

## Neural Underpinnings of Mindfulness

Mindfulness is a broad subject. However, we might consider three ways of understanding it: in terms of the practices of mindful meditation; as an ongoing state of mindful awareness in relation to ourselves and others; and, in the interpersonal system, allowing the mindful care of an empathic other to help us integrate our brains. While the mind of each individual has a different appetite regarding what is most helpful, let's first explore the neural processes that these three ways of being mindful share in common by defining mindfulness: ***paying kind attention, on purpose, without grasping onto judgments, to whatever arises in the mind from moment to moment.***

Some people hear the goal as being nonjudgmental and almost immediately feel as though they will fail. But, thinking about how our minds work, it is not possible to suspend judgment entirely. Everything that comes to us, internally or externally, is subject to the amygdala's initial assessment of its value and importance. The amygdala first informs us when something needs attention, pulling our consciousness in that direction. Then, from a lifetime of encoding, perceptual biases – the essence of judgment – come into play, activated by each new experience. So the key phrase here is “***without grasping onto judgments.***” Practicing the kind state, we may merely note that a judgment has arisen and let it go. “Oh, there's a judgment. Thank you for your opinion,” as Buddhist teacher and psychotherapist, Jack Kornfield (2007) says.

Returning to the definition, paying kind attention on purpose, can mean many things, including attuning with our senses to notice what is happening right now, whether that is the sensation of the breath coming and going in our nostrils, our footfalls on the trail, or the rumble of our neighbor's motorcycle. It can also mean attending to whatever arises in the mind from moment to moment from the various streams of information coming into awareness: sensations, observations, conceptions, and a kind of non-conceptual knowing that is without words (Seigel, 2007). If you were to try either of these processes right now, you might notice that your mind has a tendency to go on frequent side trips to the remembered past or imagined future; to get caught in thoughts or feelings that pull attention away from the experience in the moment. However, you may notice also, when a few seconds or moments of staying present flow, there is a feeling of openness and receptivity, brimming with several flavors of well-being.

When we are able to stay centered in this new way of experiencing for even a brief bit of time, what is happening in our brains? Through the alchemy of our intention to attend, we are actually changing the way we are processing information in our six-layered cortex. In extreme simplification, here is the story. Each of the six layers is about as thick as a business card, and our brain has the appearance of a rumpled gray shirt because the dinner-napkin size cortex has to fold to fit in the rigid confines of our skulls (Hawkins & Blakeslee, 2004). Right- and left- hemisphere cortical structures aside, let's focus on the function of the six cortical layers. In tandem with limbic judgments made about incoming experience, the top two layers contain “***invariant representations***”: they anticipate what will happen next, based on past experience. This is called ***top-down processing***, and it is enormously useful for say, driving cars and

avoiding dangerous situations. These representations create expectations that are so precise that, if for example, someone moved your front door knob a quarter of an inch to the right, you would be instantly aware that something was “wrong.” You have likely had numerous such experiences.

However, our invariant representations can also bind us to old experiences in detrimental ways. If I have been struck as a child, every time I see someone raise a hand, I may have a flood of top-down convictions that I am about to be harmed. Sadly, this reaction can distort my inner experience as well as the way I relate to others. Generally speaking, the greater the unhealed hurt, the more power contained in the invariant representation – unless there is another source of information to balance it (Badenoch 2008).

Here is where the bottom two cortex layers can be great allies. Their job is new- information processing; streaming in through the senses – the breeze on our faces, the yellow of the turning leaves, or that barking dog. When we attend to them, they pull us into the freshness of the moment, as though we have never experienced just this breeze before – because we haven’t. The sensation is often enlivening and soothing at the same time. Laughter and smiles may erupt. This is **bottom-up processing**. Nothing stops top-down processes, but strengthening the strands of bottom-up information will often bring a creative balance. Mindful awareness is one such strengthening process, neurofeedback training, another. With continual feedback, you can train your brain to strengthen its bottom-up processing capacity.

It is precisely when top-down meets bottom-up that creativity flourishes. In that moment, what we already believe may ignite in the energy of the new. From this, we know that when we focus on our senses or the arising of experience, we are cultivating the ability to be a bit freer of the automatic processes that have accumulated in our invariant representations. For those who have suffered in childhood, even a brief respite from the tyranny of perceptual bias brings relief. With practice, we may live more often where the cortical layers meet. With neurofeedback we encourage dynamic interaction, and efficiency of processing in these cortical layers to achieve brighter, clearer brain regulation, and the experience of inner peacefulness.