Sitting Meditation

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[for audio guidance, go to Sitting Meditation]

We call the heart of the formal meditation practice "sitting meditation" or simply "sitting." As with breathing, sitting is not foreign to anyone. We all sit, nothing special about that. But mindful sitting is different from ordinary sitting in the same way that mindful breathing is different from ordinary breathing. The difference, of course, is your awareness.

To practice sitting, we make a special time and place for non-doing. We consciously adopt an alert and relaxed body posture so that we can feel relatively comfortable without moving, and then we reside with calm acceptance in the present without trying to fill it with anything. You have already tried this in the various exercises in which you have watched your breathing.

It helps a lot to adopt an erect and dignified posture, with your head, neck, and back aligned vertically. This allows the breath to flow most easily. It is also the physical counterpart of the inner attitudes of self-reliance, self-acceptance, and alert attention that we are cultivating.

We usually practice the sitting meditation either on a chair or on the floor *(see "NOTE" at the end of this article for alternatives)*. If you choose a chair, the ideal is to use one that has a straight back and that allows your feet to be flat on the floor. We often recommend that if possible you sit away from the back of the chair so that you spine is self-supporting (see Figure A). But if you have to, leaning against the back of the chair is also fine. If you choose to sit on the floor, do so on firm, thick cushion which raises your buttocks off the floor three to six inches (a pillow folded over once or twice does nicely; or you can purchase a meditation cushion, or zafu, specifically for sitting).

There are a number of cross-legged sitting postures and kneeling postures that some people use when they sit on the floor. The one I use most is the so-called "Burmese" posture (see Figure B), which involves drawing one heel in close to the body and draping the other leg in front of it. Depending on how flexible your hips and knees and ankles are, your knees may or may not be touching the floor. It is somewhat more comfortable when they are. Others use a kneeling posture, placing the cushion between the feet (see Figure C).

Sitting on the floor can give you a reassuring feeling of being "grounded" and self-supporting in the meditation posture, but it is not necessary to meditate sitting on the floor or in a cross-legged posture. Some of our patients prefer the floor, but most sit on straight-backed chairs. Ultimately it is not what you are sitting on that matters in meditation but the sincerity of your effort.

Whether you choose the floor or a chair, posture is very important in meditation practice. It can be an outward support in cultivating an inner attitude of dignity, patience, and self-acceptance. The main points to keep in mind about your posture are to try to keep the back, neck, and head aligned in the vertical, to relax the shoulders, and to do something comfortable with your hands. Usually we place them on the knees or we rest them in the lap with the fingers of the left hand above the fingers of the right and the tips of the thumbs just touching each other.

When we have assumed the posture we have selected, we bring our attention to our breathing. We *feel* it come in, we *feel* it go out. We dwell in the present, moment by moment, breath by breath. It sounds simple, and it is. Full awareness on the inbreath, full awareness on the outbreath. Letting the breath just happen, observing it, feeling all the sensations, gross and subtle, associated with it.

It is simple but it is not easy. You can probably sit in front of a TV set or in a car on a trip for hours without giving it a thought. But when you try sitting in your house with nothing to watch but your breath, your body and your mind, with nothing to entertain you and no place to go, the first thing you will probably notice is that at least part of you doesn't want to stay at this for very long. After perhaps a minute or two or three or four, either the body or the mind will have had enough and will demand something else, either to shift to some other posture or to do something else entirely. This is inevitable.

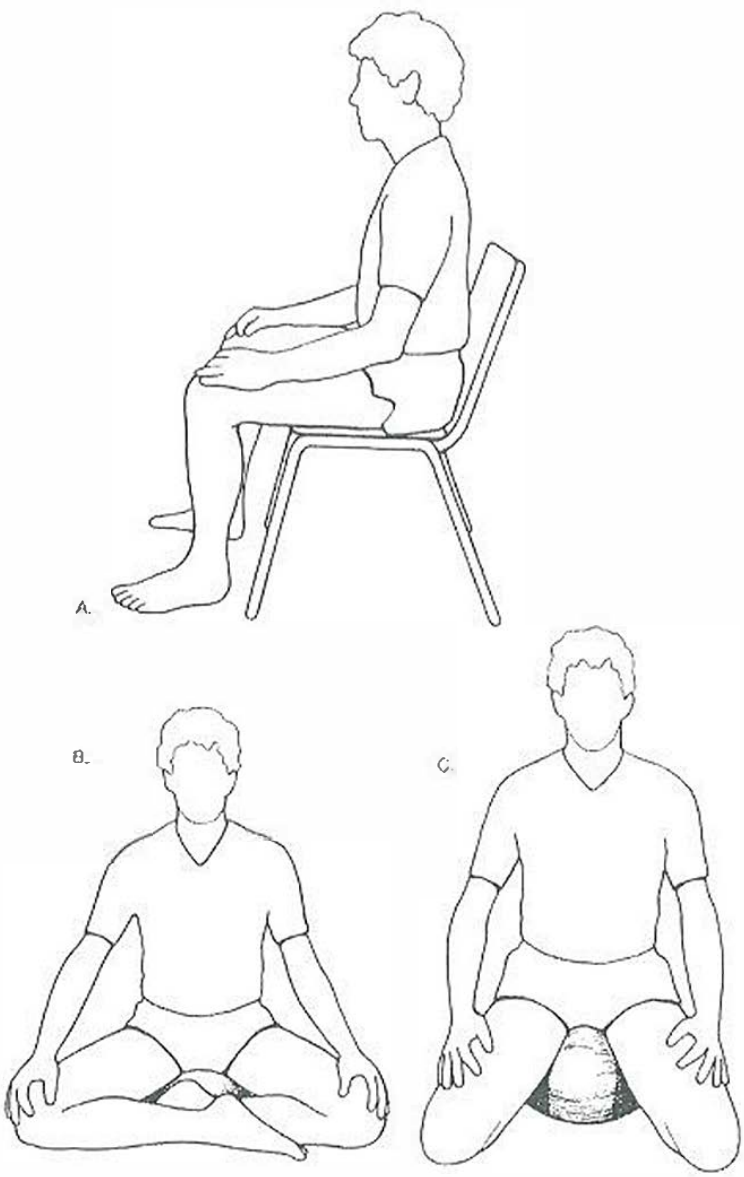
It is at this point that the work of self-observation gets particularly interesting and fruitful. Normally every time the mind moves, the body follows. If the mind is restless, the body is restless. If the mind wants a drink, the body goes to the kitchen sink or the refrigerator. If the mind says, "This is boring," then before you know it, the body is up and looking around for the next thing to do to keep the mind happy. It also works the other way around. If the body feels the slightest discomfort, it will shift to be more comfortable or it will call on the mind to find something else for it to do, and again, you will be standing up literally before you know it.

If you are genuinely committed to being more peaceful and relaxed, you might wonder why it is that your mind is so quick to be bored with being with itself and why your body is so restless and uncomfortable. You might wonder what is behind your impulses to fill each moment with something; what is behind your need to be entertained whenever you have an "empty" moment, to jump up and get going, to get back to doing and being busy? What drives the body and mind to reject being still?

In practicing meditation we don't try to answer such questions. Rather we just observe the impulse to get up or the thoughts that come into the mind. And instead of jumping up and doing whatever the mind decides is next on the agenda, we gently but firmly bring our attention back to the belly and to the breathing and just continue to watch the breath, moment by moment. We may ponder why the mind is like this for a moment or two, but basically we are practicing accepting each moment as it is without reacting to *how* it is...

By doing so you are training your mind to be less reactive and more stable. You are making each moment count. You are taking each moment as it comes, not valuing any one above any other. In this way you are cultivating your natural ability to concentrate your mind. By repeatedly bringing your attention back to the breath each time it wanders off, concentration builds and deepens, much as muscles develop by repetitively lifting weights. Working regularly with (not struggling against) the resistance of your own mind builds inner strength. At the same time you are also developing patience and practicing being non-judgmental. You are not giving yourself a hard time because your mind left the breath. You simply and matter-of-factly return it to the breath, gently but firmly...

Mindfulness does not involve pushing thoughts away or walling yourself off from them to quiet your mind. We are not trying to stop our thoughts as they cascade through the mind. We are simply making room for them, observing them as thoughts, and letting them be, using the breath as our anchor or "home base" for observing, for reminding us to stay focused and calm.



NOTE: If you choose to sit on the floor, one of the most common problems is not having your hips high enough, causing strain on the back and decreased blood flow in feet and legs. Try using more cushions than you think you need, or even a meditation bench, so that your hips are at least 6" higher than your knees.

If none of these positions work for you, see palousemindfulness.com/FAQ.html#position

Joshua Bell Plays a $3,000,000 Violin

...and almost nobody notices

In a Washington, DC Metro Station, Joshua Bell, one of the world's greatest violinists, played a beautiful, intricate, moving piece on a violin worth over 3 million dollars. During the 43 minutes he played, ***1,097 people walked by. Only seven stopped to listen***, and even those seven paused for only a few minutes. Three days before, Joshua Bell had played the same music to a sold-out audience in Boston where the seats averaged $100 each. His minimum fee for playing a public concert was $75,000.

This is a true story, a social experiment organized by journalist Gene Weingarten in 2007. For more about this, see his Washington Post article, Pearls Before Breakfast, and Judy Woodruff's newscast, both of which have video clips of the performance that day. Here is a summary of Bell's 43-minute "concert":

> ***After about 3 minutes***, a middle-aged man noticed that there was a musician playing. He slowed his pace and stopped for a few seconds, and then he hurried on to meet his schedule. ***At 4 minutes***, the violinist received his first dollar. A woman threw money in the hat and, without stopping, continued to walk. ***At 6 minutes***, a young man leaned against the wall to listen to him, then looked at his watch and started to walk again. ***At 10 minutes***, a 3-year old boy stopped, but his mother tugged him along hurriedly. The kid stopped to look at the violinist again, but the mother pushed hard and the child continued to walk, turning his head the whole time. This action was repeated by several other children, but every parent - without exception - forced their children to move on quickly. ***After 43 minutes, he finished playing and silence took over. No one noticed and no one applauded.***

To be fair, the "concert" was conducted during rush hour in of one of the busiest metros in the world. That so few people stopped was not a demonstration of the cluelessness of these commuters, but how ***the busyness of our daily life can sometimes prevent us from noticing the beautiful and miraculous world all around us***.

Every moment of every day, if we truly look, there is something extraordinary to pay attention to: the stunning earrings worn by the grocery clerk, a child's unself-conscious laugh, the color of the sky, or the miracle of our own breath.

This is not to say that we should stand in place, slack-jawed, in such awe of the beauty around us that we make ourselves late to work or forget to pick up our kids after school. It does suggest that if we stop to pay attention, even for a moment, there is always something amazing happening. We don't have to wait for Joshua Bell to play a concert in the metro.

"There are only two ways to live your life.
One is as though nothing is a miracle.
The other is as though everything is a miracle."
- Einstein

TIME
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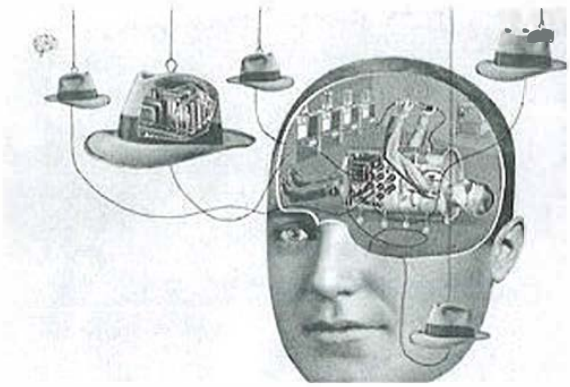
The Brain: How The Brain Rewires Itself

by Sharon Begley



It was a fairly modest experiment, as these things go, with volunteers trooping into the lab at Harvard Medical School to learn and practice a little five-finger piano exercise. Neuroscientist Alvaro Pascual-Leone instructed the members of one group to play as fluidly as they could, trying to keep to the metronome's 60 beats per minute. Every day for five days, the volunteers practiced for two hours. Then they took a test.

At the end of each day's practice session, they sat beneath a coil of wire that sent a brief magnetic pulse into the motor cortex of their brain, located in a strip running from the crown of the head toward each ear. The so-called transcranial-magnetic-stimulation (TMS) test allows scientists to infer the function of neurons just beneath the coil. In the piano players, the TMS mapped how much of the motor cortex controlled the finger movements needed for the piano exercise. What the scientists found was that after a week of practice, the stretch of motor cortex devoted to these finger movements took over surrounding areas like dandelions on a suburban lawn.

The finding was in line with a growing number of discoveries at the time showing that greater use of a particular muscle causes the brain to devote more cortical real estate to it. But Pascual-Leone did not stop there. He extended the experiment by having another group of volunteers merely think about practicing the piano exercise. They played the simple piece of music in their head, holding their hands still while imagining how they would move their fingers. Then they too sat beneath the TMS coil.

When the scientists compared the TMS data on the two groups--those who actually tickled the ivories and those who only imagined doing so--they glimpsed a revolutionary idea about the brain: the ability of mere thought to alter the physical structure and function of our gray matter. For what the TMS revealed was that the region of motor cortex that controls the piano-playing fingers also expanded in the brains of volunteers who imagined playing the music--just as it had in those who actually played it.

"Mental practice resulted in a similar reorganization" of the brain, Pascual-Leone later wrote. If his results hold for other forms of movement (and there is no reason to think they don't), then mentally practicing a golf swing or a forward pass or a swimming turn could lead to mastery with less physical practice. Even more profound, the discovery showed that mental training had the power to change the physical structure of the brain.

OVERTHROWING THE DOGMA

For decades, the prevailing dogma in neuroscience was that the adult human brain is essentially immutable, hardwired, fixed in form and function, so that by the time we reach adulthood we are pretty much stuck with what we have. Yes, it can create (and lose) synapses, the connections between neurons that encode memories and learning. And it can suffer injury and degeneration. But this view held that if genes and development dictate that one cluster of neurons will process signals from the eye and another cluster will move the fingers of the right hand, then they'll do that and nothing else until the day you

die. There was good reason for lavishly illustrated brain books to show the function, size and location of the brain's structures in permanent ink.

The doctrine of the unchanging human brain has had profound ramifications. For one thing, it lowered expectations about the value of rehabilitation for adults who had suffered brain damage from a stroke or about the possibility of fixing the pathological wiring that underlies psychiatric diseases. And it implied that other brain-based fixities, such as the happiness set point that, according to a growing body of research, a person returns to after the deepest tragedy or the greatest joy, are nearly unalterable.

But research in the past few years has overthrown the dogma. In its place has come the realization that the adult brain retains impressive powers of "neuroplasticity"--the ability to change its structure and function in response to experience. These aren't minor tweaks either. Something as basic as the function of the visual or auditory cortex can change as a result of a person's experience of becoming deaf or blind at a young age. Even when the brain suffers a trauma late in life, it can rezone itself like a city in a frenzy of urban renewal. If a stroke knocks out, say, the neighborhood of motor cortex that moves the right arm, a new technique called constraint-induced movement therapy can coax next-door regions to take over the function of the damaged area. The brain can be rewired.

The first discoveries of neuroplasticity came from studies of how changes in the messages the brain receives through the senses can alter its structure and function. When no transmissions arrive from the eyes in someone who has been blind from a young age, for instance, the visual cortex can learn to hear or feel or even support verbal memory. When signals from the skin or muscles bombard the motor cortex or the somatosensory cortex (which processes touch), the brain expands the area that is wired to move, say, the fingers. In this sense, the very structure of our brain--the relative size of different regions, the strength of connections between them, even their functions--reflects the lives we have led. Like sand on a beach, the brain bears the footprints of the decisions we have made, the skills we have learned, the actions we have taken.

SCRATCHING A PHANTOM LIMB

An extreme example of how changes in the input reaching the brain can alter its structure is the silence that falls over the somatosensory cortex after its owner has lost a limb. Soon after a car crash took Victor Quintero's left arm from just above the elbow, he told neuroscientist V.S. Ramachandran of the University of California at San Diego that he could still feel the missing arm. Ramachandran decided to investigate. He had Victor sit still with his eyes closed and lightly brushed the teenager's left cheek with a cotton swab.

Where do you feel that? Ramachandran asked. On his left cheek, Victor answered--and the back of his missing hand. Ramachandran stroked another spot on the cheek. Where do you feel that? On his absent thumb, Victor replied. Ramachandran touched the skin between Victor's nose and mouth. His missing index finger was being brushed, Victor said. A spot just below Victor's left nostril caused the boy to feel a tingling on his left pinkie. And when Victor felt an itch in his phantom hand, scratching his lower face relieved the itch. In people who have lost a limb, Ramachandran concluded, the brain reorganizes: the strip of cortex that processes input from the face takes over the area that originally received input from a now missing hand. That's why touching Victor's face caused brain to "feel" his missing hand.

Similarly, because the regions of cortex that handle sensations from the feet abut those that process sensations from the surface of the genitals, some people who have lost a leg report feeling phantom sensations during sex. Ramachandran's was the first report of a living being knowingly experiencing the results of his brain rewiring.

THINKING ABOUT THINKING

As scientists probe the limits of neuroplasticity, they are finding that mind sculpting can occur even without input from the outside world. The brain can change as a result of the thoughts we think, as with Pascual-Leone's virtual piano players. This has important implications for health: something as seemingly insubstantial as a thought can affect the very stuff of the brain, altering neuronal connections in a way that can treat mental illness

or, perhaps, lead to a greater capacity for empathy and compassion. It may even dial up the supposedly immovable happiness set point.

In a series of experiments, for instance, Jeffrey Schwartz and colleagues at the University of California, Los Angeles, found that cognitive behavior therapy (CBT) can quiet activity in the circuit that underlies obsessive-compulsive disorder (OCD), just as drugs do. Schwartz had become intrigued with the therapeutic potential of mindfulness meditation, the Buddhist practice of observing one's inner experiences as if they were happening to someone else.

When OCD patients were plagued by an obsessive thought, Schwartz instructed them to think, "My brain is generating another obsessive thought. Don't I know it is just some garbage thrown up by a faulty circuit?" After 10 weeks of mindfulness-based therapy, 12 out of 18 patients improved significantly. Before-and-after brain scans showed that activity in the orbital frontal cortex, the core of the OCD circuit, had fallen dramatically and in exactly the way that drugs effective against OCD affect the brain. Schwartz called it "self-directed neuroplasticity," concluding that "the mind can change the brain."

The same is true when cognitive techniques are used to treat depression. Scientists at the University of Toronto had 14 depressed adults undergo CBT, which teaches patients to view their own thoughts differently--to see a failed date, for instance, not as proof that "I will never be loved" but as a minor thing that didn't work out. Thirteen other patients received paroxetine (the generic form of the antidepressant Paxil). All experienced comparable improvement after treatment. Then the scientists scanned the patients' brains. "Our hypothesis was, if you do well with treatment, your brain will have changed in the same way no matter which treatment you received," said Toronto's Zindel Segal.

But no. Depressed brains responded differently to the two kinds of treatment--and in a very interesting way. CBT muted overactivity in the frontal cortex, the seat of reasoning, logic and higher thought as well as of endless rumination about that disastrous date. Paroxetine, by contrast, raised activity there. On the other hand, CBT raised activity in the hippocampus of the limbic system, the brain's emotion center. Paroxetine lowered activity there. As Toronto's Helen Mayberg explains, "Cognitive therapy targets the cortex, the thinking brain, reshaping how you process information and changing your thinking pattern. It decreases rumination, and trains the brain to adopt different thinking circuits." As with Schwartz's OCD patients, thinking had changed a pattern of activity--in this case, a pattern associated with depression--in the brain.

HAPPINESS AND MEDITATION

Could thinking about thoughts in a new way affect not only such pathological brain states as OCD and depression but also normal activity? To find out, neuroscientist Richard Davidson of the University of Wisconsin at Madison turned to Buddhist monks, the Olympic athletes of mental training. Some monks have spent more than 10,000 hours of their lives in meditation. Earlier in Davidson's career, he had found that activity greater in the left prefrontal cortex than in the right correlates with a higher baseline level of contentment. The relative left/right activity came to be seen as a marker for the happiness set point, since people tend to return to this level no matter whether they win the lottery or lose their spouse. If mental training can alter activity characteristic of OCD and depression, might meditation or other forms of mental training, Davidson wondered, produce changes that underlie enduring happiness and other positive emotions? "That's the hypothesis," he says, "that we can think of emotions, moods and states such as compassion as trainable mental skills."

With the help and encouragement of the Dalai Lama, Davidson recruited Buddhist monks to go to Madison and meditate inside his functional magnetic resonance imaging (fMRI) tube while he measured their brain activity during various mental states. For comparison, he used undergraduates who had had no experience with meditation but got a crash course in the basic techniques. During the generation of pure compassion, a standard Buddhist meditation technique, brain regions that keep track of what is self and what is other became quieter, the fMRI showed, as if the subjects--experienced meditators as well as novices--opened their minds and hearts to others.

More interesting were the differences between the so-called adepts and the novices. In the former, there was significantly greater activation in a brain network linked to empathy and maternal love. Connections from the frontal regions, so active during compassion meditation, to the brain's emotional regions seemed to become stronger with more years of meditation practice, as if the brain had forged more robust connections between thinking and feeling.

But perhaps the most striking difference was in an area in the left prefrontal cortex--the site of activity that marks happiness. While the monks were generating feelings of compassion, activity in the left prefrontal swamped activity in the right prefrontal (associated with negative moods) to a degree never before seen from purely mental activity. By contrast, the undergraduate controls showed no such differences between the left and right prefrontal cortex. This suggests, says Davidson, that the positive state is a skill that can be trained.

For the monks as well as the patients with depression or OCD, the conscious act of thinking about their thoughts in a particular way rearranged the brain. The discovery of neuroplasticity, in particular the power of the mind to change the brain, is still too new for scientists, let alone the rest of us, to grasp its full meaning. But even as it offers new therapies for illnesses of the mind, it promises something more fundamental: a new understanding of what it means to be human.

THE HUFFINGTON POST
October 7, 2010

How Meditation Affects the Gray Matter of the Brain

by David R. Hamilton, Ph. D.

I like to meditate. It makes me feel at ease and I am convinced that the sense of calm it produces helps me to handle the daily challenges of my life. There are, of course, times when I don't keep up my daily practice of sitting quietly for 10 or 15 minutes, but these are the times in my life when I experience more stress.

Stress affects everyone. I don't know a single person who doesn't get stressed. But unfortunately, it plays a major role in illness. According to the Centers for Disease Control and Prevention, in fact, up to 90 percent of doctor visits in the U.S. may be stress related. Meditation is an antidote to stress, just as an aspirin can counter a headache. A regular practice can be a major boost to health.

It calms the nervous system. It's good for the immune system. It's also good for the heart; it helps produce nitric oxide (not nitrous oxide -- that's laughing gas!) in the arteries, dilating them and reducing blood pressure. It also smooths heart rhythms.

But thanks to an explosion of brain research we now know that it also physically impacts our gray matter.

One study to show this was led by scientists at the Center for Functionally Integrative Neuroscience at Aarhus University in Denmark. Comparing MRI scans of the brains of meditators with the brains of non-meditators, they showed that meditation causes actual physical changes in the gray matter of the lower brain stem. Meditation makes the gray matter grow.

In another study, scientists Giuseppe Pagoni and Milos Cekic, from the Department of Psychiatry and Behavioral Sciences at Emory University in Atlanta, compared the volume of gray matter in the brains of people performing Zen meditations with another group who were not meditators.

The volume of our gray matter normally reduces as we get older and this is what the scientists found in the group of non-meditators. But for the meditators, their gray matter hadn't reduced at all with age. According to the scientists, meditation had a 'neuroprotective' effect on the meditators: It protected the brain from some of the effects of aging.

This mirrors some 2008 Harvard research that analyzed the genes of meditators against non-meditators. It was the first study of its kind to measure the genetic impact of meditation and found that 2,209 genes were differently activated in long-term meditation practitioners compared with non-meditators. And even looking at novice meditators, they found that 1,561 genes were affected after only eight weeks of meditation practice. They concluded that the genetic effects of meditation may have long-term physiological consequences, one of which was a slowing down of the rate of aging.

We have all heard the stories of people under extreme stress whose hair turns white in a matter of weeks. We know that stress can speed up aging. So why should it be a surprise to us that a technique to combat stress should be able to slow aging?

There are many different forms of meditation. A study at Massachusetts General Hospital examined the impact of the Buddhist 'Insight' meditation on the brain. Insight meditation is a technique of moving our attention over the body or focusing on our breathing. The study found that it caused an increase in thickness of the prefrontal cortex in the brain, the part just above the eyes and associated with attention.

Several areas of the brain are active when we meditate, but most pronounced is the prefrontal cortex because when we meditate we are focusing our attention on something -- whether that be the

body, our breathing, a word, a candle or even a spiritual ideal. When this area is active, just like a muscle being exercised, it grows.

Neuroscientists use this analogy to describe the way the brain changes. When we exercise a muscle it becomes larger and denser with muscle mass. In a similar way, when we exercise any part of the brain, which we do when we meditate, it becomes larger and denser with neural mass -- gray matter. The phenomenon is known as neuroplasticity and describes how the brain actually changes throughout life.

When I attended university I learned that the brain is hardwired once we reach young adulthood. The analogy used is that when we are young, the brain is a bit like dough, which can be kneaded into various forms, but when we reach young adulthood we put the dough in the oven and it comes out with a bread crust on it. The brain is then 'hardwired,' we were taught.

But this analogy has since been abandoned. We now know that we never put the dough in the oven. Our gray matter is ever-changing as we experience life; as we learn, walk, run, dance, and when we concentrate, as we do when we meditate.

Our gray matter is changing until the last seconds of our life. It grows even with our last breath.

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