

The following are extracts from *Hardwiring Happiness: The practical science of reshaping your brain and your life* by Rick Hanson

Experience-Dependent Neuroplasticity

The brain is the organ that learns, so it is designed to be changed by your experiences. It still amazes me but it's true: Whatever we repeatedly sense and feel and want and think is slowly but surely sculpting neural structure. As you read this, in the five cups of tofu-like tissue inside your head, nested amid a trillion support cells, 80 to 100 billion neurons are signalling one another in a network with about half a quadrillion connections, called synapses. All this incredibly fast, complex, and dynamic neural activity is continually changing your brain. Active synapses become more sensitive, new synapses start growing within minutes, busy regions get more blood since they need more oxygen and glucose to do their work, and genes inside neurons turn on or off. Meanwhile, less active connections wither away in a process sometimes called neural Darwinism: the survival of the busiest.

All mental activity—sights and sounds, thoughts and feelings, conscious and unconscious processes—is based on underlying neural activity. Much mental and therefore neural activity flows through the brain like ripples on a river, with no lasting effects on its channel. But intense, prolonged, or repeated mental/neural activity—especially if it is conscious—will leave an enduring imprint in neural structure, like a surging current re-shaping a riverbed. As they say in neuroscience: Neurons that fire together wire together. Mental states become neural traits. Day after day, your mind is building your brain.

This is what scientists call experience-dependent neuroplasticity, which is a hot area of research these days. For example, London taxi drivers memorizing the city's spaghetti snarl of streets have thickened neural layers in their hippocampus, the region that helps make visual-spatial memories; as if they were building a muscle, these drivers worked a part of their brain and grew new tissue there. Moving from the cab to the cushion, mindfulness meditators have increased gray matter—which means a thicker *cortex*—in three key regions: *prefrontal* areas behind the forehead that control attention; the *insula*, which we use for tuning into ourselves and others; and the hippocampus. Your experiences don't just grow new synapses, remarkable as that is by itself, but also somehow reach down into your genes—into little strips of atoms in the twisted molecules of DNA inside the nuclei of neurons—and change how they operate. For instance, if you routinely practice relaxation, this will increase the activity of genes that calm down stress reactions, making you more resilient.

Changing the Brain for the Better

If you step back from the details of these studies, one simple truth stands out: Your experiences *matter*. Not just for how they feel in the moment but for the lasting traces they leave in your brain. Your experiences of happiness, worry, love, and anxiety can make real changes in your neural networks. The structure-building processes of the nervous system are turbocharged by conscious experience, and especially by what's in the foreground of your awareness. Your attention is like a combination spotlight and vacuum cleaner: It highlights what it lands on and then sucks it into your brain—for better or worse.

There's a traditional saying that the mind takes its shape from what it rests upon. Based on what we've learned about experience-dependent neuroplasticity, a modern version would be to say that *the brain* takes *its* shape from what the mind rests upon. If you keep resting your mind on self-criticism, worries, grumbling about others, hurts, and stress, then your brain will be shaped into greater reactivity, vulnerability to anxiety and depressed mood, a narrow focus on threats and losses, and inclinations toward anger, sadness, and guilt. On the other hand, if you keep resting your mind on good events and conditions (someone was nice to you, there's a roof over your head), pleasant feelings, the things you do get done, physical pleasures, and your good intentions and qualities, then over time your brain will take a different shape, one with strength and resilience hardwired into it, as well as a realistically optimistic outlook, a positive mood, and a sense of worth. Looking back over the past week or so, where has your mind been mainly resting?

In effect, what you pay attention to—what you rest your mind on—is the primary shaper of your brain. While some things naturally grab a person's attention—such as a problem at work, a physical pain, or a serious worry—on the whole you have a lot of influence over where your mind rests. This means that you can deliberately prolong and even create the experiences that will shape your brain for the better.

Meanwhile, feel free to start taking in the good right now.

Things That Couldn't Be True

You can also use your inner theater to imagine good facts that could never be true for you. Deep down in the emotional memory centers of your brain, imagined experiences build neural structures through mechanisms similar to those that actual, lived experiences use. You're not using this method to delude yourself about what's been

missing, or to slip into a rosy fantasy world that distracts you from improving this one. You still know what's true. You just suffer it less.

For example, I've known people who never received any kind of loving parenting. Feeling loved in this way is important for healthy psychological development, and the lack of it leaves a wound in the heart. For these people, it was a powerful experience to imagine a loving parent and then take in feelings of being cuddled, soothed, and cherished. This didn't mean they forgot what had actually happened in their childhood. But they were resourceful on their own behalf, finding ways to give themselves at least *some* sense of a vital experience, feeling cherished by a loving parent. Though it wasn't a miracle cure, this practice made a big difference to them.

Making Connections

You could also imagine that the positive material is connecting with younger layers in your psyche, as this person did:

My mother abandoned our family on my third birthday. Regularly, I take in the good while walking on a nearby trail along a lagoon. Every day I see things there that nourish me, such as the graceful flight of a large flock of birds or the tender new leaves on a bush. When I notice such things, I stop for maybe thirty seconds to drink them in. I breathe deeply and imagine the goodness of the experience sinking into me—I find the image of filling a treasure chest in my heart effective. I began pairing this beautiful experience with the thought of my mother's leaving. At first, it was bewildering to think of her. But after doing this practice for a few months, I can now think of my mother without it feeling painful.

You could even get the sense that the child inside you—since there are younger layers inside everyone's psyche—is finally getting some things that he or she always needed. Perhaps visualize a nurturing adult part of you holding and comforting young parts of you in your lap, as this woman did:

Recently a deep childhood hurt appeared out of the rabbit hole of memory. In the past it would have swept me away. But this time I asked myself: What does this very scared and alone small child need? The answer was for someone to hold her with love and bear witness to her sadness. So I just stayed with the sense of a caring, gentle, caressing presence who listened to this little girl and didn't try to talk her out of her

feelings. Many, many years later, that small child was finally heard, felt, and held. This hurt has reappeared several times since, but it keeps getting softer.

As a bonus, if it's real for you, explore a sense of receiving the positive material *into* the negative. Like a sense of being soothed. Or a sense of young parts of you receiving and taking in at least a little of what they've longed for. This involves a kind of dual perspective in which one part of you experiences offering a positive experience while another part of you experiences receiving it.