, much of which adds to your suffering.

## **Self-Compassion**

Each person suffers sometimes, and many people suffer a lot. Compassion is a natural response to suffering, including your own. Self-compassion isn't self-pity, but is simply warmth, concern, and good wishes—just like compassion for another person. Because self-compassion is more emotional than self-esteem, it's actually more powerful for reducing the impact of difficult conditions, preserving self-worth, and building resilience (Leary et al. 2007). It also opens your heart, since when you're closed to your own suffering, it's hard to be receptive to suffering in others.

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*The root of compassion is compassion for oneself.*  
—Pema Chödrön

In addition to the everyday suffering of life, the path of awakening itself contains difficult experiences which also call for compassion. To become happier, wiser, and more loving, sometimes you have to swim against ancient currents within your nervous system. For example, in some ways the three pillars of practice are unnatural: virtue restrains emotional reactions that worked well on the Serengeti, mindfulness decreases external vigilance, and wisdom cuts through beliefs that once helped us survive. It goes against the evolutionary template to undo the causes of suffering, to feel one with all things, to flow with the changing moment, and to remain unmoved by pleasant and unpleasant alike. Of course, that doesn't mean we shouldn't do it! It just means we should understand what we're up against and have some compassion for ourselves.

To nurture self-compassion and strengthen its neural circuits:

- Recall being with someone who really loves you—the feeling of receiving caring activates the deep attachment system circuitry in your brain, priming it to give compassion.
- Bring to mind someone you naturally feel compassion for, such as a child or a person you love—this easy flow of compassion arouses its neural underpinnings (including oxytocin, the *insula* [which senses the internal state of your body], and the PFC), “warming them up” for self-compassion.
- Extend this same compassion to yourself—be aware of your own suffering and extend concern and good wishes toward yourself; sense compassion sifting down into raw places inside, falling like a gentle rain that touches everything. The actions related to a feeling strengthen it (Niedenthal 2007), so place your palm on your cheek or heart with the tenderness and warmth you'd give a hurt child. Say phrases in your mind such as *May I be happy again. May the pain of this moment pass.*
- Overall, open to the sense that you are receiving compassion—deep down in your brain, the actual source of good feelings doesn't matter

much; whether the compassion is from you or from another person, let your sense of being soothed and cared for sink in.

## **chapter 2: Key Points**

- Three fundamental strategies have evolved to help us pass on our genes: creating separations, stabilizing systems, and approaching opportunities while avoiding threats.
- Although these strategies are very effective for survival, they also make you suffer.
- The effort to maintain separations is at odds with the myriad ways you're actually connected with the world and dependent upon it. As a result, you may feel subtly isolated, alienated, overwhelmed, or as if you're in a struggle with the world.
- When the systems within your body, mind, and relationships become unstable, your brain produces uncomfortable signals of threat. Since everything keeps changing, these signals keep coming.
- Your brain colors your experiences with a feeling tone—pleasant, unpleasant, or neutral—so you'll approach what's pleasant, avoid what's unpleasant, and move on from what's neutral.
- In particular, we evolved to pay great attention to unpleasant experiences. This negativity bias overlooks good news, highlights bad news, and creates anxiety and pessimism.
- The brain has a wonderful capacity to simulate experiences, but there's a price: the simulator pulls you out of the moment, plus it sets you chasing pleasures that aren't that great and resisting pains that are exaggerated or not even real.
- Compassion for yourself helps reduce your suffering.

## chapter 3

# The First and Second Dart

*Ultimately, happiness comes down to choosing between the discomfort of becoming aware of your mental afflictions and the discomfort of being ruled by them.*

—Yongey Mingyur Rinpoche

Some physical discomfort is unavoidable; it's a crucial signal to take action to protect life and limb, like the pain that makes you pull your hand back from a hot stove. Some mental discomfort is inevitable, too. For example, as we evolved, growing emotional investments in children and other members of the band motivated our ancestors to keep those carriers of their genes alive; understandably, then, we feel distress when dear ones are threatened and sorrow when they are harmed. We also evolved to care greatly about our place in the band and in the hearts of others, so it's normal to feel hurt if you're rejected or scorned.

To borrow an expression from the Buddha, inescapable physical or mental discomfort is the “first dart” of existence. As long as you live and love, some of those darts will come your way.

## **The Darts We Throw Ourselves**

First darts are unpleasant to be sure. But then we add our *reactions* to them. These reactions are “second darts”—the ones we throw ourselves. Most of our suffering comes from second darts.

Suppose you're walking through a dark room at night and stub your toe on a chair; right after the first dart of pain comes a second dart of anger: “Who moved that darn chair?!” Or maybe a loved one is cold to you when you're hoping for some caring; in addition to the natural drop in the pit of your



stomach (first dart), you might feel unwanted (second dart) as a result of having been ignored as a child.

Second darts often trigger more second darts through associative neural networks: you might feel guilt about your anger that someone moved the chair, or sadness that you feel hurt yet again by someone you love. In relationships, second darts create vicious cycles: your second-dart reactions trigger reactions from the other person, which set off more second darts from you, and so on.

Remarkably, most of our second-dart reactions occur when there is in fact no first dart anywhere to be found—when there’s no pain inherent in the conditions we’re reacting to. We *add* suffering to them. For example, sometimes I’ll come home from work and the house will be a mess, with the kids’ stuff all over. That’s the condition. Is there a first dart *in* the coats and shoes on the sofa or the clutter covering the counter? No, there isn’t; no one dropped a brick on me or hurt my children. Do I *have* to get upset? Not really. I could ignore the stuff, pick it up calmly, or talk with them about it. Sometimes I manage to handle it that way. But if I don’t, then the second darts start landing, tipped with the Three Poisons: greed makes me rigid about how I want things to be, hatred gets me all bothered and angry, and delusion tricks me into taking the situation personally.

Saddest of all, some second-dart reactions are to conditions that are actually *positive*. If someone pays you a compliment, that’s a positive situation. But then you might start thinking, with some nervousness and even a little shame: *Oh, I’m not really that good a person. Maybe they’ll find out I’m a fraud.* Right there, needless second-dart suffering begins.

## Heating Up

Suffering is not abstract or conceptual. It’s *embodied*: you feel it in your body, and it proceeds through bodily mechanisms. Understanding the physical machinery of suffering will help you see it increasingly as an impersonal condition—unpleasant to be sure, but not worth getting upset about, which would just bring more second darts.

Suffering cascades through your body via the sympathetic nervous system (SNS) and the *hypothalamic-pituitary-adrenal axis* (HPAA) of the endocrine

(hormonal) system. Let's unscramble this alphabet soup to see how it all works. While the SNS and HPAA are anatomically distinct, they are so intertwined that they're best described together, as an integrated system. And we'll focus on reactions dominated by an aversion to sticks (e.g., fear, anger) rather than a grasping for carrots, since aversive reactions usually have a bigger impact due to the negativity bias of the brain.

## **Alarms Go Off**

Something happens. It might be a car suddenly cutting you off, a put-down from a coworker, or even just a worrisome thought. Social and emotional conditions can pack a wallop like physical ones since psychological pain draws on many of the same neural networks as physical pain (Eisenberger and Lieberman 2004); this is why getting rejected can feel as bad as a root canal. Even just anticipating a challenging event—such as giving a talk next week—can have as much impact as living through it for real. Whatever the source of the threat, the amygdala sounds the alarm, setting off several reactions:

- The *thalamus*—the relay station in the middle of your head—sends a “Wake up!” signal to your brain stem, which in turn releases stimulating norepinephrine throughout your brain.
- The SNS sends signals to the major organs and muscle groups in your body, readying them for fighting or fleeing.
- The hypothalamus—the brain's primary regulator of the endocrine system—prompts the pituitary gland to signal the adrenal glands to release the “stress hormones” *epinephrine (adrenaline)* and *cortisol*.

## **Ready for Action**

Within a second or two of the initial alarm, your brain is on red alert, your SNS is lit up like a Christmas tree, and stress hormones are washing through your blood. In other words, you're at least a little upset. What's going on in your body?

Epinephrine increases your heart rate (so your heart can move more blood) and dilates your pupils (so your eyes gather more light). Norepinephrine

shunts blood to large muscle groups. Meanwhile, the bronchioles of your lungs dilate for increased gas exchange—enabling you to hit harder or run faster.

Cortisol suppresses the immune system to reduce inflammation from wounds. It also revs up stress reactions in two circular ways: First, it causes the brain stem to stimulate the amygdala further, which increases amygdala activation of the SNS/HPAA system—which produces more cortisol. Second, cortisol suppresses hippocampal activity (which normally inhibits the amygdala); this takes the brakes off the amygdala, leading to yet more cortisol.

Reproduction is sidelined—no time for sex when you’re running for cover. The same for digestion: salivation decreases and peristalsis slows down, so your mouth feels dry and you become constipated.

Your emotions intensify, organizing and mobilizing the whole brain for action. SNS/HPAA arousal stimulates the amygdala, which is hardwired to focus on negative information and react intensely to it. Consequently, feeling stressed sets you up for fear and anger.

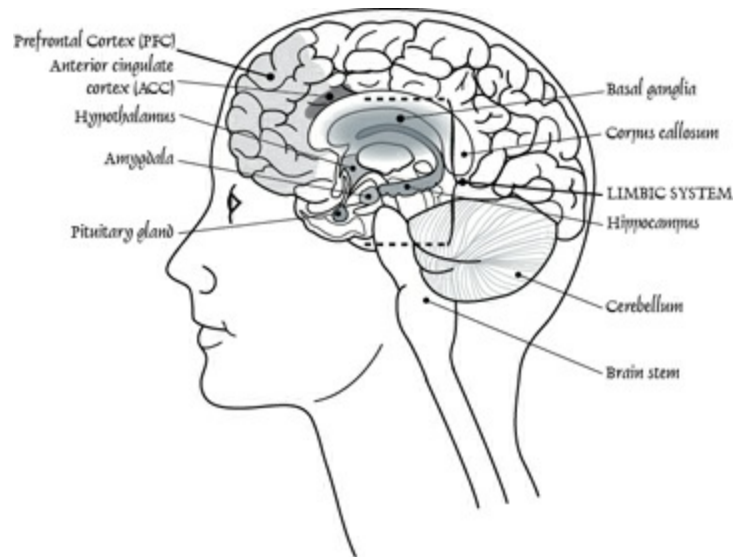
As limbic and endocrine activation increases, the relative strength of executive control from the PFC declines. It’s like being in a car with a runaway accelerator: the driver has less control over her vehicle. Further, the PFC is also affected by SNS/HPAA arousal, which pushes appraisals, attributions of others’ intentions, and priorities in a negative direction: now the driver of the careening car thinks everybody else is an idiot. For example, consider the difference between your take on a situation when you’re upset and your thoughts about it later when you’re calmer.

In the harsh physical and social environments in which we evolved, this activation of multiple bodily systems helped our ancestors survive. But what’s the cost of this today, with the chronic low-grade stresses of modern life?

## **Key Parts of Your Brain**

Each of these parts of your brain does many things; the functions listed here are those relevant to this book.

Figure 6: Key Parts of Your Brain



- **Prefrontal cortex (PFC)**—sets goals, makes plans, directs action; shapes emotions, in part by guiding and sometimes inhibiting the limbic system
- **Anterior (frontal) cingulate cortex (ACC)**—steadies attention and monitors plans; helps integrate thinking and feeling (Yamasaki, LaBar, and McCarthy 2002); a “cingulate” is a curved bundle of nerve fibers
- **Insula**—senses the internal state of your body, including gut feelings; helps you be empathic; located on the inside of the temporal lobes on each side of your head (temporal lobes and insula not shown in figure 6)
- **Thalamus**—the major relay station for sensory information
- **Brain stem**—sends neuromodulators such as serotonin and dopamine to the rest of the brain
- **Corpus callosum**—passes information between the two hemispheres of the brain
- **Cerebellum**—regulates movement
- **Limbic system**—central to emotion and motivation; includes the basal ganglia, hippocampus, amygdala, hypothalamus, and pituitary gland; sometimes also considered to include parts of the cortex (e.g., cingulate, insula), but for simplicity we will define it anatomically in

terms of subcortical structures; many parts of the brain besides the limbic system are involved with emotion

- **Basal ganglia**—involved with rewards, stimulation seeking, and movement; “ganglia” are masses of tissue
- **Hippocampus**—forms new memories; detects threats
- **Amygdala**—a kind of “alarm bell” that responds particularly to emotionally charged or negative stimuli (Rasia-Filho, Londero, and Achaval 2000)
- **Hypothalamus**—regulates primal drives such as hunger and sex; makes oxytocin; activates the pituitary gland
- **Pituitary gland**—makes endorphins; triggers stress hormones; stores and releases oxytocin

## **Life on Simmer**

Getting fired up for good reason—such as becoming passionate and enthusiastic, handling emergencies, or being forceful for a good cause—definitely has its place in life. But second darts are a bad reason to light up the SNS/HPAA system, and if they become routine, they can push the needle on your personal stress meter into the red zone. Further, apart from your individual situation, we live in a pedal-to-the-metal society that relies on nonstop SNS/HPAA activation; unfortunately, this is completely unnatural in terms of our evolutionary template.

For all of these reasons, most of us experience ongoing SNS/HPAA arousal. Even if your pot isn’t boiling over, just simmering along with second-dart activation is quite unhealthy. It continually shunts resources away from long-term projects—such as building a strong immune system or preserving a good mood—in favor of short-term crises. And this has lasting consequences.

## **Physical Consequences**

In our evolutionary past, when most people died by forty or so, the short-term benefits of SNS/HPAA activation outweighed its long-term costs. But for people today who are interested in living well during their forties and

beyond, the accumulating damage of an overheated life is a real concern. For example, chronic SNS/HPAA stimulation disturbs these systems and increases risks for the health problems listed (Licinio, Gold, and Wong 1995; Sapolsky 1998; Wolf 1995):

- **Gastrointestinal**—ulcers, colitis, irritable bowel syndrome, diarrhea, and constipation
- **Immune**—more frequent colds and flus, slower wound healing, greater vulnerability to serious infections
- **Cardiovascular**—hardening of the arteries, heart attacks
- **Endocrine**—type II diabetes, premenstrual syndrome, erectile dysfunction, lowered libido

## Mental Consequences

For all their effects on the body, second darts usually have their greatest impact on psychological well-being. Let's see how they work in your brain to raise anxiety and lower mood.

### ANXIETY

Repeated SNS/HPAA activity makes the amygdala more reactive to apparent threats, which in turn increases SNS/HPAA activation, which sensitizes the amygdala further. The mental correlate of this physical process is an increasingly rapid arousal of *state anxiety* (anxiety based on specific situations). Additionally, the amygdala helps form *implicit memories* (traces of past experiences that exist beneath conscious awareness); as it becomes more sensitized, it increasingly shades those residues with fear, thus intensifying *trait anxiety* (ongoing anxiety regardless of the situation).

Meanwhile, frequent SNS/HPAA activation wears down the hippocampus, which is vital for forming *explicit memories*—clear records of what actually happened. Cortisol and related glucocorticoid hormones both weaken existing synaptic connections in the hippocampus and inhibit the formation of new ones. Further, the hippocampus is one of the few regions in the human brain that can actually grow new neurons—yet glucocorticoids prevent the birth of neurons in the hippocampus, impairing its ability to produce new memories.

It's a bad combination for the amygdala to be oversensitized while the hippocampus is compromised: painful experiences can then be recorded in implicit memory—with all the distortions and turbo-charging of an amygdala on overdrive—without an accurate explicit memory of them. This might feel like: *Something happened, I'm not sure what, but I'm really upset*. This may help explain why victims of trauma can feel dissociated from the awful things they experienced, yet be very reactive to any trigger that reminds them unconsciously of what once occurred. In less extreme situations, the one-two punch of a revved-up amygdala and a weakened hippocampus can lead to feeling a little upset a lot of the time without exactly knowing why.

### **DEPRESSED MOOD**

Routine SNS/HPAA activation undermines the biochemical basis of an even-keeled—let alone cheerful—disposition in a number of ways:

- Norepinephrine helps you feel alert and mentally energetic, but glucocorticoid hormones deplete it. Reduced norepinephrine may cause you to feel flat—even apathetic—with poor concentration; these are classic symptoms of depression.
- Over time, glucocorticoids lower the production of dopamine. This leads to a loss of enjoyment of activities once found pleasurable: another classic criterion for depression.
- Stress reduces serotonin, probably the most important neurotransmitter for maintaining a good mood. When serotonin drops, so does norepinephrine, which has already been diminished by glucocorticoids. In short, less serotonin means more vulnerability to a blue mood and less alert interest in the world.

### **An Intimate Process**

Of course, our experience of these physiological processes is very intimate. When I'm upset, I sure don't think about all of these biochemical details. But having a general idea of them in the back of my mind helps me appreciate the sheer physicality of a second dart cascade, its impersonal nature and dependence on preceding causes, and its impermanence.

This understanding is hopeful and motivating. Suffering has clear causes in your brain and body, so if you change its causes, you'll suffer a lot less. And you *can* change those causes. From this point on, we're going to focus on how to do just that.

## **The Parasympathetic Nervous System**

So far, we've examined how reactions powered by greed and hatred—especially the latter—ripple through your brain and body, shaped by the sympathetic nervous system. But the SNS is just one of the three wings of the *autonomic nervous system* (ANS), which operates mostly below the level of consciousness to regulate many bodily systems and their responses to changing conditions. The other two wings of the ANS are the *parasympathetic nervous system* (PNS) and the *enteric nervous system* (which regulates your gastrointestinal system). Let's focus on the PNS and SNS as they play crucial roles in your suffering—and its end.

The PNS conserves energy in your body and is responsible for ongoing, steady-state activity. It produces a feeling of relaxation, often with a sense of contentment—this is why it's sometimes called the “rest-and-digest” system, in contrast to the “fight-or-flight” SNS. These two wings of the ANS are connected like a seesaw: when one goes up, the other one goes down.

Parasympathetic activation is the normal resting state of your body, brain, and mind. If your SNS were surgically disconnected, you'd stay alive (though you wouldn't be very useful in an emergency). If your PNS were disconnected, however, you'd stop breathing and soon die. Sympathetic activation is a *change* to the baseline of PNS equilibrium in order to respond to a threat or an opportunity. The cooling, steadying influence of the PNS helps you think clearly and avoid hot-headed actions that would harm you or others. The PNS also quiets the mind and fosters tranquility, which supports contemplative insight.

## **The Big Picture**

The PNS and SNS evolved hand in hand in order to keep animals—including humans—alive in potentially lethal environments. We need both of them.



For example, take five breaths, inhaling and exhaling a little more fully than usual. This is both energizing and relaxing, activating first the sympathetic system and then the parasympathetic one, back and forth, in a gentle rhythm. Notice how you feel when you're done. That combination of aliveness and centeredness is the essence of the peak performance zone recognized by athletes, businesspeople, artists, lovers, and meditators. It's the result of the SNS and PNS, the gas pedal and the brakes, working in harmony together.

Happiness, love, and wisdom aren't furthered by shutting down the SNS, but rather by keeping the autonomic nervous system as a whole in an optimal state of balance:

- Mainly parasympathetic arousal for a baseline of ease and peacefulness
- Mild SNS activation for enthusiasm, vitality, and wholesome passions
- Occasional SNS spikes to deal with demanding situations, from a great opportunity at work to a late-night call from a teenager who needs a ride home from a party gone bad

This is your best-odds prescription for a long, productive, happy life. Of course, it takes practice.

## **A Path of Practice**

As the saying goes, pain is inevitable but suffering is optional. If you can simply stay present with whatever is arising in awareness—whether it's a first dart or a second one—without reacting further, then you will break the chain of suffering right there. Over time, through training and shaping your mind and brain, you can even change what arises, increasing what's positive and decreasing what's negative. In the meantime, you can rest in and be nourished by a growing sense of the peace and clarity in your true nature.

These three processes—*being with* whatever arises, *working with* the tendencies of mind to transform them, and *taking refuge* in the ground of being—are the essential practices of the path of awakening. In many ways they correspond, respectively, to mindfulness, virtue, and wisdom—and to the three fundamental neural functions of learning, regulating, and selecting.

As you deal with different issues on your path of awakening, you'll repeatedly encounter these stages of growth:

- *Stage one*—you're caught in a second-dart reaction and don't even realize it: your partner forgets to bring milk home and you complain angrily without seeing that your reaction is over the top.
- *Stage two*—you realize you've been hijacked by greed or hatred (in the broadest sense), but cannot help yourself: internally you're squirming, but you can't stop grumbling bitterly about the milk.
- *Stage three*—some aspect of the reaction arises, but you don't act it out: you feel irritated but remind yourself that your partner does a lot for you already and getting cranky will just make things worse.
- *Stage four*—the reaction doesn't even come up, and sometimes you forget you ever had the issue: you understand that there's no milk, and you calmly figure out what to do now with your partner.

In education, these are known succinctly as unconscious incompetence, conscious incompetence, conscious competence, and unconscious competence. They're useful labels for knowing where you are with a given issue. The second stage is the hardest one, and often where we want to quit. So it's important to keep aiming for the third and fourth stages—just keep at it and you'll definitely get there!

It takes effort and time to clear old structures and build new ones. I call this *the law of little things*: although little moments of greed, hatred, and delusion have left residues of suffering in your mind and brain, lots of little moments of practice will replace these Three Poisons and the suffering they cause with happiness, love, and wisdom.

We've covered a lot of ground and have seen a lot about the evolutionary origins and neural causes of suffering. Now, in the rest of this book, let's see how to end it.

### **chapter 3: Key Points**

- Some physical and mental discomforts are unavoidable. These are the “first darts” of life.
- When we react to a first dart with one or more of the Three Poisons of

greed, hatred, and delusion (broadly defined)—each one of which has craving at its center—we start throwing second darts at ourselves and others. In fact, we often toss second darts even when no first dart is to be found. Most poignantly, we sometimes throw second darts as a reaction to situations that are actually good, such as receiving a compliment.

- Suffering is deeply embodied. Physical reactions involving your sympathetic nervous system (SNS) and hypothalamic-pituitary-adrenal axis (HPAA) cause suffering to snowball throughout your body.
- Most people experience chronic second-dart cascades, with numerous negative consequences for their physical and mental health.
- The rest-and-digest parasympathetic nervous system (PNS) calms down SNS/HPAA activation.
- The best-odds prescription for a long, good life is a baseline of mainly PNS arousal with mild SNS activation for vitality, combined with occasional SNS spikes for major opportunities or threats.
- Being with whatever arises, working with the tendencies of mind to transform them, and taking refuge in the ground of being are the essential practices of the path of awakening. In many ways, these practices correspond, respectively, to mindfulness, virtue, and wisdom.
- On the path of awakening, keep going! Lots of little moments of practice will gradually and truly increase your contentment, kindness, and insight.

PART TWO  
HAPPINESS

## chapter 4

# Taking in the Good

*I am larger, better than I thought, I did not know I held so much goodness.*

—Walt Whitman, “Song of the Open Road”

Much as your body is built from the foods you eat, your mind is built from the experiences you have. The flow of experience gradually sculpts your brain, thus shaping your mind. Some of the results can be explicitly recalled: *This is what I did last summer; that is how I felt when I was in love.* But most of the shaping of your mind remains forever unconscious. This is called implicit memory, and it includes your expectations, models of relationships, emotional tendencies, and general outlook. Implicit memory establishes the interior landscape of your mind—what it feels like to be you—based on the slowly accumulating residues of lived experience.

In a sense, those residues can be sorted into two piles: those that benefit you and others, and those that cause harm. To paraphrase the Wise Effort section of Buddhism’s Noble Eightfold Path, you should create, preserve, and increase beneficial implicit memories, and prevent, eliminate, or decrease harmful ones.

### **The Negativity Bias of Memory**

But here’s the problem: your brain preferentially scans for, registers, stores, recalls, and reacts to unpleasant experiences; as we’ve said, it’s like Velcro for negative experiences and Teflon for positive ones. Consequently, even when positive experiences outnumber negative ones, the pile of negative implicit memories naturally grows faster. Then the background feeling of what it feels like to be you can become undeservedly glum and pessimistic.

Sure, negative experiences do have benefits: loss opens the heart, remorse

provides a moral compass, anxiety alerts you to threats, and anger spotlights wrongs that should be righted. But do you really think you're not having enough negative experiences?! Emotional pain with no benefit to yourself or others is pointless suffering. And pain today breeds more pain tomorrow. For instance, even a single episode of major depression can reshape circuits of the brain to make future episodes more likely (Maletic et al. 2007).

The remedy is not to suppress negative experiences; when they happen, they happen. Rather, it is to foster positive experiences—and in particular, to take them in so they become a permanent part of you.

## **Internalizing the Positive**

Here's how, in three steps:

1. Turn positive facts into positive *experiences*. Good things keep happening all around us, but much of the time we don't notice them; even when we do, we often hardly feel them. Someone is nice to you, you see an admirable quality in yourself, a flower is blooming, you finish a difficult project—and it all just rolls by. Instead, actively look for good news, particularly the little stuff of daily life: the faces of children, the smell of an orange, a memory from a happy vacation, a minor success at work, and so on. Whatever positive facts you find, bring a mindful awareness to them—open up to them and let them affect you. It's like sitting down to a banquet: don't just look at it—dig in!
2. Savor the experience. It's delicious! Make it last by staying with it for 5, 10, even 20 seconds; don't let your attention skitter off to something else. The longer that something is held in awareness and the more emotionally stimulating it is, the more neurons that fire and thus wire together, and the stronger the trace in memory (Lewis 2005).

Focus on your emotions and body sensations, since these are the essence of implicit memory. Let the experience fill your body and be as intense as possible. For example, if someone is good to you, let the feeling of being cared about bring warmth to your whole chest.

Pay particular attention to the rewarding aspects of the experience—for example, how good it feels to get a great big hug from someone you love. Focusing on these rewards increases dopamine release, which makes it easier to keep giving the experience your attention, and strengthens its neural associations in implicit memory. You're not doing this to cling to the rewards—which would eventually make you suffer—but rather to internalize them so that you carry them inside you and don't need to reach for them in the outer world.

You can also intensify an experience by deliberately enriching it. For example, if you are savoring a relationship experience, you could call up other feelings of being loved by others, which will help stimulate oxytocin—the “bonding hormone”—and thus deepen your sense of connection. Or you could strengthen your feelings of satisfaction after completing a demanding project by thinking about some of the challenges you had to overcome.

3. Imagine or feel that the experience is entering deeply into your mind and body, like the sun's warmth into a T-shirt, water into a sponge, or a jewel placed in a treasure chest in your heart. Keep relaxing your body and absorbing the emotions, sensations, and thoughts of the experience.

## **Healing Pain**

Positive experiences can also be used to soothe, balance, and even replace negative ones. When two things are held in mind at the same time, they start to connect with each other. That's one reason why talking about hard things with someone who's supportive can be so healing: painful feelings and memories get infused with the comfort, encouragement, and closeness you experience with the other person.

## **Using the Machinery of Memory**

These mental minglings draw on the neural machinery of memory. When a memory—whether implicit or explicit—is made, only its key features are stored, not every single detail. Otherwise, your brain would become so

crowded that it wouldn't have space to learn anything new. For example, remember an experience, even a recent one, and notice how schematic your recollection is, with the main features sketched in but many details left out.

When your brain retrieves a memory, it does not do it like a computer does, which calls up a complete record of what's on its hard drive (e.g., document, picture, song). Your brain rebuilds implicit and explicit memories from their key features, drawing on its simulating capacities to fill in missing details. While this is more work, it's also a more efficient use of neural real estate—this way complete records don't need to be stored. And your brain is so fast that you don't notice the regeneration of each memory.

This rebuilding process gives you the opportunity, right down in the micro-circuitry of your brain, to gradually shift the emotional shadings of your interior landscape. When a memory is activated, a large-scale assembly of neurons and synapses forms an emergent pattern. If other things are in your mind at the same time—and particularly if they're strongly pleasant or unpleasant—your amygdala and hippocampus will automatically associate them with that neural pattern (Pare, Collins, and Pelletier 2002). Then, when the memory leaves awareness, it will be reconsolidated in storage *along with those other associations*.

The next time the memory is activated, it will tend to bring those associations with it. Thus, if you repeatedly bring to mind negative feelings and thoughts while a memory is active, then that memory will be increasingly shaded in a negative direction. For example, recalling an old failure while simultaneously lambasting yourself will make that failure seem increasingly awful. On the other hand, if you call up positive emotions and perspectives while implicit or explicit memories are active, these wholesome influences will slowly be woven into the fabric of those memories.

Every time you do this—every time you sift positive feelings and views into painful, limiting states of mind—you build a little bit of neural structure. Over time, the accumulating impact of this positive material will literally, synapse by synapse, change your brain.

## **Lifelong Learning**

- Neural circuits started forming before you were born, and your brain



will keep learning and changing up to your very last breath.

- Humans have the longest childhood of any animal on the planet. Since children are very vulnerable in the wild, there must have been a large evolutionary payoff in giving the brain an extended period of intense development. Of course, learning continues after childhood; we continually acquire new skills and knowledge all the way into old age. (After he turned 90, my dad made my jaw drop with an article in which he calculated the best odds for different bids in bridge; there are lots of similar examples.)
- The brain's capacity to learn—and thus change itself—is called *neuroplasticity*. Usually, the results are tiny, incremental alternations in neural structure that add up as the years go by. Occasionally, the results are dramatic—for example, in blind people, some occipital regions designed for visual processing can be rezoned for auditory functions (Begley 2007).
- Mental activity shapes neural structure in a variety of ways:
  - 
  - Neurons that are particularly active become even more responsive to input.
  - Busy neural networks receive increased blood flow, which supplies them with more glucose and oxygen.
  - When neurons fire together—within a few milliseconds of each other—they strengthen their existing synapses and form new ones; this is how they “wire” together (Tanaka et al. 2008).
  - Inactive synapses wither away through *neuronal pruning*, a kind of survival of the fittest: use it or lose it. A toddler has about three times as many synapses as an adult; on the way to adulthood, adolescents can lose up to 10,000 synapses per second in the prefrontal cortex (PFC) (Spear 2000).
  - Brand new neurons grow in the hippocampus; this *neurogenesis* increases the openness of memory networks to new learning (Gould et al. 1999).
- Emotional arousal facilitates learning by increasing neural excitation and consolidating synaptic change (Lewis 2005).

Because of all the ways your brain changes its structure, your experience

*matters* beyond its momentary, subjective impact. It makes enduring changes in the physical tissues of your brain which affect your well-being, functioning, and relationships. Based on science, this is a fundamental reason for being kind to yourself, cultivating wholesome experiences, and taking them in.

## **Pulling Weeds and Planting Flowers**

To gradually replace negative implicit memories with positive ones, just make the positive aspects of your experience prominent and relatively intense in the foreground of your awareness while simultaneously placing the negative material in the background. Imagine that the positive contents of your awareness are sinking down into old wounds, soothing chafed and bruised places like a warm golden salve, filling up hollows, slowly replacing negative feelings and beliefs with positive ones.

The negative mental material you're working with could be from adulthood, including current experiences. But it's often important to address explicit and implicit memories from your childhood, since these are usually the taproots of the things that keep upsetting you. People sometimes get angry with themselves about still being affected by things from the past. But remember: the brain is designed to change through experiences, especially negative ones; we learn from our experiences, particularly those that happened during childhood, and it is natural for that learning to stick with us.

Growing up, I used to weed dandelions in our front yard, and they'd always grow back if I didn't pull out their entire root. Upsets are like that, too. So sense down into the youngest, most vulnerable, most emotionally charged layers of your mind, and feel around for the tip of the root of whatever is bothering you. With a little practice and self-understanding, you'll develop a short list of "usual suspects"—the deep sources of your recurring upsets—and you'll start routinely considering them if you feel irritated, anxious, hurt, or inadequate. These deep sources might include feeling unwanted by others due to being unpopular in school, a sense of helplessness from a chronic illness, or mistrust of intimacy following a bad divorce. When you find the tip of the root, take in the good that will gradually dislodge its hold upon you. You'll be pulling weeds and planting flowers in the garden of your mind.

Painful experiences are often best healed by positive ones that are their opposite—for example, replacing childhood feelings of being weak with a current sense of strength. If sadness from mistreatment in an old relationship keeps coming up, recall being loved by other people, and let those feelings sink in. Add the power of language by saying something like this to yourself: *I got through all that, I'm still here, and many people love me.* You won't forget what happened, but its emotional charge will steadily diminish.

The point is not to resist painful experiences or grasp at pleasant ones: that's a kind of craving—and craving leads to suffering. The art is to find a balance in which you remain mindful, accepting, and curious regarding difficult experiences—while also taking in supportive feelings and thoughts.

In sum, infuse positive material into negative material in these two ways:

- When you have a positive experience today, help it sink in to old pains.
- When negative material arises, bring to mind the positive emotions and perspectives that will be its antidote.

Whenever you use one of these methods, try to feel and take in related positive experiences at least a couple more times within the following hour. There's evidence that negative memory—both explicit and implicit—is especially vulnerable to change soon after it's been recalled (Monfils et al. 2009).

If you're feeling ambitious, do something additional: take small risks and do things that reason tells you are fine but worry wants you to avoid—such as being more open about your true feelings, asking directly for love, or reaching higher in your career. When the results turn out to be good—as they most likely will—take them in and slowly but surely clear out those old fears.

Most of the time, taking in the good takes less than a minute—often, just a few seconds. It's a private act. No one needs to know you're doing it. But over time, you really can build new, positive structures in your brain.

## **Why It's Good to Take in the Good**

Given the negativity bias of the brain, it takes an *active* effort to internalize

positive experiences and heal negative ones. When you tilt toward what's positive, you're actually righting a neurological imbalance. And you're giving yourself today the caring and encouragement you should have received as a child, but perhaps didn't get in full measure.

Focusing on what is wholesome and then taking it in naturally increases the positive emotions flowing through your mind each day. Emotions have global effects since they organize the brain as a whole. Consequently, positive feelings have far-reaching benefits, including a stronger immune system (Frederickson 2000) and a cardiovascular system that is less reactive to stress (Frederickson and Levenson 1998). They lift your mood; increase optimism, resilience, and resourcefulness; and help counteract the effects of painful experiences, including trauma (Frederickson 2001; Frederickson et al. 2000). It's a positive cycle: good feelings today increase the likelihood of good feelings tomorrow.

These benefits apply to children as well. In particular, taking in the good has a special payoff for kids at either the spirited or the anxious end of the temperament spectrum. Spirited children usually zip along to the next thing before good feelings have a chance to consolidate in the brain, and anxious children tend to ignore or downplay good news. (And some kids are both spirited and anxious.) Whatever their temperament, if children are part of your life, encourage them to pause for a moment at the end of the day (or at any other natural interval, such as the last minute before the school bell) to remember what went well and think about things that make them happy (e.g., a pet, their parents' love, a goal scored in soccer). Then have those positive feelings and thoughts sink in.

In terms of spiritual practice, taking in the good highlights key states of mind, such as kindness and inner peace, so you can find your way back to them again. It is rewarding, and this helps keep you on the path of awakening, which does sometimes feel like an uphill slog. It builds conviction and faith by showing you the results of your efforts. It nourishes wholeheartedness through its emphasis on positive, heartfelt emotions—and when your own heart is full, you have more to offer to others.

Taking in the good is not about putting a happy shiny face on everything, nor is it about turning away from the hard things in life. It's about nourishing well-being, contentment, and peace inside that are refuges you can always come from and return to.

## chapter 4: Key Points

- Explicit memories are conscious recollections of specific events or other information. Implicit memories are residues of past experiences that largely remain below awareness but powerfully shape the inner landscape and atmosphere of your mind.
- Unfortunately, the bias of the brain tilts implicit memories in a negative direction, even when most of your experiences are actually positive.
- The first remedy is to consciously look for and take in positive experiences. There are three simple steps: turn positive facts into positive experiences, savor these experiences, and sense them sinking in.
- When experiences are consolidated in memory, they take with them whatever else is also in awareness, especially if it is intense. You can use this mechanism to infuse positive material into negative material; this is the second remedy. Simply have a positive experience be prominent in awareness while the painful one is sensed dimly in the background. Use this method in two ways: when you have a positive experience, help it sink into, soothe, and replace old pains; when negative material arises, bring to mind emotions and perspectives that are its antidote.
- Become aware of the deep roots of recurring upsets; the tips of these roots are typically lodged in childhood experiences; different upsets may have different roots. Deliberately direct positive experiences toward these roots in order to pull them out completely and stop them from growing back.
- Every time you take in the good, you build a little bit of neural structure. Doing this a few times a day—for months and even years—will gradually change your brain, and how you feel and act, in far-reaching ways.
- It's good to take in the good. It builds up positive emotions, with many benefits for your physical and mental health. It's a great resource for children, especially spirited or anxious ones. And it aids spiritual practice by supporting motivation, conviction, and wholeheartedness.

## chapter 5

# Cooling the Fires

*Indeed, the sage who's fully quenched  
Rests at ease in every way;  
No sense desire adheres to him  
Whose fires have cooled, deprived of fuel.*

*All attachments have been severed,  
The heart's been led away from pain;  
Tranquil, he rests with utmost ease.  
The mind has found its way to peace.  
The Buddha (Cullavagga 6:4.4)*

As we've seen, your sympathetic nervous system (SNS) and stress-related hormones "fire up" to help you pursue opportunities and avoid threats. While there's certainly a place for healthy passion and for strong stands against things that are harmful, most of the time we're just overheated—caught up with some carrot or struggling with some stick. Then we feel driven, rattled, stressed, irritated, anxious, or blue. Definitely not happy. We need to lower the flames. This chapter will cover many ways to do just that.

If your body had a fire department, it would be the parasympathetic nervous system (PNS), so that's where we'll start.

## **Activating the Parasympathetic Nervous System**

Your body has numerous major systems, including the endocrine (hormone), cardiovascular, immune, gastrointestinal, and nervous systems. If you want to use the mind-body connection to lower your stress, cool the fires, and improve your long-term health, what's the optimal point of entry into all of

these systems? It's the autonomic nervous system (ANS).

This is because the ANS—which is part of the larger nervous system—is intertwined with and helps regulate every other system. And mental activity has greater direct influence over the ANS than any other bodily system. When you stimulate the parasympathetic wing of the ANS, calming, soothing, healing ripples spread through your body, brain, and mind.

Let's explore a variety of ways to light up the PNS.

## **Relaxation**

Relaxing engages the circuitry of the PNS and thus strengthens it. Relaxing also quiets the fight-or-flight sympathetic nervous system, since relaxed muscles send feedback to the alarm centers in the brain that all is well. When you're very relaxed, it's hard to feel stressed or upset (Benson 2000). In fact, the relaxation response may actually alter how your genes are expressed, and thus reduce the cellular damage of chronic stress (Dusek et al. 2008).

You can reap the benefits of relaxation not only by initiating it in specific, stressful situations, but also by training your body “offline” to relax automatically; the methods that follow can be used in either way. First, here are four quick ones:

- Relax your tongue, eyes, and jaw muscles.
- Feel tension draining out of your body and sinking down into the earth.
- Run warm water over your hands.
- Scan your body for areas that are tense, and relax them.

## **DIAPHRAGM BREATHING**

The next method—diaphragm breathing—takes a minute or two. The diaphragm is the muscle beneath your lungs that helps you breathe; actively working it is particularly effective for reducing anxiety.

Place your hand on your stomach a couple of inches beneath the upside-down V at the center of your rib cage. Look down, breathe normally, and watch your hand. You'll probably see it move only a little bit, and sort of up and down.

Leaving your hand in place, now breathe in such a way that your hand moves out and back, perpendicular to your chest. Try to breathe into your hand with real oomph, so that it travels back and forth half an inch or more with each breath.

This can take some practice, but keep at it and you'll get it. Next, try diaphragm breathing without your hand so you can use this method, if you like, in public settings.

## **PROGRESSIVE RELAXATION**

If you have three to ten minutes, try progressive relaxation, in which you focus systematically on different parts of your body, working either from the feet to the head or vice versa. Depending on how much time you have, you might focus on large sections of your body—e.g., left leg, right leg—or on much smaller units, such as left foot, right foot, left ankle, right ankle, and so on. You can do progressive relaxation with your eyes open or closed, but learning to do it with your eyes open will help you relax more deeply if you're with other people.

In order to relax a part of your body, simply bring it into awareness; for example, take a moment right now to notice the sensations in the bottom of your left foot. Or say “relax” softly in your mind as you bring awareness to a body part. Or locate a point or a space in that part. Whatever works best.

For many people, progressive relaxation is also a great method for falling asleep.

## **Big Exhalation**

Inhale as much as you can, hold that inhalation for a few seconds, and then exhale slowly while relaxing. A big inhalation really expands your lungs, requiring a big exhalation to bring the lungs back to their resting size. This stimulates the PNS, which is in charge of exhaling.

## **Touching the Lips**

Parasympathetic fibers are spread throughout your lips; thus, touching your



lips stimulates the PNS. Touching your lips can also bring up soothing associations of eating or even of breastfeeding when you were a baby.

## **Mindfulness of the Body**

Since your PNS is primarily directed at maintaining the internal equilibrium of your body, bringing attention inward activates parasympathetic networks (as long as you're not worried about your health). You may have already had some practice with mindfulness of the body (e.g., yoga, a stress-management class). Mindfulness just means being fully aware of something, in the moment with it, and not judging or resisting it. Be attentive to physical sensations; that's all there is to it.

For example, notice the sensations of breathing, the cool air coming in and the warm air going out, the chest and belly rising and falling. Or the sensations of walking, reaching, or swallowing. Following even a single breath from beginning to end—or a single step on the way to work—can be remarkably centering and calming.

## **Imagery**

Although mental activity is commonly equated with verbal thought, most of the brain is actually devoted to nonverbal activities, such as processing mental pictures. Imagery activates the right hemisphere of the brain and quiets internal verbal chatter that could be stressful.

Like relaxation, you can use imagery on the spot to stimulate the PNS, or do longer visualizations when you've got the time to develop imagery that will be a powerful anchor for well-being. For example, if you're feeling stressed while at work, you could bring to mind a peaceful mountain lake for a few seconds. Then, when you have more time at home, you might visualize walking around the lake, and enrich your mental movie with the good smells of pine needles or the sound of children laughing.

## **Balance Your Heartbeat**

A regular heart rate has small changes in the interval between each beat; this is called *heart rate variability* (HRV). For example, if your heart beat sixty times in a minute, the time between beats would average one second. But your heart is not a mechanical metronome, and the interval between beats is continually changing: it could be something like 1 sec., 1.05 sec., 1.1 sec., 1.15 sec., 1.1 sec., 1.05 sec., 1 sec., .95 sec., .9 sec., .85 sec., .9 sec., .95 sec., 1 sec., and so on.

HRV reflects the activity of the autonomic nervous system. For example, your heart speeds up a little when you inhale (SNS activation) and slows down when you exhale (PNS arousal). Stress, negative emotions, and aging all decrease HRV, and people with relatively low HRV are less likely to recover after a heart attack (Kristal-Boneh, et al. 1995).

An interesting question is whether heart rate variability is merely an *effect* of ups and downs in stress and other factors, or whether changes in HRV can themselves directly *cause* improvements in mental and physical health. The evidence is preliminary, but studies have shown that learning to increase the amount and coherence of HRV is associated with decreased stress, and improved cardiovascular health, immune system function, and mood (Luskin, et al. 2002; McCraty, Atkinson, and Thomasino 2003).

HRV is a good indicator of parasympathetic arousal and overall well-being, and you can change it directly. The HeartMath Institute has pioneered the study of HRV and developed numerous techniques, which we've adapted for this simple, three-part approach:

1. Breathe in such a way that your inhalation and exhalation are the same duration; for example, count one, two, three, four in your mind while inhaling, and one, two, three, four while exhaling.
2. At the same time, imagine or sense that you're breathing in and out through the area of your heart.
3. As you breathe evenly through your heart, call to mind a pleasant, heartfelt emotion such as gratitude, kindness, or love—perhaps by thinking about a happy time, being with your children, appreciation for the good things in your life, or a pet. You can also imagine this feeling moving through your heart as part of the breath.

Try this for a minute or longer—you'll probably be quite struck by the results.

## **Meditation**

Meditation activates the PNS through multiple pathways. These include withdrawing attention from stressful matters, relaxing, and bringing awareness into the body. Through stimulating the PNS and other parts of the nervous system, regular meditation:

- Increases gray matter in the insula (Hölzel et al. 2008; Lazar et al. 2005), hippocampus (Hölzel et al. 2008; Luders et al. 2009), and prefrontal cortex (Lazar et al. 2005; Luders et al. 2009); reduces cortical thinning due to aging in prefrontal regions strengthened by meditation (Lazar et al. 2008); improves psychological functions associated with these regions, including attention (Carter et al. 2005; Tang et al. 2007), compassion (Lutz, Brefczynski-Lewis et al. 2008), and empathy (Lazar et al. 2005)
- Increases activation of left frontal regions, which lifts mood (Davidson 2004)
- Increases the power and reach of fast, gamma-range brainwaves in experienced Tibetan practitioners (Lutz et al. 2004); brainwaves are the weak but measurable electrical waves produced by large numbers of neurons firing rhythmically together
- Decreases stress-related cortisol (Tang et al. 2007)
- Strengthens the immune system (Davidson et al. 2003; Tang et al. 2007)
- Helps a variety of medical conditions, including cardiovascular disease, asthma, type II diabetes, PMS, and chronic pain (Walsh and Shapiro 2006)
- Helps numerous psychological conditions, including insomnia, anxiety, phobias, and eating disorders (Walsh and Shapiro 2006)

There are many contemplative traditions and many ways to meditate, and you may already have your own favorite method. The following box describes a basic mindfulness meditation. The key to reaping the rewards of meditation is to develop a regular, daily practice, no matter how brief. How about making a personal commitment never to go to sleep without having meditated that day, even if for just one minute? Also consider joining a regular meditation group in your area.

## Mindfulness Meditation

Find a comfortable place where you can focus and you won't be disturbed. It's fine to meditate while standing, walking, or lying down, but most people do so while sitting on a chair or cushion. Find a posture that is both relaxed and alert, with your spine reasonably straight. As the Zen saying suggests, you should handle your mind like the skillful rider of a horse, with neither too tight nor too loose a rein.

Meditate for as long as you like. You can start with shorter periods, even just five minutes. Longer sittings, from thirty to sixty minutes, will usually help you go deeper. You can decide how long you're going to meditate at the outset or play it by ear. It's all right to glance at a clock during the meditation. Alternately, you could set a timer. Some people light a stick of incense—when it's finished, they are, too. Feel free to modify the suggestions that follow.

*Take a big breath and relax, with your eyes open or closed. Be aware of sounds coming and going, and let them be whatever they are. Know that you are taking this time to meditate. You can drop all other concerns during this period, like setting down a heavy bag before plopping into a comfortable chair. After the meditation, you can pick those concerns up again—if you want to!*

*Bring your awareness to the sensations of breathing. Don't try to control the breath; let it be whatever it is. Sense the cool air coming in and warm air going out. The chest and belly rising and falling.*

*Try to stay with the sensations of each breath from beginning to end. You may want to softly count your breaths—count to ten and then start over; go back to one if your mind wanders—or note them quietly to yourself as “in” and “out.” It's normal for the mind to wander, and when it does, just return to the breath. Be gentle and kind with yourself. See if you can stay attentive to ten breaths in a row (usually a challenge at first). After your mind settles down during the first minutes of the meditation, explore becoming increasingly absorbed in the breath and letting go of everything else. Open to the simple pleasures of breathing, given over to the breath. With some practice, see if you can stay present with the breath for dozens of breaths in a row.*

*Using the breath as a kind of anchor, be aware of whatever else is moving*

*through the mind. Aware of thoughts and feelings, wishes and plans, images and memories—all coming and going. Let them be what they are; don't get caught up in them; don't struggle with or get fascinated by them. Have a sense of acceptance—even kindness—toward whatever passes through the open space of awareness.*

*Keep settling into the breath, perhaps with a growing sense of peacefulness. Be aware of the changing nature of what passes through the mind. Notice how it feels to get caught up in the passing contents of awareness—and how it feels to let them go by. Be aware of peaceful, spacious awareness itself.*

*When you like, bring the meditation to an end. Notice how you feel, and take in the good of your meditation.*

## **Feeling Safer**

As we saw in chapter 2, the brain continually scans your inner and outer worlds for threats. When any are detected, your stress-response system fires up.

Occasionally, this vigilance is warranted, but usually it's excessive, driven by amygdala-hippocampus reactions to past events that are no longer likely. The anxiety that results is unnecessary and unpleasant, and it primes your brain and body to overreact to small things.

Additionally, vigilance and anxiety draw attention away from mindfulness and contemplative absorption. It's no accident that traditional instructions for meditation often encourage practitioners to find a place of seclusion where they are protected from harm. For example, the account of the Buddha's night of awakening has him sitting at the base of the Bodhi Tree, which "had his back." Feelings of safety tell the brain that it can afford to bring in the troops that have been manning the watchtowers, and put them to work internally to increase concentration and insight—or just let them get some rest.

But before we explore specific methods for feeling safer, two important points. First, in ordinary reality, there is no such thing as complete safety. Life is continually changing, cars run red lights, people get sick, and whole nations erupt and send shock waves around the world. There is no absolutely

stable ground, no perfect shelter. Accepting this truth is wisdom, and embracing it and getting on with life can feel exhilarating. Second, for some people—especially those with a history of trauma—reducing anxiety can seem threatening, since lowering their guard makes them feel vulnerable. For these reasons, we speak of “safer” rather than “safe,” and please adapt the methods that follow to your own needs.

### **Relax Your Body**

Relaxation drains away anxiety like pulling the plug in a bathtub. (See the methods described earlier in this chapter.)

### **Use Imagery**

Right hemisphere imagery is closely connected with emotional processing. To feel safer, visualize protective figures with you, such as a beloved grandmother or a guardian angel. Or imagine that you’re surrounded by a bubble of light like a force field; in ticklish situations, I’ll sometimes hear Captain Kirk’s voice (from *Star Trek*) in my mind: “Shields up, Scotty!”

### **Connect with People Who Support You**

Identify friends and family who care about you, and try to spend more time with them. When you’re apart, visualize being with them and take in the good feelings. Companionship, even if only imagined, activates the brain’s attachment and social group circuitry. Physical and emotional closeness to caregivers and other members of the band was a necessity for survival during our evolutionary history. Consequently, activating a felt sense of closeness will probably help you feel safer.

### **Bring Mindfulness to Fear**

Anxiety, dread, apprehension, worry, and even panic are just mental states like any other. Recognize fear when it arises, observe the feeling of it in your

body, watch it try to convince you that you should be alarmed, see it change and move on. Verbally describe to yourself what you're feeling, to increase frontal lobe regulation of the limbic system (Hariri, Bookheimer, and Mazziotta 2000; Lieberman et al. 2007). Notice how the awareness which contains fear is itself never fearful. Keep separating from the fear; settle back into the vast space of awareness through which fear passes like a cloud.

### **Evoke Inner Protectors**

Enabled by the distributed network of the nervous system, different subpersonalities interact dynamically to form the seemingly monolithic but actually fragmented self. For example, one well-known threesome is called the inner child/critical parent/nurturing parent; a related triad is the victim/persecutor/protector. Your nurturing parent/protector subpersonality is reassuring, encouraging, and soothing, and it stands up against the inner and outer voices that are judgmental and demeaning. It does *not* flatter you or make things up. It is grounded in reality, like a solid, caring, no-nonsense teacher or coach who reminds you of good things about you and the world while telling mean people to back off and leave you alone.

Growing up, many of us felt let down by people who should have been better protectors. The deepest upsets are often not with those who harmed you but with the people who didn't prevent it—they're the ones you probably had the strongest attachment bonds to and thus felt most let down by. So it's understandable if your inner protector is not as strong as it could be. What you can do today is pay particular attention to the experience of being with strong people who care for you and stand up for you; savor this experience and take it in. Imagine, and perhaps write down, a conversation between an inner protector and a critical or alarming subpersonality, and make sure that the inner protector makes a powerful case for you.

### **Be Realistic**

Draw on prefrontal capacities to evaluate: What is the chance that the feared event will happen? How bad would it be? How long would the damage last? What could I do to cope? Who could help me?

Most fears are exaggerated. As you go through life, your brain acquires expectations based on your experiences, particularly negative ones. When situations occur that are even remotely similar, your brain automatically applies its expectations to them; if it expects pain or loss, or even just the threat of these, it pulses fear signals. But because of the negativity bias, many expectations of pain or loss are overstated or completely unfounded.

For example, I was a shy child and considerably younger than most of the other kids in my classrooms, so I grew up feeling like an outsider, and a lonely one, in many situations. Later, as an adult, when I joined a new group (e.g., a team at work, the board of a nonprofit), I'd anticipate being an outsider again, and feel uncomfortable about it—even though the other people in the group were perfectly welcoming.

Expectations that come from childhood—often the most powerful ones of all—are particularly suspect. When you're young, (A) you have little choice about your family, school, and peers, (B) your parents and many others have much more power than you do, and (C) you don't have many resources yourself. But these days, the plain facts are that (A) you have many more choices about what you do in life, (B) power differentials between you and others are usually minimal or nonexistent, and (C) you have lots of inner and outer resources (e.g., coping skills, goodwill toward you from others). So, when a fear arises, ask yourself: "What options do I actually have? How could I exercise power skillfully to stick up for myself and take good care of myself? What resources could I draw upon?"

You're trying to see the world clearly, without distortion, confusion, or selective attention. What are the facts? Science, business, medicine, psychology, and contemplative practice are all founded on the truth of things, whatever it may be; in Buddhism, for example, ignorance is considered the fundamental source of suffering. Not surprisingly, studies have shown that appraising a situation more accurately leads to greater positive emotions and fewer negative ones (Gross and John 2003). And if there really is something to worry about, deal with it as best you can (e.g., pay the bill, see the doctor). Not only will doing *something* and moving forward feel better in its own right, it will also usually improve a situation that's worrying you (Aspinwall and Taylor 1997).



## Nurture Your Sense of Secure Attachment

Your childhood relationships with major caregivers—notably your parents—have probably had a great influence on your expectations, attitudes, emotions, and actions in your important relationships as an adult. Dan Siegel (2001, 2007), Allan Schore (2003), Mary Main (Main, Hesse, and Kaplan 2005), and others have helped clarify the neurobiology of attachment. To summarize a large body of research, the recurring experiences a young child has with her parents—which are affected by the child’s temperament—will lead to one of four modes of *attachment* to them: *secure*, *insecure-avoidant*, *insecure-anxious*, and *disorganized* (this last type is rare and won’t be discussed further). The type of attachment to one parent is largely independent of the type of attachment to the other one. Insecure attachment modes appear to be associated with characteristic patterns of neural activity, such as a lack of integration between the prefrontal cortex (PFC) and the limbic system (Siegel 2001).

Attachment modes tend to persist into adulthood and become the underlying, default template for important relationships. If, like a large fraction of the population, you grew up with insecure-avoidant or insecure-anxious attachment, you can still change that template so you experience a greater sense of security in your relationships. Here are some good methods for doing so:

- Develop self-understanding of how your upbringing affected your relationships with your parents, especially in early childhood; acknowledge any insecure attachment.
- Bring compassion to yourself for any sense of insecurity.
- As much as possible, seek out nurturing and reliable people, and take in the feeling of being with them. Also do what you can to be treated well in your existing relationships.
- Practice mindfulness of your inner state, including through meditation. In effect, you are giving yourself today the attention and attunement you should have received as a child. Mindfulness activates the mid-line regions of your brain and helps increase the coordination between the PFC and the limbic system; these are key neural substrates of secure attachment (Siegel 2007).

## Finding Refuge

In this life, where have you found refuge? Refuges include people, places, memories, ideas, and ideals—anyone or anything that provides reliable sanctuary and protection, so you can let down your guard and gather strength and wisdom. As a child, refuge might have been your mother's lap, reading in bed, or hanging out with friends. Personally, I spent a lot of time in the hills around my home, clearing my head and getting refueled by nature.

Today as an adult, your refuge might be a particular location or activity (e.g., a church or temple, a quiet walk with your dog, a long bath) or the company of your mate, good friends, or perhaps a teacher. Some refuges are ineffable, though potentially more profound: confidence in the power of reason, feeling connected with nature, or a basic intuition of the fundamental alrightness of all things.

Consider these refuges, adapted from Buddhism with some broadened meanings:

- Teacher—the historical figure at the center of a faith tradition (such as Jesus, Moses, Siddhartha, or Mohammed) in whom one has confidence; qualities embodied by that person which are also present within you
- Truth—reality itself and accurate descriptions of it (e.g., how suffering arises and ends)
- Good company—both those who are farther along on the path of awakening and those joined with you in fellowship near at hand

Taking refuge pulls you away from reactivating situations and concerns, and then fills you with positive influences. As you rest increasingly in a background sense of refuge, neurons are quietly stitching a safety net for you. On the path of awakening, it's natural to experience some upheaval, dark nights of the soul, or unnerving groundlessness when the foundation of old beliefs falls away. At these times, your refuges will catch you and help you ride out the storm.

Try to take refuge in one or more things every day. This can be formal or informal, verbal or nonverbal—whatever works best for you. Experiment with different ways to experience refuge, such as the sense that the refuge is where you come from or that it flows through you.

## Exploring Your Refuges

Identify several of your refuges. Then apply this exploration to as many of them as you like. You can do this with your eyes open or closed, slowly or quickly. Instead of the suggested phrase, *I find refuge in*, you could try:

*I take refuge in \_\_\_\_\_.*

*I go for refuge to \_\_\_\_\_.*

*I abide as \_\_\_\_\_.*

*I come from \_\_\_\_\_.*

*There is \_\_\_\_\_.*

*\_\_\_\_\_ flows through me.*

*I am one with \_\_\_\_\_.*

Or whatever you like.

*Bring to mind a refuge. Get a feeling or idea of it, and sense it in your body. Get a sense of how it's wholesome for you to take refuge there. To have its influence in your life. To come from that place. To have its shelter and protection.*

*Say softly in your mind: I find refuge in \_\_\_\_\_. Or wordlessly feel yourself entering refuge there.*

*Notice how it feels to have entered this refuge. Let that feeling sink in and become a part of you.*

*When you like, move on to the next refuge. And then to as many refuges as you want.*

*When you are finished entering your refuges, notice what the experience as a whole feels like. Know that as you go through your days, you'll carry your refuges with you.*

## chapter 5: Key Points

- The most powerful way to use the mind-body connection to improve your physical and mental health is through guiding your autonomic nervous system (ANS). Every time you calm the ANS through stimulating the parasympathetic nervous system (PNS), you tilt your

body, brain, and mind increasingly toward inner peace and well-being.

- You can activate the PNS in many ways, including relaxation, big exhalations, touching the lips, mindfulness of the body, imagery, balancing your heartbeat, and meditation.
- Meditation increases gray matter in brain regions that handle attention, compassion, and empathy. It also helps a variety of medical conditions, strengthens the immune system, and improves psychological functioning.
- Deliberately feeling safer helps control the hardwired tendency to look for and overreact to threats. Feel safer by relaxing, using imagery, connecting with others, being mindful of fear itself, evoking inner protectors, being realistic, and increasing your sense of secure attachment.
- Find refuge in whatever is a sanctuary and refueling station for you. Potential refuges include people, activities, places, and intangible things like reason, a sense of your innermost being, or truth.

## chapter 6

# Strong Intentions

*Do all that you can, with all that you have, in the time that you have, in the place where you are.*

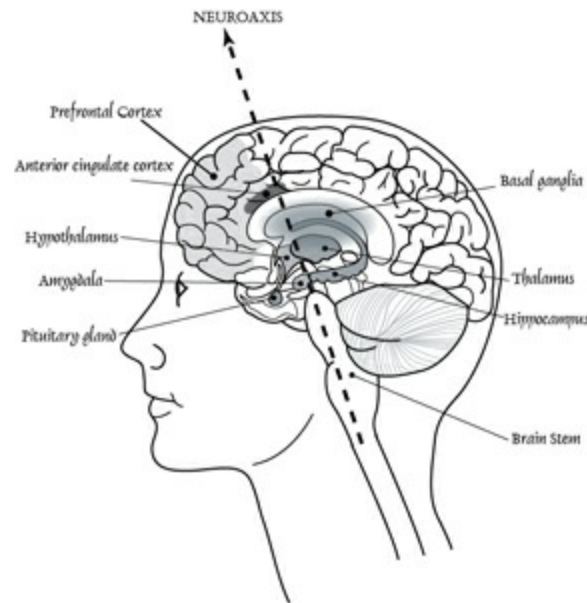
—Nkosi Johnson

The previous chapter focused on cooling down greed and hatred to reduce the causes of suffering. This chapter is about “warming up” the inner strength that will increase the causes of your happiness. You’ll see how your brain gets motivated—how it establishes intentions and pursues them—and how to use these neural networks to move forward strongly in the days to come. To be alive is to lean into the future (Thompson 2007), to stretch for the next breath or meal. Or reach for happiness, love, and wisdom.

## **The Neuroaxis**

Your brain evolved from the bottom up and the inside out, along what is called the *neuroaxis* (Lewis and Todd 2007; Tucker, Derryberry, and Luv 2000), which is one way to conceptualize the organization of the brain. Starting at the base, let’s explore how each of the four main levels of the neuroaxis supports your intentions.

Figure 7: The Neuroaxis



## **Brain Stem**

The brain stem sends neuromodulators such as norepinephrine and dopamine throughout your brain in order to get you ready for action, keep you energized while you pursue your goals, and reward you when you attain them.

## **Diencephalon**

The *diencephalon* consists of the thalamus (the brain's central switchboard for sensory information) and the hypothalamus, which directs your autonomic nervous system and influences your endocrine system through the pituitary gland. The hypothalamus regulates primal drive states (e.g., for water, food, sex) and primal emotions (e.g., terror, rage).

## **Limbic System**

The limbic system evolved from the diencephalon, and includes the

amygdala, hippocampus, and basal ganglia. It's basically Grand Central Station for emotion.

Limbic structures lie to the sides of the diencephalon, and in some cases beneath it (e.g., amygdala). They are considered a higher level in the neuroaxis since they are more recent in evolution—even though some of these structures are lower down, which can be a little confusing.

## **Cortex**

The cortex includes the prefrontal cortex (PFC), cingulate, and insula. These regions—which play a prominent role in this book—handle abstract reasoning and concepts, values, planning, and the “executive functions” of organization, self-monitoring, and impulse control. The cortex also includes the sensory and motor strips that stretch more or less from ear to ear (sensation and movement), the parietal lobes (perception), the temporal lobes (language and memory), and the occipital lobe (vision).

These four levels work together to keep you motivated; they're integrated up and down the neuroaxis. In general, the lower levels orient and energize the upper ones, which guide and inhibit the lower ones. The lower levels have more direct control over your body and less capacity to change their own neural networks. The upper levels are the opposite: although they're more removed from the action, they have vastly greater neuroplasticity—the capacity to be shaped by neural/mental activity, to learn from experience. At all levels of the neuroaxis, the intentions—the goals and related strategies—at work in your life operate mainly outside of your awareness.

The farther down the neuroaxis, the more immediate the reactions; higher up on the neuroaxis, time frames stretch. For example, cortical influences help you pass up a reward right now in order to gain a greater one in the future (McClure et al. 2004). Usually, the longer the view, the wiser the intentions.

## **The Motivational Macrosystem**

## The Anterior Cingulate Cortex Hub

Although each part of the neuroaxis works with the others, two regions in particular are hubs, sending out neural spokes in many directions: the anterior cingulate cortex (ACC) and the amygdala. Let's start with the ACC (for more details, see Lewis and Todd, 2007; Paus 2001).

The ACC is closely connected to the evolutionarily recent *dorsal* (upper) and *lateral* (outer) regions of the prefrontal cortex, known by the mouth-watering acronym DLPFC. The DLPFC is a key neural *substrate*, or basis, of *working memory*, which is a kind of workspace where your brain gathers information to solve problems and make decisions. The ACC is also closely connected to the supplementary motor area, where new actions are planned. Through these links, your ACC guides your actions to fulfill your intentions.

When an intention crystallizes, your inner experience of things coming together toward a unified aim reflects a *neural coherence*. In the cortical “spokes” of the ACC, many far-flung (on the microscopic scale of cells) regions start pulsing together, matching the phases—the highs and lows—of their firing rhythms, typically in the gamma range of neural synchrony: 30 to 80 times a second (Thompson and Varela 2001).

The ACC is the primary overseer of your attention. It monitors progress toward your goals, and flags any conflicts among them. Its upper layers manage *effortful control*, the deliberate and sustained regulation of thoughts and behavior. These areas don't fully develop until ages three to six (Posner and Rothbart 2000), a major reason why young children have less self-control than older ones. Any time you consciously exercise your will, your ACC is involved.

Through its dense, reciprocal connections to the amygdala, hippocampus, and hypothalamus, the ACC influences your emotions and is influenced by them as well. Therefore, it's a key site for the integration of thinking and feeling (Lewis 2005). Strengthening the ACC—such as through meditation—helps you think clearly when you're upset, and brings warmth and emotional intelligence to your logical reasoning.

In sum, the ACC is at the center of top-down, deliberate, centralized, reasoned motivation.



## **The Amygdala Hub**

Through its own dense connections to the ACC, PFC, hippocampus, hypothalamus, basal ganglia, and brain stem, the amygdala is the second major hub of motivational activity.

Moment to moment, the amygdala spotlights what's relevant and important to you: what's pleasant and unpleasant, what's an opportunity and what's a threat. It also shapes and shades your perceptions, appraisals of situations, attributions of intentions to others, and judgments. It exerts these influences largely outside of your awareness, which increases their power since they operate out of sight.

When you get motivated in any significant way, it means the subcortical regions that connect to the amygdala have synchronized with each other. The neural networks in the limbic system, hypothalamus, and brain stem start pulsing together, usually in the theta frequency of four to seven times a second (Kocsis and Vertes 1994; Lewis 2005).

In sum, the amygdala is at the center of bottom-up, reactive, distributed, passionate motivation.

## **Head and Heart**

Together, the ACC and amygdala hubs form a joint system that's involved in just about every aspect of motivated activity. These hubs modulate each other; for example, in a three-step feedback loop, the amygdala excites the lower parts of your ACC, which then excite its upper parts, which in turn inhibit the amygdala (Lewis and Todd 2007). Consequently, the ostensibly rational ACC-based network is deeply involved in your emotions and drives through its downward projections into the three lower levels of the neuroaxis. Meanwhile, the supposedly irrational amygdala-based network helps construct your appraisals, values, and strategies through its upward projections into the cortex.

This integration can happen within a fraction of a second, as neural populations all along the neuroaxis synchronize with each other in response to motivationally meaningful information, phase-locking their rhythms together. In a more general way, such integration can continue for many years. Consider how your “cool” ACC-based and “warm” amygdala-based

motivations have worked together in the important areas of your life. For example, warmhearted advocacy for a child with special needs benefits from cool clarity about how to keep working with a school district to get the most resources for her.

On the other hand, these two hubs can also be out of step or tug against each other. For example, during adolescence, the amygdala-based network often overpowers the ACC-based network. In terms of your own motivations, are your ACC- and amygdala-based networks equally strong? And are they—head and heart, metaphorically speaking—pulling in the same direction? For example, I realized some years ago that the training of my head had gotten out in front of the cultivation of my heart, so I've been focusing more on the latter ever since.

## **Intentions and Suffering**

It is sometimes said that desire leads to suffering, but is that always true? The territory of desire is far-reaching, and it includes wishes, intentions, hopes, and cravings. Whether a desire leads to suffering depends on two factors: Is craving—the sense that you need something—involved? And what is the desire *for*? Regarding the first of these, desire per se is not the root of suffering; craving is. You can wish for or intend something without craving the results; for example, you can decide to get eggs from the refrigerator without craving them—and without getting upset if there are none left.

Regarding the second factor, intentions are a double-edged sword that can either hurt or help. For example, the Three Poisons—greed, hatred, and delusion—are a kind of intention: to grab pleasure and hold on tight, resist pain and anything else you don't like, and ignore or distort things you'd rather not know about.

Harmful intentions operate at all levels of the brain, from rage and fear released by the hypothalamus to subtle plans for payback constructed by the PFC. But the same is also true of wholesome inclinations toward generosity, kindness, and insight: they ripple up and down the neuroaxis, from visceral brain stem energy for good causes to abstract ideals sustained by the PFC. As you weave positive inclinations more deeply into the different levels of your brain, you increasingly push the Three Poisons to the margins. It's important to nurture good intentions at *all* levels of the neuroaxis—and to cultivate the

strength to carry them out.

## **Feeling Strong**

During a break from college, I helped take a dozen school kids backpacking through the Yosemite high country. We didn't see anyone all day before stopping for lunch at a rocky area by a river, where the trail disappeared. Then we headed into the forest, where we picked up the trail again. A mile or so later, one of the kids realized he'd left his jacket back by the river. I said I'd go get it and meet the group at our campground several miles ahead. Dropping my pack by the side of the trail, I returned to our lunch area, searched around, and found the jacket.

But now I couldn't find the trail. After casting about for a while amidst the jumbled boulders, it really hit me: it was late afternoon, the only people around were miles away, it was already getting chilly, and I was looking at spending the night at 6,000 feet in a T-shirt and jeans. Then an unprecedented and powerful sense came over me. I felt like a feral animal, like a hawk that would do whatever it takes to survive. I felt a fierce determination to live through the day and, if need be, the night. Newly energized, I scrambled in widening circles, finally finding the trail. I made it to our campsite later that night. I've never forgotten the intense feelings of that day, and have drawn on them for strength many times since.

When have you felt really strong yourself? What was that experience like—in your body, your emotions, and your thoughts? Strength is often quiet, receptive determination rather than chest-thumping pushiness. One of the strongest people I've ever known was my mother, who just kept taking care of her family no matter what.

## **Feeling Stronger**

Strength has two primary aspects: energy and determination. You can intensify these by quickening your breathing a little, or by tightening your shoulders slightly, as if you're bracing to carry a load. Get familiar with the muscle movements—often subtle ones—associated with strength. Just as making the facial expression of an emotion will heighten that feeling

(Niedenthal 2007), engaging the muscle movements of strength will increase your experience of it.

Get in the habit of deliberately calling up a sense of strength—not to dominate anybody or anything, but to fuel your intentions (see the exercise, “Many Ways to Feel Strong”). Involve the entire neuroaxis in order to power up your experience of strength. For example, bring to mind a sense of visceral, muscular willfulness to stimulate your brain stem to send norepinephrine and dopamine like a rising fountain up into the rest of your brain for arousal and drive. Bring the limbic system into the action by focusing on how good it feels to be strong, so you’ll be increasingly drawn to strength in the future. Add the power of cortical language by commenting on the experience to yourself: *I’m feeling strong. It’s good to be strong.* Notice any beliefs that it’s bad or wrong to be strong, and send them on their way with counterthoughts like *Strength helps me do good things. I have the right to be strong.* Make sure that the intentions at all levels of your neuroaxis are heading in the same direction.

When you experience strength—whether you evoked it deliberately or it just came to mind—consciously take it in so it deepens its traces in implicit memory and becomes a part of you.

## **Many Ways to Feel Strong**

There are many ways to find and intensify the feeling of strength. This exercise explores some of them; feel free to adapt it however you like. It’s best to keep your eyes open during it, since you’ll want strength in everyday situations in which your eyes are open.

*Take a breath and come into yourself. Be aware of thoughts passing through your mind without any need to engage with them. Feel the strength in awareness, always clear and everlasting, no matter what passes through it.*

*Now sense the vitality in your body. Notice how your breathing has a strength of its own. Sense your muscles, your capacity to move in any direction. Sense the animal strength in your body (even if it is also weak in some ways).*

*Recall a time when you felt really strong. Imagine that situation as intensely as you can. Bring to mind the sense of strength you experienced.*

*Strength in your breathing, energy in your arms and legs. That same strength is beating today in your powerful heart. Whatever you feel is fine. And continue to open to the sense that you are strong, clear, and determined. Notice how it feels good to feel strong. Let strength sink into your being. (If you like, recall additional times you felt strong.)*

*Now, continuing to feel strong, bring to mind a person (or group of people) who supports you. Make this as real as possible; imagine this person's face, the sound of his or her voice. Let yourself feel supported, valued, believed in. Sense how this feeling of support increases your sense of strength. Notice how it feels good to feel strong. Let strength sink into your being. (You can repeat this for other people who support you.)*

*Notice any other feelings coming up, too—perhaps even opposite ones like weakness. Whatever is arising is fine. Just notice it, let it be, and let it go. Turn your attention back to your sense of being strong.*

*Finally, abiding in a sense of strength, bring to awareness a challenging situation. Solid in your strength, feel a spaciousness around that difficult condition. Allow it to be what it is while you continue to feel strong and centered. Be strong, with no need to grasp or struggle in any way. Any problems are flowing through awareness like clouds across the sky. Be spacious, relaxed, and easy. Feel the strength, in your breathing, in your awareness, in the clarity of your mind, in the wholeness of your body, in your good intentions.*

*As you go through your day, pay attention to the sense of feeling strong. Notice how it feels good to feel strong. Let strength sink into your being.*

## **chapter 6: Key Points**

- It's important both to cool the causes of suffering and to warm up the causes of happiness—such as your intentions. Intentions involve strength applied to clear and appropriate goals, sustained over time. Most of the intentions operating in your brain do so outside of awareness.
- To simplify, your brain evolved in four levels, along a kind of neuroaxis; these levels work together to keep you motivated. From the bottom up, along the neuroaxis, they are the brain stem, diencephalon,

limbic system, and cortex.

- In general, the farther down the neuroaxis a response takes place, the faster, more intense, and more automatic it is. Higher on the neuroaxis, responses become more delayed, less intense, and more considered. In particular, the cortex—the most evolutionarily recent level—really enhances your capacity to take the future into account. Usually, the longer the view, the wiser the intentions.
- The neuroaxis has two hubs: the anterior cingulate cortex (ACC) and the amygdala. The ACC-based network manages top-down, deliberate, centralized, reasoned motivation, while the amygdala-based network handles bottom-up, reactive, distributed, passionate motivation.
- These two networks are woven together. For example, the “logical” ACC-based network guides the flow of your feelings, and the “emotional” amygdala-based network shapes your values and worldview.
- The two networks—metaphorically the head and the heart—can support each other, be awkwardly out of sync, or struggle in outright conflict. Ideally, your intentions will be aligned with each other at all levels of the neuroaxis: that’s when they have the most power.
- Intentions are a form of desire. Desire per se is not the root of suffering; craving is. The key is to have wholesome intentions without being attached to their results.
- Inner strength comes in many forms, including quiet perseverance. Get familiar with what strength feels like in your body so you can call it up again. Deliberately stimulate feelings of strength to deepen their neural pathways.

## chapter 7

# Equanimity

*Equanimity is a perfect, unshakable balance of mind.*

—Nyanaponika Thera

Imagine that your mind is like a house with a mud-room—the entry room in cold climates where people put their messy boots and dripping coats. With *equanimity*, your initial reactions to things—reach for this carrot, push away that stick—are left in a mental mud-room so that the interior of your mind remains clear and clean and peaceful.

The word equanimity comes from Latin roots meaning “even” and “mind.” With equanimity, what passes through your mind is held with spaciousness so you stay even-keeled and aren’t thrown off balance. The ancient circuitry of the brain is continually driving you to react one way or another—and equanimity is your circuit breaker. Equanimity breaks the chain of suffering by separating the feeling tones of experience from the machinery of craving, neutralizing your reactions to those feeling tones.

For example, one time I came home from a meditation retreat, we sat down to dinner, and soon our kids were doing their usual bickering. Normally this would have bothered me, but because of the equanimity gained from the retreat, the irritation in my mind was like an annoying fan yelling from the upper bleachers in a stadium far above me, while I was down below and not hijacked by it. Psychologists have a term—*demand characteristics*—for the aspects of situations that really pull at you, like a doorbell ringing or someone reaching out his hand to shake yours. With equanimity, situations have only characteristics, not demands.

Equanimity is neither apathy nor indifference: you are warmly engaged with the world but not troubled by it. Through its nonreactivity, it creates a great space for compassion, loving-kindness, and joy at the good fortune of others. For example, the Buddhist teacher Kamala Masters tells the story of

taking a boat down the Ganges at dawn. On her left, the sun lit ancient towers and temples with an exquisite rosy glow. On her right, funeral pyres were burning, and the sounds of wailing rose up with the smoke. Beauty to the left and death to the right, with equanimity opening her heart wide enough to include both. You draw on this same equanimity to stay centered and large-hearted when you face situations that have great personal impact, such as when you—or a dear friend—lose a loved one.

## **A Taste of Equanimity**

If you like, take some time here to get a taste of equanimity. It won't be the all-encompassing sense that is available in the deepest meditations, but it will give you a feeling for the evenness, clarity, and peacefulness of this state of mind.

*Relax. Take a few minutes to steady your mind by focusing on the sensations of breathing in your belly or chest, or around your upper lip.*

*Become increasingly mindful of the changing feeling tones—pleasant, unpleasant, or neutral—of your experience.*

*Sense a growing impartiality toward whatever arises, an ease, a relaxed and undisturbed presence. Accept and be at peace with whatever is arising. Let your mind become increasingly steady, quiet, and collected.*

*Be aware of sounds. Hear without being caught by what's heard. Be aware of sensations. Sense without being caught by what's sensed. Be aware of thoughts. Think without being caught by what's thought.*

*Notice how pleasant, unpleasant, and neutral feeling tones come and go. They're constantly changing, and not a dependable basis for happiness.*

*Be aware of passing thoughts and feelings without identifying with them. No one needs to own them.*

*Be aware of passing thoughts and feelings without reacting to them. Notice a growing disengagement. There's less tilting toward pleasure, less pulling back from pain.*

*In the pleasant, there is just the pleasant, with no reactions added. In the unpleasant, there is just the unpleasant, with no reactions added. In the*



*neutral, there is just the neutral, with no reactions added. This is the mind of no preferences. Rest as awareness, free from reactions.*

*Abide as equanimity. Breath after breath. At ease. Settle into deeper and deeper layers of equanimity. As you can, sense a sublime freedom, contentment, and peace.*

*If they aren't already open, open your eyes. Bring visual sensations into your equanimity. Explore the mind of no preferences for whatever crosses your gaze, be it pleasant, unpleasant, or neutral. Move your body a bit as you finish the meditation. Explore the mind of no preferences for body sensations, be they pleasant, unpleasant, or neutral.*

*As your day proceeds, notice what it's like to bring more equanimity to people and situations.*

## **The Equanimous Brain**

When you are equanimous, you don't grasp after enjoyable experiences or push against disagreeable ones. Rather, you have a kind of space around experiences—a buffer between you and their feeling tones. This state of being is not based on standard prefrontal control of emotions, in which there is inhibition and direction of limbic activity. Instead, with equanimity, the limbic system can fire however it “wants.” The primary point of equanimity is not to reduce or channel that activation, but *simply not to respond to it*. This is very unusual behavior for the brain, which is designed by evolution to respond to limbic signals, particularly to pulses of pleasant and unpleasant feeling tones. What could be happening, neurologically, to accomplish this? Let's look at the different aspects of equanimity and the parts of the brain they likely involve.

### **Understanding and Intention**

With equanimity, you see into the transient and imperfect nature of experience, and your aim is to remain *disenchanted*—free of the spells cast by pleasure and pain. In this—rather Buddhist—sense of the word, disenchanted, you are not disappointed or dissatisfied with life; you simply see through its apparent charms and alarms and are not knocked off center by

either.

Understanding and intention are both grounded in the prefrontal cortex. The intention to remain equanimous relies in particular on the anterior cingulate cortex (ACC) hub in the neuroaxis.

## **Great Steadiness of Mind**

Equanimity also involves remaining aware of the passing stream without letting any bit of it hook you. This entails anterior cingulate oversight, especially in the beginning stages of equanimity. As equanimity deepens, meditators report an effortless continuity of mindfulness, which presumably correlates with reduced ACC activity and self-organizing stability in the neural substrates of awareness.

## **A Global Workspace of Consciousness**

Another aspect of equanimity is an unusually expansive *global workspace of consciousness* (Baars 1997), the neural complement to the mental sense of great spaciousness surrounding the objects of awareness. This could be enabled by stable and far-reaching gamma-wave synchronization of billions of neurons across large areas of the brain, rhythmically firing together 30–80 times a second. Interestingly, this atypical brainwave pattern is seen in Tibetan monks with lots of meditation practice—and a lot of equanimity (Lutz et al. 2004).

## **Dampening the Stress-Response System**

The limbic, HPAA, and sympathetic nervous systems react to each other in circular ways. For example, if something frightening occurs, your body will tend to become activated (e.g., increased heart rate, sweaty palms); those bodily changes will be interpreted by the limbic system as evidence of a threat, which will trigger more fear reactions in a vicious cycle. Through activating the parasympathetic nervous system (PNS), you prevent the stress-response system from reacting to its own reactions. This is one reason why the training for equanimity in contemplative settings involves considerable

relaxation and tranquility.

## **The Fruits of Equanimity**

Over time, equanimity deepens into a profound inner stillness that is a defining characteristic of contemplative absorption (Brahm 2006). It also becomes increasingly woven into daily life, bringing great benefit. If you can break the link between feeling tones and craving—if you can be with the pleasant without chasing after it, with the unpleasant without resisting it, and with the neutral without ignoring it—then you have cut the chain of suffering, at least for a time. And that is an incredible blessing and freedom.

*With equanimity, you can deal with situations with calm and reason while keeping your inner happiness.*

—The Dalai Lama

## **Developing the Factors of Equanimity**

While complete equanimity is an uncommon state for both the mind and the brain, a basic sense of it can be experienced in everyday life and developed with practice. The underlying neural factors we've explored suggest a number of ways to encourage this process.

### **Understanding**

Recognize the fleeting nature of rewards and that they usually aren't actually all that great. See, too, that painful experiences are transient and usually not that awful. Neither pleasure nor pain is worth claiming as your own or identifying with. Further, consider how every event is determined by countless preceding factors so that things can not be any other way. This is not fatalism or despair: you can take action to make the *future* different. But even then, remember that most of the factors that shape the future are out of

your hands. You can do everything right, and still the glass will break, the project will go nowhere, you'll catch the flu, or a friend will remain upset.

*I make myself rich by making my wants few.*  
—Henry David Thoreau

## **Intention**

Keep reminding yourself of the important reasons for equanimity: you want more freedom from craving and the suffering it brings. Routinely recall your intention to be aware of the feeling tone, to be spacious around it, and to let it be whatever it is without reacting to it. To help hold this in mind, put a little sticky note with “equanimity” on it near your computer or telephone, or use a picture of a beautiful, tranquil setting.

## **Steadiness of Mind**

Chapters 11 and 12 will explore various ways to cultivate an increasingly stable presence of mind. As your mind grows steadier, pay particular attention to the neutral feeling tone. Stimuli that evoke a pleasant or unpleasant feeling tone stir up more brain activity than neutral tones do, because there is more to think about and respond to. Since your brain doesn't naturally stay engaged with neutral stimuli, you must make a conscious effort to sustain attention to them. Through sensitizing yourself to the neutral aspects of experience, your mind will become more comfortable staying with them, and less inclined to seek rewards or scan for threats. In time, the neutral tone can become, as my teacher Christina Feldman puts it, a “doorway to the eventless”—an entry into the stillness of the ground of being, which never changes and is always the same.

## **Spacious Awareness**

Imagine the contents of your mind coming and going in a vast open space of awareness, like shooting stars. The feeling tones of experience are just more contents moving through this space. Boundless space surrounds them—dwarfing them, untroubled by them, unaffected by their passing. The space of awareness allows every content of mind to be or not to be, to come and to go. Thoughts are just thoughts, sounds are just sounds, situations are just situations, and people are just being themselves. As Ajahn Sumedho said during a talk at Chithurst Monastery, “Trust in awareness, in being awake, rather than in transient and unstable conditions” (2006).

## **Tranquility**

This involves not acting based on the feeling tone. For example, you don’t automatically move toward something just because it is pleasant. In the words of the Third Zen Patriarch: “The Great Way is not difficult for those who have no preferences” (Kornfield 1996, 143). Set aside a period of your day—even just a minute long—to consciously release preferences for or against anything. Then extend this practice to more and more of your day. Your actions will be guided increasingly by your values and virtues, not by desires that are reactions to positive or negative feeling tones.

Tranquility involves parasympathetic activation, which you’ve learned how to encourage in chapter 5. Make a list of situations that trigger strong greed or hatred (broadly defined) in you, arranged from mild triggers all the way up to your equivalent of a four-alarm fire. Then, starting with the easier situations and working your way up the list, deliberately focus on bringing greater tranquility to them by using some of chapter 5’s approaches, such as big exhalations, being mindful of the fear, or taking refuge.

Inner peace can definitely be sustained in difficult circumstances. Here are two examples that are worlds apart, yet have aspects of equanimity in common:

Think of Joe Montana playing football, guiding the 49ers downfield while 300-pound defensive linemen rushed to crush him to the ground. His teammates said that the crazier and more desperate the game got, the cooler Joe became. My wife and I used to joke: *Three minutes left in the fourth quarter of the Super Bowl, eighty yards to go for the game-winning touchdown—Joe’s got them right where he wants them!*

And consider Ramana Maharshi, the great Indian saint who passed away in 1950. Toward the end of his life, he developed cancer in his arm. Although this must have been very painful, he remained serene and loving throughout his final days. One time he looked down with a beautiful smile and said simply, “Poor arm.”

Buddhism has a metaphor for the different conditions in life. They’re called the Eight Worldly Winds: pleasure and pain, praise and blame, gain and loss, fame and ill repute. As you develop greater equanimity, these winds have less effect on your mind. Your happiness becomes increasingly unconditional, not based on catching a good breeze instead of a bad one.

## **chapter 7: Key Points**

- Equanimity means not reacting to your reactions, whatever they are.
- Equanimity creates a buffer around the feeling tones of experiences so that you do not react to them with craving. Equanimity is like a circuit breaker that blocks the normal sequence in the mind that moves from feeling tone to craving to clinging to suffering.
- Equanimity is not coldness, indifference, or apathy. You are present in the world but not upset by it. The spaciousness of equanimity is a great support for compassion, kindness, and joy at the happiness of others.
- In daily life and meditation, deepen your equanimity by becoming increasingly mindful of the feeling tones of experience and increasingly disenchanted with them. They come and they go, and they’re not worth chasing or resisting.
- Equanimity is an unusual brain state. It is not based on prefrontal inhibition of the limbic system. Rather, it involves not reacting to the limbic system. This probably draws on four neural conditions: prefrontal and anterior cingulate cortex (ACC) activation for understanding and intention; steadiness of mind, driven initially by ACC oversight but then self-organizing; fast gamma-wave entrainment of large areas of the brain to create the mental experience of great spaciousness; and parasympathetic activation to dampen limbic/SNS/HPAA feedback loops that would otherwise make the stress-response system react to its own reactions in vicious cycles.

- You can strengthen the neural factors of equanimity with the methods summarized in this chapter and discussed in greater detail throughout this book. As you do this, your happiness will become increasingly unconditional and unshakeable.