

The Neuroscience of Empathy

Neuroscientists identify specific brain areas linked to compassion.

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Are some people born with a brain that is wired to be more empathetic? Can compassion be learned? What daily habits or life experiences reinforce selfishness, narcissism, and at a far extreme psychopathy?

Last night, I listened to an interview(link is external) with Madonna and Anderson Cooper talking about the importance of teaching our children to be able to empathize and to not be complacent about fighting against oppression and inequality. Two studies in the past month have identified specific brain regions linked to empathy and compassion.

This morning, a new study was released by the Max Planck Institute for Human and Cognitive Brain Sciences that revealed the neurobiological roots of how our own feelings and experiences can distort someone's capacity for empathy. Last month, another study from the University of Chicago found the neurobiological roots of psychopathic behavior. Together, these studies offer valuable clues for ways we can fortify empathy at a neural level. Luckily, researchers have found that compassion can be trained.

The Neuroscience of Empathy

In a study(link is external) published in the *Journal of Neuroscience* on October 9, 2013, Max Planck researchers identified that the tendency to be egocentric is innate for human beings – but that a part of your brain recognizes a lack of empathy and autocorrects. This specific part of your brain is called the the **right supramarginal gyrus**. When this brain region doesn't function properly—or when we have to make particularly quick decisions—the researchers found one's ability for empathy is dramatically reduced. This area of the brain helps us to distinguish our own emotional state from that of other people and is responsible for empathy and compassion.

The supramarginal gyrus is a part of the cerebral cortex and is approximately located at the junction of the parietal, temporal and frontal lobe. "This was unexpected, as we had the temporo-parietal junction in our sights. This is located more towards the front of the brain," explains Claus Lamm, one of the paper's authors.

The research team headed by Tania Singer said, "When assessing the world around us and our fellow humans, we use ourselves as a yardstick and tend to project our own emotional state onto others. While cognition research has already studied this phenomenon in detail, nothing is known about how it works on an emotional level. It was assumed that our own emotional state can distort our understanding of other people's emotions, in particular if these are completely different to our own. But this emotional egocentricity had not been measured before now."

The right supramarginal gyrus ensures that we can decouple our perception of ourselves from that of others. When the neurons in this part of the brain were disrupted in the course of a research task, the participants found it difficult to stop from projecting their own feelings and circumstances onto others. The participants' assessments were also less accurate when they were forced to make particularly quick decisions.

The Lap of Luxury Can Make You Less Empathetic

When you are in an agreeable and comfortable situation it is more difficult to empathize with another person's suffering. At a neurobiological level – without a properly functioning supramarginal gyrus – your brain has a tough time putting itself in someone else's shoes. To test this in the laboratory the Max Planck researchers used a perception experiment in which participants, who worked in teams of two, were exposed to either pleasant or unpleasant simultaneous visual and tactile stimuli.

For example, while participant 1 was shown a picture of maggots and had slime placed on her hand, participant 2 saw a picture of a puppy and could feel soft, fleecy fur on her skin. "It was important to combine the two stimuli. Without the tactile stimulus, the participants would only have evaluated the situation 'with their heads' and their feelings

would have been excluded," explains Claus Lamm. The participants could also see the stimulus that their team partners were exposed at the same time.

The two participants were then asked to evaluate either their own emotions compared to those of their partners. As long as both participants were exposed to the same type of positive or negative stimuli, they found it easy to assess their partner's emotions.

The participant who was confronted with an unpleasant or disagreeable experience could easily imagine how unpleasant the sight and feeling of slime and maggots must be for her partner. For more on the genetics of staying happily married please check out my recent *Psychology Today* blog: "Is the Secret to a Happy Marriage Held in Your DNA?"

Major differences arose during the test when one partner was confronted with pleasant stimuli and the other with unpleasant ones. In this scenario a person's capacity for empathy plummeted. The participants' own emotions distorted their assessment of the other person's feelings. The participants who were feeling good themselves assessed their partners' negative experiences as less severe than they actually were. In contrast, those who had just had an unpleasant experience assessed their partners' good experiences less positively.

Until now, social neuroscience models have assumed that people simply rely on their own emotions as a reference for empathy. This only works, however, if we are in a neutral state or the same state as our counterpart. Otherwise, the brain must use the right supramarginal gyrus to counteract and correct a tendency for self-centered perceptions of another's pain, suffering or discomfort.

The Neurological Basis for a Lack of Empathy

Psychopathy is a personality disorder characterized by 'a lack of empathy and remorse, shallow affect, glibness, manipulation and callousness.' When individuals with psychopathy imagine others in pain, researchers have found that brain areas necessary

for feeling empathy and concern for others fail to become active and connected to other important regions involved in affective processing and compassionate decision-making.

A September 2013 study(link is external) from the Department of Psychology at the University of Chicago published in journal *Frontiers in Human Neuroscience* found the neurobiological roots of psychopathic behavior.

When highly psychopathic participants imagined pain to themselves, they showed a typical neural response within the brain regions involved in empathy for pain, including the **anterior insula**, the **anterior midcingulate cortex**, **somatosensory cortex**, and the **right amygdala**. The increase in brain activity in these regions was unusually pronounced, suggesting that psychopathic people are sensitive to the thought of pain but are unable to put themselves in someone else's shoes and feel that pain.

When participants imagined pain to others, these regions failed to become active in high psychopaths. In a sadistic twist, when imagining others in pain, psychopaths actually showed an increased response in the **ventral striatum**, an area known to be involved in pleasure. Participants were assessed with the widely used PCL-R, which is a diagnostic tool use to identify varying degrees of psychopathic tendencies. Based on this assessment, the participants were then divided in three groups of approximately 40 individuals each: highly, moderately, and weakly psychopathic.

Previous research rate of psychopathy in prisons is much higher than the average population. About 23% of prison inmates are thought to be psychopathic while the average population is around 1%. To better understand the neurological basis of empathy dysfunction in psychopaths, neuroscientists used functional magnetic resonance imaging (fMRI) on the brains of 121 inmates of a medium-security prison.

In the study participants were shown a variety of visual scenarios illustrating physical pain, such as a finger caught between a door, or a toe caught under a heavy object. Then they were asked to imagine that this accident happened to themselves, or somebody else. They were also shown control images that did not depict any painful situation, for example a hand on a doorknob.

The researchers believe that finding the neurobiological roots of empathy vs. psychopathy may lead to intervention programs in a domain where therapeutic pessimism is running rampant. Honing in on neural networks needed to make people more empathetic may be the key to targeting psychopathic behavior and lower violent crime. "Imagining oneself in pain or in distress may trigger a stronger affective reaction than imagining what another person would feel, and this could be used with some psychopaths in cognitive-behavior therapies as a kick-starting technique," the authors conclude.

Conclusion: Can meditation, daily physical activity, and volunteerism make your brain more empathetic?

Neuroscience allows us to see inside the human brain and better understand our minds. With this knowledge we can begin to make daily choices of mindset and behavior that not only reshape our neural circuitry but can alter the way human beings interact with one another.

Because our brain's neural circuitry is malleable and can be rewired through neuroplasticity one's tendency for empathy and compassion is never fixed. We all need to practice putting ourselves in someone else's shoes to reinforce the neural networks that allow us to 'love thy neighbor as thyself' and 'do unto others as you would have them do unto you.'

There are no easy answers for how to elevate people's consciousness and empathetic response. I am optimistic that through daily choices of mindset and behavior that anyone can rewire his or her brain to be more empathetic. As with everything, we need to take a multi-pronged approach. Other research has shown that compassion can be trained through: rigorous mindfulness training and/or loving-kindness meditation; physical activity that puts your body and mind in touch with "disagreeable" experiences some would consider to be a "suffer-fest"; and giving back through prosocial behavior and volunteerism.

Many studies have shown that mindfulness meditation that includes LKM (loving-kindness meditation) can rewire your brain. Practicing LKM is easy. All you have to do is take a few minutes everyday to sit quietly and systematically send loving and compassionate thoughts to: 1) Family and friends. 2) Someone with whom you have tension or a conflict. 3) Strangers around the world who are suffering. 4) Self-compassion, forgiveness and self-love to yourself.

Doing this simple 4-step LKM practice literally rewires your brain by engaging neural connections linked to empathy. You can literally feel the tumblers in your brain shift and open up to empathy by spending just a few minutes going through this systematic LKM practice.

I also believe that regular physical exercise and getting through a tough workout makes people more empathetic to human suffering. Some people may think that pushing yourself through a workout is masochistic. It is. This is one reason why daily physical exercise might make anyone less sadistic or likely to be a psychopath at neurological level.

Through the daily process of consciously seeking and experiencing something that is 'disagreeable' you become physically and mentally tough, but it makes you sensitive to what pain feels like. By leaving the comfort zone of modern American life – on a long run, bike ride or tough workout – you viscerally connect to the essence of human struggle experienced everyday by people around the world who are less fortunate than many of us. This is one of the founding principles of *The Athlete's Way: Sweat and the Biology of Bliss*(link is external).

Lastly, many studies have shown that volunteerism is good for your health. Dedicating some time each week to some type of charity work creates a win-win by reinforcing the empathetic wiring of your brain while making a contribution to reduce the suffering of someone less fortunate.

These are all small steps, but taken together they can fortify empathy and altruism at a neurobiological level for each individual. Collectively, these small steps can help make the world a better place.