

CHAPTER 3

Positive Neuroplasticity

The Neuroscience of Mindfulness

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In this chapter I will share some ideas about the intersection of three circles: neuroscience, clinical psychology, and Buddhist contemplative practice, which I informally call “applied neurodharma.” (In Sanskrit, *dharma* means both reality and an accurate description of it.) Let’s begin with a review of some relevant neuroscience.

The Science of Experience-Dependent Neuroplasticity

The function of the nervous system is to process information, and the brain is constantly changing—both functionally and structurally—due to the information coursing through it. Most of the immaterial information represented by material neural substrates is forever unconscious, but the fraction of this information that composes conscious experience is particularly influential in shaping the brain. This is what researchers call experience-dependent neuroplasticity. The idea that changes in the nervous system underlie learning and memory dates back, in the Western world, at least to Hippocrates. But beginning in the 1940s, accelerating in the past couple decades, our scientific understanding of the breadth, depth, and underlying mechanics of neuroplasticity has grown tremendously. For example, you may have encountered the saying based on the work of the psychologist Donald Hebb in the 1940s: “neurons that fire together, wire together” (Hebb, 2002).

It turns out that neurons fire and wire preferentially and maximally with regard to whatever is in the field of focused attention. In a sense, awareness is like a stage. Right now, in this moment, you are conscious of many things, both in the foreground and in the periphery of the field of awareness. What’s front and center in awareness is more likely to become neural structure, because as the nervous system evolved over 600 million years, what our ancestors paid attention to was usually most relevant to survival, and therefore most important to learn from. And when I use the term “learning” or a related word like “memory,” this includes the emotional, somatic, attitudinal, motivational, social, and sometimes even spiritual residues of our experiences. Traumatization is a kind of learning, as is healing, the acquisition of psychological resources such as mindfulness and compassion, personal growth, and spiritual awakening.

Consequently, one's own path of development is a process of changing one's own brain. Similarly, therapists, educators, meditation teachers, executive coaches, and parents are helping others to change their brains as well. Whether you are encouraging beneficial brain change in yourself or in others, the fact that learning is heightened for what's in the field of focused attention has profound implications. As William James, the grandfather of American psychology, wrote over a century ago, "The education of attention would be the education *par excellence*" (James, 1950). Because attention is like a combination spotlight and vacuum cleaner, it illuminates what it finds on the stage of awareness, and sucks it into our brain. Improving regulation of that spotlight/vacuum cleaner is the foundation of harnessing the ongoing structure-building processes in the nervous system. This highlights the importance of helping our clients (the term I will use here) to get more control over attention, so they can place that spotlight where it's useful and keep it there, or pull it away from what's harmful, such as anxious rumination, grinding resentments, obsessions, compulsions, or addictions. In essence, mental health—brain health—means being able to pull the spotlight of attention away from what hurts, and hold it onto something that helps.

The Powerful Potential of Mindfulness for Healing and Change

The problem is that most people don't have much control over that spotlight. Since learning—in some sense a process of internalization—is turbocharged for what's in the field of focused attention, mindfulness training (or related contemplative training) is vital for improving therapeutic outcomes. Of course, implementing this understanding requires the modesty not to skip over the foundational steps. This reminds me of an experience I had learning the clarinet in sixth grade. I got bored with the scales, and I wanted to skip over the fundamentals to the cool stuff, in which I'd be playing songs like a rock-and-roller. Predictably, after a few weeks I got frustrated because I didn't have the foundational skills to do what I wanted to do, so I lost interest, and unfortunately that was the last experience I had with learning a musical instrument.

Explaining to clients how mindfulness training will help them take charge of the structure-building processes in their brain—in effect, taking charge of the person they are becoming—a little more resilient, a little less anxious, a little more loving each day—is really quite motivating. It's not airy-fairy: the changes are *physical*. More generally, it is also highly motivating to clients, as well as to ourselves as therapists, to appreciate that therapy changes the brain. Although it may be common sense that psychological growth must involve neural change, it can be really helpful to have MRI findings or other hard evidence showing that skillful mental activity, repeated over time, leads to lasting beneficial changes in neural structure or function. The physician Jerome Frank, in his book *Persuasion and Healing*, argues that the effectiveness of psychotherapy depends critically on motivation (Frank, 1993). Joseph Goldstein says something similar about contemplative practice: "Everything rests on the tip of motivation" (Goldstein, 2016). How do

we help our clients be motivated to change? For many, it is truly inspiring to know that their efforts in psychotherapy are actually producing lasting physical changes in the tissues of their own body.

Self-Healing and Transformation in Buddhism

Far afield from modern neuroscience, ancient contemplative traditions like Buddhism offer many time-tested ways of boosting people's motivation for change. Sharon Salzberg alludes to this in the previous chapter. One such way involves the powerful therapeutic optimism or fundamental trust in our potential shown by the Buddha and his teaching. The path of contemplative practice in the Buddhist frame of reference starts with acknowledging the universality of suffering, while promising that our suffering can end in complete liberation. The basis of this promise is the Buddha's personal experience that we all are naturally capable of radical transformation, because of what he calls the stainless purity of mind. In other words, we start out naturally fundamentally free of the suffering that afflicts us, so the path of liberation involves not so much a fierce uphill struggle to force something new "over there" into being, but a progressive and intrinsically rewarding process of revealing what was already present "in here." The Buddha called this process, and the factors that support it, the Noble Eightfold Path. We start with suffering, but end up with the "highest happiness which is peace." Along the way, we need a path made up of intermediate steps, including the gradual removal of the obscurations of our always already true nature.

Perhaps that's what the Buddha meant when he said, "Rejoice in your goodness" (Easwaran, 2007). Appreciate your own good heart, your own good intentions, the sacredness of your own aspirations and daily efforts, and the development of your own good qualities and the fruits of your virtuous efforts. You deserve that gladness, and it's motivating for practice down the long road, which isn't always easy. Spiritual practice, life practice, psychological practice, career practice, parenting practice—any kind of practice can be a long hard road. To motivate ourselves down that road, it's very helpful to periodically feel glad about what's good in yourself, and there's a lot that is good in all of us. I think one of the great taboos these days is the recognition that you actually really are a good person. A taboo against claiming that knowing for yourself, and especially against expressing that knowing to others. This knowing is something like: "I'm not a perfect person, except perhaps in some ultimate sense of having perfect potential. I'm not a perfect person in the conventional sense—but I am a basically decent, *good* person." How can we help our clients claim an authentic confidence about their own goodness? More importantly, how can we help them claim that confidence if we don't have any authentic feeling of claiming it ourselves?

Therapeutic Optimism on the Path of Psychotherapy

If it's appropriate to wish for the end of suffering, it's also appropriate to wish for less suffering. If through psychotherapeutic means we can help people clear

out some of their hindrances of greed or hatred or doubt or remorse or restlessness, or help them exercise right speech in their relationships so they cause less harm to themselves and others, perhaps we can see those simple improvements as intermediate steps on the more ambitious path that leads all the way to exceptional happiness. Likewise, if we help people clear out bit by bit the legacy of their own childhood trauma, so that they can access more capacity to enjoy an undisturbed mind, perhaps this healing process in psychotherapy can also be part of a contemplative path to greater peace and well-being.

Obviously there are pitfalls on either approach to self-healing and transformation, whether by psychotherapy or by contemplation. For instance, one could get overly obsessed with short-term self-improvement and fail to recognize that perfecting the contents of mind is like polishing Jell-O, an impossible task. On the other hand, approached from the spiritual side, some may be prone to what John Welwood called “spiritual bypassing,” using spiritual insights or practices to skip over the hard work of cleaning out their own psychological basements (Welwood, 1983). Yet while there are pitfalls on either side, if we take care to avoid them, I think the psychotherapeutic and contemplative approaches to well-being can each be very effective, perhaps even more so when practiced together.

Of course, there’s a lot of misfortune and suffering in the world, but one thing we can be sure of is that if there is to be mental change for the better there must also be neural change for the better. Even if we don’t yet have the technology that could document what those neural improvements are, we have thousands of anecdotal examples and many studies that show that, given the right healing causes and conditions, even those who have been hit hardest by life can make dramatic recoveries. If people can make dramatic recoveries in terms of their mental functioning, their mood, outlook, sobriety, impulse control, whatever, it must therefore mean that their brains are changing as well. That’s a very important point to appreciate, and an easy way to talk about therapeutic change with clients, colleagues, or the media. If the mind is changing the brain must be changing as well.

Brain Vulnerability, Prevention, and Mindfulness

The brain consists of roughly three pounds of tofu-like tissue inside the coconut shell of the skull. It may not look like much but is arguably the most complex physical object currently known. It has roughly 1.1 trillion cells, about 10 percent of which—100 billion or so—are neurons. Neurons on average make about 5000 connections with other neurons, giving us a network with several hundred trillion nodes called synapses, each so tiny that roughly 5000 of them would fit in the width of a single human hair. The realm of the brain is the realm of the very small, the very fast, and the very complex. Neurons are firing away typically five to fifty times a second. Even though it’s just 2 to 3 percent of body weight, the brain consumes roughly 20 to 25 percent of the oxygen and glucose circulating in our blood.

With regards to the plasticity of the brain, it is particularly vulnerable to changing for the worse through negative experiences. There are some vicious cycle

dynamics we are increasingly aware of, one of which involves cortisol, a stress hormone that is also released when we feel irritated with a partner or worried about money, or when we recall an upsetting experience. Released from the adrenal glands on the kidneys, cortisol enters the brain, where it has a one-two punch. It sensitizes the amygdala—in some ways the alarm bell of the brain—and weakens the hippocampus, which (among other functions) helps us put things in context while also calming down the amygdala and signaling the hypothalamus to quit calling for more stress hormones. These very physical processes create a feedback loop in which negative experiences yesterday make us more vulnerable to them today, which then sensitizes us even more to the negative tomorrow. Unfortunately, there's no comparable process of sensitization to positive experiences. We need to bring repeated sustained mindful attention to beneficial experiences (which usually feel good because they are good for us) in order to help the brain become increasingly efficient at internalizing them.

We have a brain that's vulnerable to change for the worse. So we have to take care to stop the causes of stress, as well as to protect our minds and brains from the powerful effects of chronic stress and trauma. An ounce of prevention is worth a pound of cure. The good news is that in addition to the mental evidence for the possibility of healing and recovery from trauma, there is a growing body of neural evidence for the possibility of preventing our natural vulnerability to stress and trauma. For example, the activation of the amygdala can be down-regulated by simply noting your own experience through mindfulness practice. Literally just naming anger, rage, or trauma increases processing in the prefrontal cortex, the executive system of the brain, and down-regulates activation of the amygdala. That's good in the short term.

Over the long term you can actually also get neuro-structural change in the amygdala itself through contemplative practice (Hölzel et al., 2010). For example, you can get an increase in receptors in the amygdala for oxytocin, the social bonding and connecting hormone. So people become more and more able to use social experiences of feeling nurtured and included and seen. Even when the hippocampus has shrunk in size due to chronic overexposure to cortisol, you can still get neurogenesis there, the birth of baby neurons, through healthy exercise of your body and stimulation of your mind (Kirsty et al., 2013).

Some people, such as Alan Schore, have advanced the view that very vulnerable young children who've had horrifying traumatic experiences can be permanently damaged by them (Schore, 2012). This may turn out to be true—though in general I prefer to bet on the human spirit, on the possibilities of neuroplasticity. The stress diathesis model basically says that healthy human development is based on the three variables. The first of these are life challenges, demands on us like stresses, traumas, and injuries. The second variable is our genetic or constitutional vulnerability, physical and psychological. The third factor is resources. The greater our vulnerabilities, the more we need to be careful to dial down challenges and increase resources wherever possible. Similarly, the greater the challenges, the more we need to protect vulnerabilities and increase resources. We tend to have less influence over our challenges, though we may be able do some things to regulate

the environment and the demands we're grappling with. We can do a little bit about our vulnerabilities, especially over time. But where we usually have the most opportunity is increasing resources of various kinds. To me, this possibility is really, really hopeful and helpful. If people do the best that they can in the next minute, which is the most important minute of our life, minute after minute, the *experience* of living can certainly improve—even if bodily or environmental conditions are stubbornly slow to change.

Overcoming Therapeutic Pessimism through Mindful Cultivation

I think Freud was grossly mistaken when he called psychotherapy an “impossible profession” (Freud, 1937, p. 248). I find the efficacy evidence for psychotherapy is extraordinary. If Pfizer or Merck could patent psychotherapy in terms of its benefits for physical health outcomes, let alone mental health outcomes, we'd be seeing ads for it every night on television. Of course, the challenges are huge, and often it's hard to deliver resources to people in the most dire need. But we can do a lot to help. From an evolutionary standpoint, certain experiences have a very high restorative value. Everyday beneficial experiences—relaxing while exhaling, taking in the friendly smile of another person, recognizing some good quality in oneself—have the power to bring us out of the “red zone” of stress and trauma back into the “green zone” of well-being, which is our resting state, our home base.

One aspect of the restorative power of internalizing beneficial experiences, taking them into yourself to build durable psychological resources, is that they often help you to register that in this moment you are basically all right. How does this work? Consider the fact that most of the inputs into the brain originate from inside the body, since our ancestors—going all the way back to jellyfish, worms, crabs, jawless fish, turtles, and mammals from rodents to primates—had to know what was going on inside their bodies. Of course, there are times when things inside our bodies are not all right. We may be in extreme pain, on the edge of death, when something terrible has happened. But most of the time, the vast majority of signals coming up from the viscera into the hypothalamus, which monitors your interior and is a key control center for craving (subtle to gross), are like the reassuring calls of a night watchman: “All is well, in this moment there is actually enough air, you've had enough food, you're not extremely thirsty, not in agonizing pain, things are actually all right, right now.”

The opportunity, especially for those hit hard by life, is to recognize that at least in this moment they're actually all right in a fundamental sense. It may not be a great moment, a perfect moment, but it is basically all right. We may wish we had more food, more money, more love, but it's vital to realize what is *also* true: that we're basically all right, right now. Each of us has an incredible opportunity to register again and again and again, thousands and thousands of times, one or five or ten seconds at a time, “I'm all right, right now.” The fact is, we need to consciously choose and practice recognizing this, since most of us, especially those who have been traumatized, live with a background trickle of anxiety. Through natural

selection, evolution has bred us to be ever vigilant. To truly register that we're basically, fundamentally all right here and now, we have to push against the well-intended lie that Mother Nature is continually whispering, like the evil minister Wormtongue in *The Lord of the Rings*, "Be afraid; watch out; be very afraid."

Besides recognizing that you are basically all right when you actually are, another usually accessible source of authentic well-being involves feeling cared about by other beings, in some way, shape, or form. Any time you have a chance to feel included, seen, appreciated, liked, or loved, that is a beautiful opportunity to experience a sense of well-being in the moment—and to internalize that experience to develop an increasingly unconditional sense of confidence and worth hard-wired into your own nervous system. As our primate, hominid, and early human ancestors lived and evolved in small bands, for instance on the Serengeti plains, exile was effectively a death sentence. If you were separated from your band, you were likely to die. Consequently, today, surrounded by all our fancy technology, the experience of social support is still primally vital to the sense of basic safety.

So, repeatedly having and taking in these two simple and down-to-earth experiences—of feeling all right, right now, and feeling cared about in one way or another—has become an important part of my day as well as my contemplative practice. Sometimes, there's so much fear as well as mistrust of others that doing this practice is a kind of "cultural disobedience" akin to civil disobedience. For instance, when I used to pass through airports with signs and loudspeaker announcements that "the threat level is orange, the threat level is orange," I would remind myself that the actual odds of a bad event on my flight that day were like a swimming pool of green paint with one drop of yellow. And I kept registering in my own body, "No, I'm green, I'm green, I'm green." Likewise, with others, it doesn't have to be a perfect interaction or perfect relationship, but in some fundamental sense we can register feeling included, seen, appreciated, even loved.

Natural Constraints on Neuroplasticity

Of course, there are constraints on neuroplasticity. For example, I could not will myself to lose a language. Or, someone who's suffered a stroke that mildly affects certain parts of their brain might be able to recover a fair amount of function, but there can also be irrevocable damage that can't be undone by even the most persistent practice. I also think there are limits in terms of core things like temperament. And of course there may also be constitutional limits on certain capacities or talents. We can't suddenly make ourselves mathematical geniuses, for example. Closer to home, there may also be constraints in terms of the negative habits that grip us each day. How quickly or easily can we help ourselves be less gripped by hatred, heartache, or delusion, or less affected by a parent's critical voice in our head, or by childhood losses or traumas we've had? The evidence is that people can change dramatically, but it's rarely quick or easy.

The fact is, we have a brain that did not evolve to be enlightened. It's been shaped by the harsh survival needs of our ancestors to suffer and crave and suffer some more. Animals that fought or fled or froze in reaction to real or potential pain . . .

that chased or gorged on or tried to mate with whatever was pleasurable . . . that clung to relationships, with loyalty to their own band and fear and disgust toward other bands . . . that moved quickly past what was neutral, looking for something better—well, these animals were more likely to pass on their genes. One useful way to think about practice, when it comes to underlying biological, neurological, or psychological causes of suffering and how to end them, is to appreciate how much power those ancient causes have. When we practice, we are dealing with 600 million years of evolution in the nervous system, on top of another three billion years of evolution of life. This said, we did not evolve to play chess or ping pong, or to make symphonies or skyscrapers, and yet we can do these things and more. With practice, we really can extinguish the fires of craving over time. And through repeated insight and practice, we can even deconstruct the conventional sense of “I” that hooks us into taking the largely impersonal processes of life so very personally. We can help ourselves learn from beneficial experiences, gradually coming home to the green zone, in which there is less and less need to presume a unified, stable, and independent “I” (Hanson, 2009, 2013).

The Neurobiology of Mind and Meditation

The Buddha was one of the pioneers in describing the mental causes of suffering and happiness. Nowadays, we can complement his hard-won wisdom with an evolutionary neuropsychology that sheds new light on the underlying causes of suffering and happiness. Of course, the Buddha and many of his peers and heirs became awakened without having an MRI. In this chapter, I have been exploring our experiences, and consciousness altogether, inside what is called the “natural frame” of science. In this framework, phenomena are considered to have causes within the material universe—including wildly exotic causes such as mass bending space to produce gravity, quantum entanglement, and dark energy—even if we do not yet understand them fully. This framework does not argue against potential causes that lie outside it, but does ask whether it is necessary to posit such causes for a full account of a phenomenon.

Within the natural frame, scientists and scholars explore how what we see, what we hear, what we think, our hopes, our joys, our sorrows could be the result of causes within the material universe. From this perspective, there are still great mysteries, such as the two-way causal link between mind and brain. There might be causes of consciousness that are supernatural or transcendental, by definition outside of the natural frame, but science does not engage these causes, and looks instead at the human body, embedded in nature and culture, both now and over the course of deep time. Science investigates how the mind—which I define as the information represented by the nervous system—could be a natural process that is grounded in life.

Correlations between mental activity and physical process within the brain are increasingly well established. Yet there still remains what is called the “hard problem” in consciousness studies: an explanatory gap between the meat and the mind that profound scholars and teachers like Francesco Varela and Tenzin Palmo

have written about (Varela et al., 1992; Palmo, 2002). As Tenzin Palmo has said, “We’re thinking all the time, but we still don’t actually know what a single thought actually is.” As we explore, inside the natural frame, the processes of mind and how to shape them for our own sake and that of other beings, it is important also to respect the mystery and majesty of mind. Immaterial information (mind) represented by a material substrate (brain, embedded in a nervous system embedded in a body embedded in life) is an example of what philosophers call “dual-aspect monism,” the notion that there can be two categorically distinct features of a single system. Looking at things in this way allows causality to flow in both directions, from mind to brain and brain to mind. Information has a logic of its own, its own causal streaming. It enlists underlying material processes to represent it, but its own logic is driving the underlying flow of neural activity, which then can leave lasting traces in neural structure. This way of understanding the mind respects its dignity, while also locating mind as a natural process arising dependently upon its material substrates.

If we’re being deliberately mindful, whether it’s in contemplative practice, attending to our partner, or learning long division, we’re stimulating certain kinds of brain activity. If we observe the brain of someone paying attention in an MRI, we might see heightened activation in the cingulate cortex, especially the anterior part of it that supports top-down processing. MRI imagery—humorously described as the new science of “blobology”—may make it look as if the rest of the brain has gone dark, sort of like the orange glow of a little campfire late at night in a lonely wood, but the whole brain is still busy. It’s just that the anterior cingulate cortex, in this case, is about 2–3 percent more metabolically active: a difference that makes a difference. This is just one illustration of how mental activity, in this case paying attention deliberately, entails underlying neural activity, which shows up as greater activation in a part of the brain that performs that particular function. Then we go to the next step: repeated patterns of mental activity entail repeated patterns of neural activity, and repeated patterns of neural activity build neural structure. Here we have the essence of experience-dependent neural plasticity; our thoughts, our feelings, and how we respond to them are continually sculpting our brain.

The brain is the organ that learns, and any form of learning—from personal growth and cultivation of loving-kindness to nonordinary states of absorption—all that learning involves alterations in brain structure or function. For example, comparing the brains of long-time meditators to those of non-meditators, as in the well-known study by Sarah Lazar and her colleagues (2005), found that the meditators’ brains had measurably thicker cortex in two key regions. Number one is the insula, on the inside of the temporal lobes, which is very involved in interoception. The second is the prefrontal cortex behind the forehead, involved in the control of attention, emotion, and action. These findings make sense given that meditators are constantly regulating their breath and body awareness, as well as their attention, emotions, and responses. They work the “muscles” in the parts of the brain involved with these functions’ regions until they get bigger, metaphorically speaking, as a result. Now, we naturally lose several thousand brain cells a day.

That's a lot but since we have 1.1 trillion to start with, we only lose several percent by the time we are elderly. In the cortex, this process is called normal cortical thinning and it is related to normal cognitive decline due to aging—not dementia, but forgetting names and where you left your car keys. Lazar and her colleagues found that the non-meditators did in fact develop thinner insular and prefrontal cortex as they aged, but older meditators did *not* have such thinning: they preserved these portions of their brains, apparently through regular meditative practice. They used it so they did not lose it—which has obvious implications for everyone, including an aging population.

The Neurobiology of Wholesome Experience: Installing States and Traits

Whether looked at from the vantage of modern or traditional mind science, what is fundamental to healing is the cycle of states and traits, activation and installation. States are momentary, temporary conditions, like a moment of loving-kindness, anger, or determination. Traits are more enduring tendencies of heart and mind that can incline us toward better or worse. This brings us to the question: how do we develop wholesome traits? Traits come from states. On average, roughly a third of our personal qualities are innate, grounded in our biology, in our DNA. The other two-thirds of our traits are acquired, not innate. They start out as states, experiences of one kind or another, and then through repetition they become gradually installed in enduring neural structure as a trait. This process offers us the welcome possibility of a virtuous circle of positive traits. Activated, positive states can become installed as enduring positive traits, then these installed positive traits can foster positive states in turn, which then become another opportunity to reinstall and reinforce the trait.

How do we cultivate this virtuous circle? The opportunity here is one of self-directed neuroplasticity, in which we can use the mind to change the brain to change the mind for the better. In order to do this, we have to get on our own side, to be a friend to ourselves. Otherwise there will be no traction, no motivation to activate wholesome mental states, and no motivation to install those activated mental states as enduring neural traits. It's helpful to appreciate in Buddhism or in other traditions various rationales for being a friend to ourselves, as an act of benevolence. Most people treat others better than they treat themselves, but the Golden Rule is a two-way street: we should do unto ourselves as we do unto others. If it's a moral value for us to be benevolent toward all beings, that includes the one being who wears our own name tag. In general, we have the highest duty to use power well over those that we most influence, and the one being we influence most is our future self, a minute from now, a year from now, perhaps a lifetime from now. As Pema Chodron says, "The root of Buddhism is compassion, and the root of compassion is self-compassion, compassion for oneself" (Chodron, 2000).

There are so many implications to this process of growing inner strengths. It makes me think of a famous story you've likely heard in some form. A Native American woman was asked toward the end of her life, "Grandmother, how did

you become so happy, so strong, and so wise? Everybody listens to you, everybody wants to be your friend. How did you do it?” She paused, reflected, and replied, “I think it was because when I was young I realized that in my heart were two wolves, one of love and one of hate. I also realized that everything depended upon which one I fed each day.” Who among us does not have some kind of wolf of hate broadly defined, a capacity for hostility, for envy, for resentment, for aggression, even violence? Modern evolutionary studies indicate that the wolf of love and wolf of hate coevolved in our ancestors, in hominid and early human groups that bred mainly inside the band. Groups that were better at cooperating internally could outcompete other groups. Bands that were more aggressive than other bands at claiming resources in hard times were also more able to pass on their genes. Of course, evolution gives us inclinations and options, and it is up to us to respond to these wisely today. Which wolf will we feed?

The Buddhist View of Cultivation and Resilience

A frequent metaphor in early Buddhism is the Vedic image of the sacrificial fire. So perhaps a Buddhist way to ask this question is, “Which fire are we fueling?” For instance, the Buddha described greed, hatred, and delusion as fuels for the fire of suffering and harm. By contrast, generosity, love, and wisdom are fuels for the fire of happiness and welfare. Whether as therapists, parents, meditation teachers, or business consultants, much of our efforts in life are devoted to cultivating strengths, broadly defined. Inner strengths include things like character virtues. In the Buddhist context, these include qualities like the seven factors of enlightenment: mindfulness, investigation, energy, bliss, tranquility, concentration, and equanimity. Another list involves positive emotional factors called immeasurable states or divine abodes (*brahma-vihara*): loving-kindness, compassion, altruistic joy, and equanimity. As positive psychology has increasingly shown, many of these states of mind promote lasting happiness (Lopez & Pedrotti, 2014).

Unfortunately, most positive experiences are wasted on the brain. This is the fundamental weakness of psychotherapy, character education for kids, mindfulness training, recovery work, or dealing with trauma. As teachers, therapists, coaches, people in the humanities broadly, we may be quite good at activating positive states. But historically we’ve assumed that these states would just stick to the brain. As it turns out, the real problem is less around activating positive states than it is around installing them in the brain as neural traits, so we don’t waste them. We’ve hit the bottleneck in our brains; now we need to open that bottleneck up. That’s where the practice of taking in the good comes in. With a little bit of mindful attention, five, ten, twenty seconds at a time, we can heighten the conversion of positive, useful, activated mental states into lasting, useful, positive neural traits.

H-E-A-L: The Four Stages of Wholesome Learning

I’ve described the practice of taking in the good, wholesome learning, as a two-stage process: we start by activating a useful state, then we install it in the brain.

But if we really want to insure that we install the positive state, there are at least two other things we can do to help the process along. I summarize the four-step process of taking in the good with the acronym HEAL. H reminds us that we need to *have* positive experiences first of all. E reminds us that we are more likely to register and install them if we *enrich* that experience. A reminds us that we need to *absorb* the experience. L reminds us that we can more fully install the experience if we *link* it to other experiences which are significant to us.

Having positive experiences is simple enough, but how do we enrich them? There are five major factors that are known to heighten or enrich learning. First, duration is fundamental, the longer the better. Second, intensity counts, the more intense the experience the more readily we remember it. Third, multimodality, which means the more you feel it in the body, the more it's enacted, the more it's sensate, the more it's emotional, the more neurons are going to be firing together and wiring together. Fourth is novelty. The more we see things afresh rather than just presuming, "I know what this is," the more likely we are to install it. Fifth and last comes personal relevance. We remember what's salient, what matters to us. Why would it help me to have this particular positive experience?

As for the third step, we need to *absorb* the experience. Research shows that we can sensitize or prime underlying memory systems through the top-down intention to remember. We've probably all had the experience of getting the phone number of some cool person we meet in a bar, but we can't write it down: we just say it again and again and again. Or we may have a really meaningful moment, maybe at meditation or the birth of a child or a particularly beautiful sunset, and we tell ourselves to remember this one.

Finally, we can help install the state we're experiencing by linking it to other states. One way to do this is to hold an awareness of both positive and negative material at the same time. That's since neurons fire together, they wire together, the neural substrates of the positive material start associating with, and linking with and wiring together with the neural substrates of the negative material. When the negative material goes back down the memory hole to be reconsolidated in a very dynamic process, it takes some of those positive associations with it. Then, repeatedly, with repeated linking of positive to negative, eventually the negative can be soothed, eased, minimized, and even gradually replaced. Many people do this naturally or intuitively. Increasingly therapists are learning to do this. Focusing is an example of using this technique in therapy, and others include forms of trauma treatment like eye movement desensitization and reprocessing (EMDR) or somatic experiencing, addressed in Diana Fosha and Mariana Caplan's chapters later in this volume.

If you think about the first three steps, it may help to use the metaphor of fire—much as the Buddha did long ago. In the first step, Have, we light the fire. In the second, Enrich, we add fuel to the fire to keep it burning, burning ever more brightly. In the third step, Absorb, we warm ourselves by the fire. We let the warmth, the heat of the fire sink into us. We let what's useful and wholesome about this experience really come in.

To put the HEAL practice in context, there are three fundamental ways to engage the mind. The first way is to just be with what is, feel the feelings, experience the experience, witness it, hopefully hold it in a vast space of awareness, possibly even direct some friendliness or compassion towards what's there. Hopefully we can also disidentify from it, maybe even investigate it. We sense down to what's younger, more vulnerable or more central to us. But we're not trying to change it. We're simply being with it. The second way to engage the mind is to prevent, reduce, or end what is negative. (Throughout this chapter, I mean "good" and "bad," "positive" and "negative," in pragmatic not moral terms as that which, respectively, promotes the happiness and welfare of oneself and others, or promotes the suffering and harm.) We release greed, hatred and delusion, relax tension in our body, let go of thoughts that are not helpful for us or other people, control or abandon desires that are harmful for ourselves and others. The third way to engage the mind is to create, preserve, or grow the positive. We open to wise view, we cultivate good intentions, we develop mindfulness, grit, gratitude, and compassion. We can be mindful in all three forms of practice. Using the metaphor of a garden, we can witness it, pull weeds, or grow flowers. While all of these are vital, the first one—being with the mind—is most fundamental, since you can't always release the negative or grow the positive. Still, it is not the only mode of practice, and I think that many people overvalue it.

How do we understand cultivation in a Buddhist frame of reference? We're taught the root of all suffering is craving—but what is the root of craving? In terms of evolutionary neuropsychology, craving is a drive state that arises dependently upon an invasive internal sense of deficit or disturbance. Through repeatedly internalizing wholesome experiences of core needs being met, we can gradually replace the roots of craving with a growing sense of fullness and balance hardwired into the nervous system. Over time, cultivation undoes craving. Having and taking in experiences of core needs met—experiences of safety, satisfaction, and connection—builds up the neural substrates of a green zone brain, with a mind increasingly colored by peace, contentment, and love. Do this practice of wholesome cultivation again and again and again, 10,000 times, ten seconds at a time. Again and again and again and again and again, growing the internal sense of core needs met no matter if the world or other people are flashing red.

Doing this will deepen the keel in the sailboat of your mind/brain, and you will be able to manage inevitable challenges in life more resiliently and gracefully and joyfully. As the eight "worldly winds" blow—praise and blame, gain and loss, fame and ill-repute, pleasure and pain—it will be much harder to knock you over. And if you get banged hard, you will recover more quickly. Then you can afford to dream bigger dreams, and head on out into the deep blue sea. As Mary Oliver (2004) asks:

Tell me, what is it you plan to do
with your one wild and precious life?