

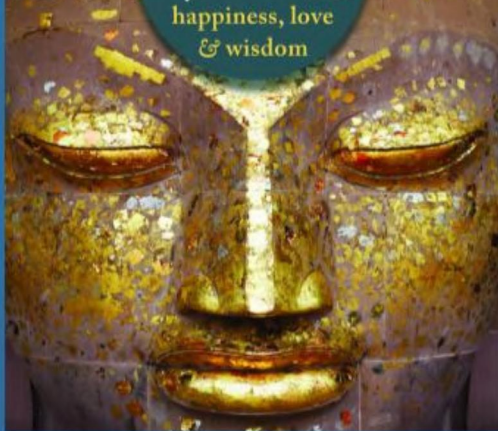
RICK HANSON, PH.D.
with RICHARD MENDIUS, MD

Foreword by DANIEL J. SIEGEL, MD
Preface by JACK KORNFIELD, PH.D.

the practical
neuroscience of

Buddha's Brain

happiness, love
& wisdom



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Buddha's Brain

The Practical Neuroscience of Happiness, Love &
Wisdom

Rick Hanson, PH.D.
Richard Mendius, MD

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“A wonderfully comprehensive book. The authors have made it easy to understand how our minds function and how to make changes so that we can live happier, fuller lives.”

—Sharon Salzberg, author of *Lovingkindness*

“Solidly grounded in the latest neuroscientific research, and supported by a deep understanding of contemplative practice, this book is accessible, compelling, and profound—a crystallization of practical wisdom!”

—Philip David Zelazo, Ph.D., Nancy M. and John E. Lindahl Professor at the Institute of Child Development, University of Minnesota

“This is simply the best book I have read on why and how we can shape our brains to be peaceful and happy. This is a book that will literally change your brain and your life.”

—Jennifer Loudon, author of *The Woman’s Comfort Book* and *The Life Organizer*

“Buddha’s Brain is a significant contribution to understanding the interface between science and meditation in the path of transformation. Illuminating.”

—Joseph Goldstein, author of *A Heart Full of Peace* and *One Dharma*

“Buddha’s Brain is compelling, easy to read, and quite educational. The book skillfully answers the central question of each of our lives—how to be happy—by presenting the core precepts of Buddhism integrated with a primer on how our brains function. This book will be helpful to anyone wanting to understand time-tested ways of skillful living backed up by up-to-date science.”

—Frederic Luskin, Ph.D., author of *Forgive for Good* and director of Stanford Forgiveness Projects

“I wish I had a science teacher like Rick Hanson when I went to school. *Buddha’s Brain* is at once fun, fascinating, and profound. It not only shows us effective ways to develop real happiness in our lives, but also explains physiologically how and why they work. As he instructs us to do with positive experiences, take in all the good information this book offers and savor it.”

—James Baraz, author of *Awakening Joy* and cofounder of Spirit Rock Meditation Center

“With the mind of a scientist, the perspective of a psychologist, and the wise heart of a parent and devoted meditator, Rick Hanson has created a guide for all of us who want to learn about and apply the scintillating new research that embraces neurology, psychology, and authentic spiritual inquiry. Up-to-date

discoveries combined with state-of-the-art practices make this book an engaging read. *Buddha's Brain* is at the top of my list!"

—Richard A. Heckler, Ph.D., assistant professor at John F. Kennedy University in Pleasant Hill, CA

"An illuminating guide to the emerging confluence of cutting-edge neuropsychology and ancient Buddhist wisdom filled with practical suggestions on how to gradually rewire your brain for greater happiness. Lucid, good-humored, and easily accessible."

—John J. Prendergast, Ph.D., adjunct associate professor of psychology at California Institute of Integral Studies and senior editor of *The Sacred Mirror* and *Listening from the Heart of Silence*

"*Buddha's Brain* will show you how mental practices, informed by contemplative traditions, can increase your capacity for experiencing happiness and peace. This book provides a scientific understanding of these methods and clear guidance through practices that cultivate a wise and free heart."

—Tara Brach, Ph.D. author of *Radical Acceptance*

"This book enables us to understand the whys and hows of our human operating system so we can make more informed actions that allow us to live our lives

more fully, compassionately, and with greater well-being and kindness towards others and ourselves. What I find exciting about *Buddha's Brain* is Rick Hanson's ability to clearly delineate the root causes of suffering and explain pertinent ways we can actually change these causes and effect lasting change on all levels of our mind, body, and interpersonal relationships. His informative, relaxed, and easy-to-read style of writing made me want to pick up this book again and again and dive ever more deeply into the complexities of our human engineering. *Buddha's Brain* is now on my recommendation list for all my students and teachers-in-training."

—Richard C. Miller, Ph.D., founding president of
Integrative Restoration Institute

"Numerous writings in recent years have exacerbated the traditional rift between science and religion; however, there has been a refreshing parallel movement in the opposite direction. Neuroscientists have become increasingly interested in using first-person introspective inquiries of the mind to complement their third-person, Western scientific investigations of the brain. Buddhist contemplative practices are particularly amenable to such collaboration, inviting efforts to find neurobiological explanations for Buddhist philosophy. Stripped of religious baggage, *Buddha's Brain* clearly describes how modern concepts of evolutionary and cognitive neurobiology support core Buddhist

Foreword

Buddha's Brain is an invitation to use the focus of your mind to harness the power of attention to enhance your life and your relationships with others. Synthesizing ancient insights from contemplative practice in the Buddhist traditions with modern discoveries from the field of neuroscience, Drs. Rick Hanson and Richard Mendius have assembled a thought-provoking and practical guide that walks you step-by-step through awakening your mind.

A revolution in science has recently revealed that the adult brain remains open to change throughout the lifespan. Though many brain scientists have in the past stated that the mind is just the activity of the brain, we now can look at the connection between these two dimensions of our lives from a different perspective. When we consider the mind as an embodied and relational process that regulates the flow of energy and information, we come to realize that we can actually use the mind to change the brain. The simple truth is that how we focus our attention, how we intentionally direct the flow of energy and information through our neural circuits, can directly alter the brain's activity and its structure. The key is to know the steps toward using our awareness in ways that promote well-being.

Knowing that the mind is relational and that the brain is the social organ of the body, we also come to another new point of view: Our relationships with

one another are not a casual part of our lives; they are fundamental to how our minds function and are an essential aspect of brain health. Our social connections with one another shape our neural connections that form the structure of the brain. This means that the way we communicate alters the very circuitry of our brain, especially in ways that help keep our lives in balance. Science further verifies that when we cultivate compassion and mindful awareness in our lives—when we let go of judgments and attend fully to the present—we are harnessing the social circuits of the brain to enable us to transform even our relationship with our own self.

The authors have woven together Buddhist practices developed over two thousand years and new insights into the workings of the brain to offer us this guide to intentionally creating these positive changes in ourselves. Modern times often cause us to go on automatic pilot, continually multitasking and busying our lives with digital stimulation, information overload, and schedules that stress our brains and overwhelm our lives. Finding time to pause amidst this chaos has become an urgent need few of us take the time to satisfy. With *Buddha's Brain*, we are invited to take a deep breath and consider the neural reasons why we should slow ourselves down, balance our brain, and improve our connections with one another, and with our self.

The exercises offered here are based on practices that have been scientifically demonstrated to have

positive effects in shaping our internal world by making us more focused, resilient, and resourceful. These well-established steps also enhance our empathy for others, widening our circles of compassion and care into the interconnected world in which we live. The promise of harnessing our minds to change our brains through these practices is to build the circuits of kindness and well-being moment by moment, one person, one relationship at a time. What more can we ask for? And what better time to begin than now?

Daniel J. Siegel, MD

Author, *Mindsight: The New Science of Personal Transformation* and *The Mindful Brain: Reflection and Attunement in the Cultivation of Well-Being*

Mindsight Institute and the UCLA Mindful

Awareness Research Center

Los Angeles, California

June 2009

Preface

In *Buddha's Brain*, Drs. Rick Hanson and Richard Mendius offer you a beautifully clear and practical connection to the essential wisdom teachings of the Buddha. Using the contemporary language of scientific research, they invite the reader to open to the mysteries of the mind, bringing a modern understanding to the ancient and profound teachings of inner meditation practice. *Buddha's Brain* skillfully weaves these classical teachings with the revolutionary findings of neuroscience, which has begun to confirm the human capacities for mindfulness, compassion, and self-regulation that are central to contemplative training.

In reading this book, you will learn both brain science and practical inner ways to enhance well-being, develop ease and compassion, and reduce suffering. You will be introduced to wise new perspectives on life and the biological bases for fostering the development of this wisdom. These chapters will help you better understand the workings of the mind and the neurological roots of happiness, empathy, and interdependence.

The teachings that underlie each chapter—the noble truths, the foundations of mindfulness, and the development of virtue, lovingkindness, forgiveness, and inner peace—are straightforward and immediate, presented with the Buddha's openhanded invitation for each person to understand individually. The practices that follow these teachings are equally clear

and authentic. They offer fundamentally the same trainings you would receive in a meditation temple.

I have seen Rick and Richard offer these teachings, and I respect how positively it affects the minds and hearts of those who come to practice with them.

More than ever, the human world needs to find ways to build love, understanding, and peace, individually and on a global scale.

May these words contribute to this critical endeavor.

Blessings,

Jack Kornfield, Ph.D.
Spirit Rock Center
Woodacre, California
June 2009

Introduction

This book is about how to reach inside your own brain to create more happiness, love, and wisdom. It explores the historically unprecedented intersection of psychology, neurology, and contemplative practice to answer two questions:

- What brain states underlie the mental states of happiness, love, and wisdom?
- How can you use your mind to stimulate and strengthen these positive brain states?

The result is a practical guide to your brain, full of tools you can use to gradually change it for the better.

Richard is a neurologist and I'm a neuropsychologist. While I've written most of the words here, Richard has been my long-time collaborator and teaching partner; his insights into the brain from his thirty years as a physician are woven into these pages. Together we've founded the Wellspring Institute for Neuroscience and Contemplative Wisdom; its website, www.wisebrain.org, offers many articles, talks, and other resources.

In this book you'll learn effective ways to deal with difficult states of mind, including stress, low mood, distractibility, relationship issues, anxiety, sorrow, and anger. But our main focus will be on positive wellbeing, psychological growth, and spiritual practice. For thousands of years, contemplatives—the Olympic athletes of mental training—have studied the mind.

In this book we'll take the contemplative tradition we know best—Buddhism—and apply it to the brain to reveal neural pathways to happiness, love, and wisdom. No one knows the full nature of the brain of a Buddha or of any other person. But what is increasingly known is how to stimulate and strengthen the neural foundations of joyful, caring, and deeply insightful states of mind.

HOW TO USE THIS BOOK

You don't need any background in neuroscience, psychology, or meditation to use this book. It weaves together information and methods—like an operating manual for your brain combined with a toolbox—and you'll find the tools that work best for you.

Because the brain is fascinating, we've presented a good deal of the latest science about it, including numerous references in case you want to look up these studies yourself. (But to avoid this turning into a textbook, we've simplified the descriptions of neural activities to focus on their essential features.) On the other hand, if you're more interested in practical methods, it's fine to glide over the science parts. Of course, psychology and neurology are both such young sciences that there's a lot they don't understand yet. So we haven't attempted to be comprehensive. In fact, we've been opportunistic, focusing on methods that have a plausible scientific explanation for how they light up your neural networks of contentment, kindness, and peace.

These methods include some guided meditations. The instructions for these are deliberately loose, often including language that's poetic and evocative rather than narrow and specific. You can approach these in different ways: you might just read and think about them; you might bring parts of them into any meditative practices you are already doing; you might work through them with a friend; or you might record the instructions and do them by yourself. The instructions are just suggestions; pause as long as you like between them. There is no wrong way to do a meditation—the right way is what feels right to you.

A word of caution: This book isn't a substitute for professional care, and it is not a treatment for any mental or physical condition. Different things work for different people. Sometimes a method may stir up uncomfortable feelings, especially if you have a history of trauma. Feel free to ignore a method, discuss it with a friend (or counselor), change it, or drop it. Be kind to yourself.

Last, if I know one thing for sure, it's that you can do small things inside your mind that will lead to big changes in your brain and your experience of living. I've seen this happen again and again with people I've known as a psychologist or as a meditation teacher, and I've seen it in my own thoughts and feelings as well. You really can nudge your whole being in a better direction every day.

When you change your brain, you change your life.

chapter 1

The Self-Transforming Brain

The principal activities of brains are making changes in themselves.

—Marvin L. Minsky

When your mind changes, your brain changes, too. In the saying from the work of the psychologist Donald Hebb: when neurons fire together, they wire together—mental activity actually creates new neural structures (Hebb 1949; LeDoux 2003). As a result, even fleeting thoughts and feelings can leave lasting marks on your brain, much like a spring shower can leave little trails on a hillside.

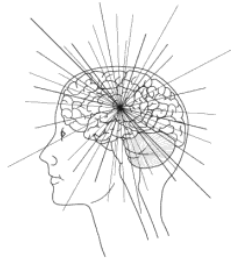
For example, taxi drivers in London—whose job requires remembering lots of twisty streets—develop a larger hippocampus (a key brain region for making visual-spatial memories), since that part of the brain gets an extra workout (Maguire et al. 2000). As you become a happier person, the left frontal region of your brain becomes more active (Davidson 2004).

What flows through your mind sculpts your brain. Thus, *you can use your mind to change your brain for the better*—which will benefit your whole being, and every other person whose life you touch.

This book aims to show you how. You'll learn what the brain is doing when the mind is happy, loving, and wise. And you'll learn many ways to activate these brain states, strengthening them a bit each time. This will give you the ability to gradually rewire your own brain—from the inside out—for greater well-being, fulfillment in your relationships, and inner peace.

Your Brain—Basic Facts

- Your brain is three pounds of tofu-like tissue containing 1.1 trillion cells, including 100 billion *neurons*. On average, each neuron receives about five thousand connections, called *synapses*, from other neurons (Linden 2007).



- At its receiving synapses, a neuron gets signals—usually as a burst of chemicals called *neurotransmitters*—from other neurons. Signals tell a neuron either to fire or not; whether it fires depends mainly on the combination of signals it receives each moment. In turn, when a neuron fires, it sends

scientific knowledge about the mind and brain. As a result, we now have many more ways to become happier and more effective in daily life.

Meanwhile, there's been a growing interest in the contemplative traditions, which have been investigating the mind—and thus the brain—for thousands of years, quieting the mind/brain enough to catch its softest murmurs and developing sophisticated ways to transform it. If you want to get good at anything, it helps to study those who have already mastered that skill, such as top chefs on TV if you like to cook. Therefore, if you'd like to feel more happiness, inner strength, clarity, and peace, it makes sense to learn from contemplative practitioners—both dedicated lay people and monastics—who've really pursued the cultivation of these qualities.

We have probably learned more about the brain in the past twenty years than in all of recorded history.

—Alan Leshner

Although “contemplative” may sound exotic, you've been contemplative if you've ever meditated, prayed, or just looked at the stars with a sense of wonder. The world has many contemplative traditions, most of which are associated with its major religions, including Christianity, Judaism, Islam, Hinduism, and Buddhism. Of these, science has engaged Buddhism the

most. Like science, Buddhism encourages people to take nothing on faith alone and does not require a belief in God. It also has a detailed model of the mind that translates well to psychology and neurology. Consequently, with great respect for other contemplative traditions, we'll draw particularly on Buddhist perspectives and methods.

Anything less than a contemplative perspective on life is an almost certain program for unhappiness.

—Father Thomas Keating

Imagine each of these disciplines—psychology, neurology, and contemplative practice—as a circle (figure 1). The discoveries being made at that intersection are only just starting to show their promise, but scientists, clinicians, and contemplatives have already learned a great deal about the brain states that underlie wholesome mental states and how to activate those brain states. These important -discoveries give you a great ability to influence your own mind. You can use that ability to reduce any distress or dysfunction, increase well-being, and support spiritual practice; these are the central activities of what could be called the *path of awakening*, and our aim is to use brain science to help you travel far and well upon it. No book can give you the brain of a Buddha, but by better understanding the mind and

brain of people who've gone a long way down this path, you can develop more of their joyful, caring, and insightful qualities within your own mind and brain as well.

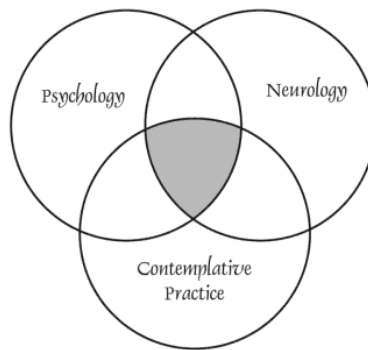


Figure 1 The Intersection of Three Disciplines

The history of science is rich in the example of the fruitfulness of bringing two sets of techniques, two sets of ideas, developed in separate contexts for the pursuit of new truth, into touch with one another.

—J. Robert Oppenheimer

THE AWAKENING BRAIN

Richard and I both believe that something transcendental is involved with the mind, consciousness, and the path of awakening—call it God, Spirit, Buddha-nature, the Ground, or by no name at all. Whatever it is, by definition it's beyond the physical universe. Since it cannot be proven one way or another,

it is important—and consistent with the spirit of science—to respect it as a possibility.

That said, more and more studies are showing how greatly the mind depends on the brain. For example, as the brain develops in childhood, so does the mind; if the brain is ever damaged, so is the mind. Subtle shifts in brain chemistry will alter mood, concentration, and memory (Meyer and Quenzer 2004). Using powerful magnets to suppress the emotion-processing limbic system changes how people make moral judgments (Knoch et al. 2006). Even some spiritual experiences correlate with neural activities (Vaitl et al. 2005).

Any aspect of the mind that is not transcendental must rely upon the physical processes of the brain. Mental activity, whether conscious or unconscious, maps to neural activity, much like a picture of a sunset on your computer screen maps to a pattern of magnetic charges on your hard drive. Apart from potential transcendental factors, the brain is the necessary and proximally sufficient condition for the mind; it's only *proximally* sufficient because the brain is nested in a larger network of biological and cultural causes and conditions, and is affected itself by the mind.

Of course, no one yet knows exactly *how* the brain makes the mind, or how—as Dan Siegel puts it—the mind uses the brain to make the mind. It's sometimes said that the greatest remaining scientific questions are: What caused the Big Bang? What is the grand

unified theory that integrates quantum mechanics and general relativity? And what is the relationship between the mind and the brain, especially regarding conscious experience? The last question is up there with the other two because it is as difficult to answer, and as important.

To use an analogy, after Copernicus, most educated people accepted that the earth revolved around the sun. But no one knew how that actually happened. Roughly 150 years later, Isaac Newton developed the laws of gravity, which began to explain how the earth went about the sun. Then, after 200 more years, Einstein refined Newton's explanation through the theory of general relativity. It could be 350 years, and maybe longer, before we completely -understand the relationship between the brain and the mind. But meanwhile, a reasonable working hypothesis is that *the mind is what the brain does*.

Therefore, an awakening mind means an awakening brain. Throughout history, unsung men and women and great teachers alike have cultivated remarkable mental states by generating remarkable brain states. For instance, when experienced Tibetan practitioners go deep into meditation, they produce uncommonly powerful and pervasive gamma *brainwaves* of electrical activity, in which unusually large regions of neural real estate pulse in synchrony 30–80 times a second (Lutz et al. 2004), integrating and unifying large territories of the mind. So, with a deep bow to the transcendental, we will stay within the frame of

vealed the underlying activities of his brain) and saw there both the causes of suffering and the path to freedom from suffering. Then, for forty years, he wandered northern India, teaching all who would listen how to:

- Cool the fires of greed and hatred to live with integrity
- Steady and concentrate the mind to see through its confusions
- Develop liberating insight

In short, he taught virtue, mindfulness (also called concentration), and wisdom. These are the three pillars of Buddhist practice, as well as the wellsprings of everyday well-being, psychological growth, and spiritual realization.

Virtue simply involves regulating your actions, words, and thoughts to create benefits rather than harms for yourself and others. In your brain, virtue draws on top-down direction from the *prefrontal cortex* (PFC); “prefrontal” means the most forward parts of the brain, just behind and above the forehead, and your “cortex” is the outer layer of the brain (its Latin root means “bark”). Virtue also relies on bottom-up calming from the *parasympathetic* nervous system and positive emotions from the *limbic* system. You’ll learn how to work with the circuitry of these systems in chapter 5. Further on, we’ll explore virtue in relationships, since that’s where it’s often most challenged, and then build on that foundation to nurture

the brain states of empathy, kindness, and love (see chapters 8, 9, and 10).

Mindfulness involves the skillful use of attention to both your inner and outer worlds. Since your brain learns mainly from what you attend to, mindfulness is the doorway to taking in good experiences and making them a part of yourself (we'll discuss how to do this in chapter 4). We'll explore ways to activate the brain states that promote mindfulness, including to the point of deep meditative absorption, in chapters 11 and 12.

Wisdom is applied common sense, which you acquire in two steps. First, you come to understand what hurts and what helps—in other words, the causes of suffering and the path to its end (the focus of chapters 2 and 3). Then, based on this understanding, you let go of those things that hurt and strengthen those that help (chapters 6 and 7). As a result, over time you'll feel more connected with everything, more serene about how all things change and end, and more able to meet pleasure and pain without grasping after the one and struggling with the other. Finally, chapter 13 addresses what is perhaps the most seductive and subtle challenge to wisdom: the sense of being a self who is separate from and vulnerable to the world.

Regulation, Learning, and Selection

Virtue, mindfulness, and wisdom are supported by the three fundamental functions of the brain: regulation, learning, and selection. Your brain regulates it-

self—and other bodily systems—through a combination of excitatory and inhibitory activity: green lights and red lights. It learns through forming new circuits and strengthening or weakening existing ones. And it selects whatever experience has taught it to value; for example, even an earthworm can be trained to pick a particular path to avoid an electric shock.

These three functions—regulation, learning, and selection—operate at all levels of the nervous system, from the intricate molecular dance at the tip of a synapse to the whole-brain integration of control, competence, and discernment. All three functions are involved in any important mental activity.

Nonetheless, each pillar of practice corresponds quite closely to one of the three fundamental neural functions. Virtue relies heavily on regulation, both to excite positive inclinations and to inhibit negative ones. Mindfulness leads to new learning—since attention shapes neural circuits—and draws upon past learning to develop a steadier and more concentrated awareness. Wisdom is a matter of making choices, such as letting go of lesser pleasures for the sake of greater ones. Consequently, developing virtue, mindfulness, and wisdom in your mind depends on improving regulation, learning, and selection in your brain. Strengthening the three neural functions—which you'll learn to do in the pages ahead—thus buttresses the pillars of practice.

INCLINING THE MIND

When you set out on the path of awakening, you begin wherever you are. Then—with time, effort, and skillful means—virtue, mindfulness, and wisdom gradually strengthen and you feel happier and more loving. Some traditions describe this process as an uncovering of the true nature that was always present; others frame it as a transformation of your mind and body. Of course, these two aspects of the path of awakening support each other.

On the one hand, your true nature is both a refuge and a resource for the sometimes difficult work of psychological growth and spiritual practice. It's a remarkable fact that the people who have gone the very deepest into the mind—the sages and saints of every religious tradition—all say essentially the same thing: your fundamental nature is pure, conscious, peaceful, radiant, loving, and wise, and it is joined in mysterious ways with the ultimate underpinnings of reality, by whatever name we give That. Although your true nature may be hidden momentarily by stress and worry, anger and unfulfilled longings, it still continues to exist. Knowing this can be a great comfort.

On the other hand, working with the mind and body to encourage the development of what's wholesome—and the uprooting of what's not—is central to every path of psychological and spiritual development. Even if practice is a matter of "remov-

ing the obscurations” to true nature—to borrow a phrase from Tibetan Buddhism—the clearing of these is a progressive process of training, purification, and transformation. Paradoxically, it takes time to become what we already are.

In either case, these changes in the mind—uncovering inherent purity and cultivating wholesome qualities—reflect changes in the brain. By understanding better how the brain works and changes—how it gets emotionally hijacked or settles into calm virtue; how it creates distractibility or fosters mindful attention; how it makes harmful choices or wise ones—you can take more control of your brain, and therefore your mind. This will make your development of greater well-being, lovingness, and insight easier and more fruitful, and help you go as far as you possibly can on your own path of awakening.

BEING ON YOUR OWN SIDE

It’s a general moral principle that the more power you have over someone, the greater your duty is to use that power benevolently. Well, who is the one person in the world you have the greatest power over? It’s your future self. You hold that life in your hands, and what it will be depends on how you care for it.

One of the central experiences of my life occurred one evening around Thanksgiving, when I was about six years old. I remember standing across the street from our house, on the edge of cornfields in Illinois, seeing ruts in the dark soil filled with water from a

the edge of a sword, and it could tip either way. Across the planet, slowly but surely, we're seeing increasing democratization, a growing number of grassroots organizations, and more understanding of our fragile interconnectedness. On the other hand, the world is getting hotter, military technologies are increasingly lethal, and a billion people go to sleep hungry every night.

The tragedy and the opportunity of this moment in history are exactly the same: the natural and technical resources needed to pull us back from the brink *already exist*. The issue is not a lack of resources. It is a lack of will and restraint, of attention to what's truly happening, and of enlightened self-interest—a shortage, in other words, of virtue, mindfulness, and wisdom.

As you and other people become increasingly skillful with the mind—and thus the brain—that could help tip our world in a better direction.

chapter 1: KEY POINTS

- What happens in your mind changes your brain, both temporarily and in lasting ways; neurons that fire together wire together. And what happens in your brain changes your mind, since the brain and mind are a single, integrated system.

- Therefore, you can use your mind to change your brain to benefit your mind—and everyone else whose life you touch.
- People who have practiced deeply in the contemplative traditions are the “Olympic athletes” of the mind. Learning how they’ve trained their minds (and thus their brains) reveals powerful ways to have more happiness, love, and wisdom.
- The brain evolved to help you survive, but its three primary survival strategies also make you suffer.
- Virtue, mindfulness, and wisdom are the pillars of everyday well-being, personal growth, and spiritual practice; they draw on the three fundamental neural functions of regulation, learning, and selection.
- The path of awakening involves both transforming the mind/brain and uncovering the wonderful true nature that was there all along.
- Small positive actions every day will add up to large changes over time, as you gradually build new neural structures. To keep at it, you need to be on your own side.
- Wholesome changes in the brains of many people could help tip the world in a better direction.

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).

*image
not
available*

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: 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).