

Article

Science of Compassion

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Abstract

This paper presents a scientific pathway for compassion. The framework presented is for individual, organizational, national, and global transformation and peace. With the framework, an individual may progress to any extent possible for a human being all the way to enlightenment. However, there may be an upper limit to how much progress is possible for specific nations or on a global scale but diligent pursuit of the ideas and concepts should lead to more compassionate nations and a more peaceful world.

Keywords: Compassion, happiness, scientific investigation, global peace.

*If you want others to be to be happy, practice compassion.
If you want to be happy, practice compassion.
His Holiness the Dalai Lama*

INTRODUCTION

The Honorable Mayor of Metro Louisville has embraced a vision to make the city most compassionate in America. The scientific questions that this paper addresses are why this is important, how it can be accomplished, and what the benefits of a successful effort would be.

We the human inhabitants of the planet Earth can be surmised to have three components of the mindset: (1) S – truthfulness, honesty, equanimity, steadfastness, etc., (2) R – attachment, ego, bravery, greed, ambition, desire to live, etc., and (3) T – lying cheating, causing injury in words or deeds, sleep, etc. On the S, R, T scale of human consciousness, the revered ones are at the top with the highest level of S possible for a human being with the appropriate amount of R and minimum amount of T necessary for life while the wicked ones are at the bottom and the rest of us in between. Thus, to rise on the scale of human consciousness means to raise S while controlling R and minimizing T (Deshpande, Ref. 1). Now, positive emotions such as compassion, unconditioned love, kindness, and empathy strongly correlate with the S component while negative emotions such as anger, hatred, hubris, arrogance, hostility, etc., strongly correlate with the excessive R and T components. Therefore, to rise on the scale of human consciousness is also equivalent to becoming more compassionate.

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SCIENTIFIC FRAMEWORK

A scientific action plan of progress for becoming more compassionate requires a measurable outcome. Scientists have discovered in recent years that positive emotions characteristic of the S component result in ordered, coherent heart wave patterns seen in the lower portion in Figure 1 while negative emotions characteristic of excessive R and T components lead to random, jerky heart wave patterns as seen in the top portion of this figure. Thus, the quest to enhance compassion may be thought of, in part, as an effort to achieve life-enhancing heart wave patterns.

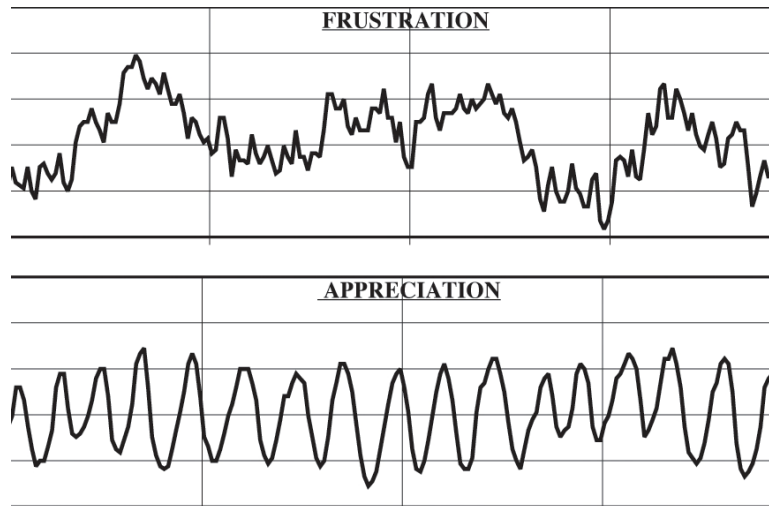


Figure 1. Heart Rate Variability Patterns under Positive and Negative Emotions
(Source: Science of the Heart, Ref. 2)

It is possible to cite three pathways to achieve the desired objective.

- I. The first pathway for cultivating positive emotions – compassion has two components, a conscious approach and a process whose side-effect is a rise in the S component and compassion. The first component involves the mind in the absence of external events while the second component involves the mind in the presence of external events.

Conscious approach. Even in the absence of external events, the mind produces thoughts which lead to emotions which in turn produce chemicals and hormones. Positive emotions promote life-supporting chemicals and hormones such as growth hormones, while negative emotions lead to life-degrading ones such as elevated levels of Cortisol. The biblical wisdom, “*As you sow, so you reap*” has real practical significance. To progress with this approach, it is necessary to monitor one’s actions literally on a daily basis to regulate and hopefully raise S while controlling R and lowering T. Effort with this approach is warranted even if progress possible is modest.

Process whose side-effect is a rise in positive emotions. This concept requires an understanding of the connection between emotions and external events. External events too can give rise to emotions, just as thoughts can in the absence of external events. A story has it

that The Buddha and some of his disciples were wandering in the woods one day when they saw that an elephant was charging at them. Upon seeing the elephant, the disciples fled but The Buddha just stayed and merely raised his hand as though in blessing and the elephant stopped in his track. So, what could have happened here? In the case of the disciples, the external event was the sight of the elephant, the perception was threat, the emotion was fear, and the action was to flee. The Buddha on the other hand only had positive emotions which were instantly conveyed to the elephant and the elephant stopped sensing compassion, realizing that they meant no harm.

This story could be viewed as allegorical, metaphorical, or factual. To prove that it is factual requires scientific evidence for two things: (1) That it is theoretically possible for positive emotions to travel from human consciousness to the consciousness of nonhuman specie, and (2) That the signal travels sufficiently fast; positive emotions must reach the elephant's consciousness before the latter gets too close. Scientists at the Institute for HeartMath have reported (McCraty, Ref. 3) the results of experiments with animals (dog, horse) which are supportive of the hypothesis of emotions traveling between a human and an animal. For example the data in Figure 2 were obtained using ambulatory ECG (Holter) recorders fitted on a boy named Josh and his pet dog Mabel. When Josh entered the room where Mabel was waiting and consciously felt feelings of love and care towards his pet, his heart rhythms became more coherent and this change appeared to have influenced Mabel's heart rhythms, which then also became more coherent. When Josh left the room, Mabel's heart rhythms became much more chaotic and incoherent.

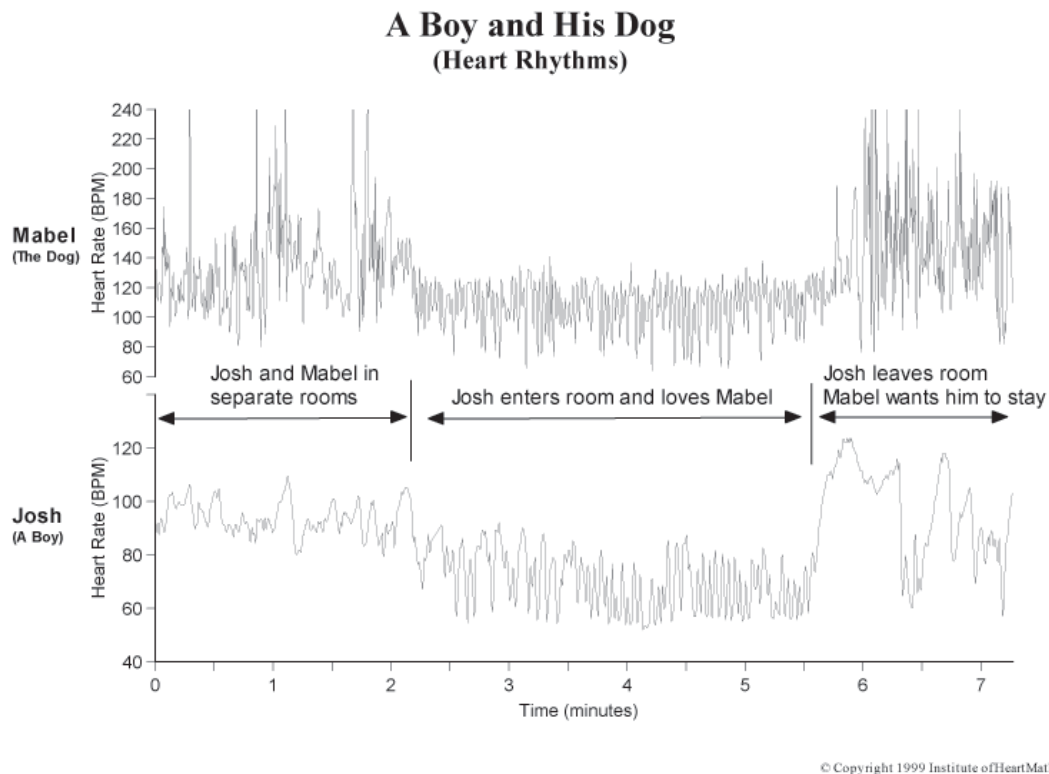


Figure 2. Heart Interactions of Josh and his Dog Mabel (Source: McCraty, Ref. 3)

In the last few decades, western scientists have conducted experiments which show that emotions can be conveyed instantaneously to human DNA over hundred of miles; they don't have to travel anywhere; As soon as they are created, they are at the destination. This is consistent with an ancient Sutra on the Indra's Net from Mahayana Buddhism. In the early twentieth Century, physicist and biologist Jagdish Chandra Bose had hypothesized that even plants respond to positive emotions. Since then, a number of scientists have carried out experiments which are supportive of the possibility that human emotions can be understood by nonhumans. There may be a good reason why the narrator of the story chose an elephant and say not a tiger; elephants are vegetarian but tigers are not. If a tiger were charging at the group, The Buddha would have been confronted by two unknowns; was the tiger starving or did he simply perceive a threat?

Principal approaches whose side-effect is a rise in compassion are various forms of prayer and meditation. If meditation is taken up for scrutiny then, there must be measurable evidence that it works. It may be recalled that Gautama was a prince growing up at which time it may be speculated that he couldn't have had the highest level of S and an appropriate amount of R and a minimum amount of T required for life. If he did, no further effort towards enlightenment would have been necessary. So, how did he go from being a prince to emerging as The Buddha (The Awakened One or Enlightened One)? The only thing he is reported to have done differently from the ordinary folks of the day was meditation. There are numerous other examples supportive of this hypothesis.

Scientists at the Institute for HeartMath at Boulder Creek, California have shown that there is a magnetic field around the heart as depicted in Figure 3. Their experiments have shown that human DNA responds to emotions. Positive emotions caused human DNA in a beaker some distance away to uncoil while negative emotions produced the opposite effect. The lower portion of the plot in Figure 1 is the result of heart-focused compassion practice.

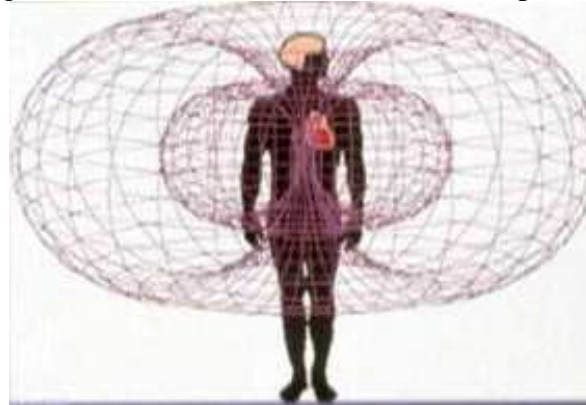


Figure 3. Wireframe Model of the Magnetic Field around the Heart (Source: Institute for HeartMath, Ref. 4)

In a related work, Drs. Richard Davidson and Matthieu Ricard and associates have studied the effects of positive and negative emotions on brainwaves. They presented Functional MRI results in the form of a graph shown in Figure 4 which plot the frequency of occurrence vs.

brainwave frequency in dimensionless units for 150 subjects. They found that positive emotions activated the left prefrontal cortex leading to the data to the left of the mean while negative emotions activated the right prefrontal cortex giving the data to the right of the mean. The data point at $z = -0.45$ shown for an unidentified experienced meditator was four standard deviations to the left of the mean, far beyond that for any of the 150 subjects in the investigation. Some of these results were published in Lutz, et al., (Ref. 6). The jerky heart wave forms in Figure 1 likely correspond to the data to the right of the mean while regular, coherent heart wave patterns correspond to the data to the left of the mean.

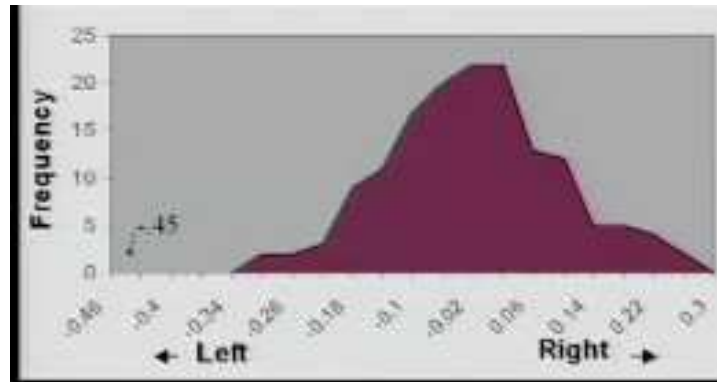


Figure 4. Effect of Emotions on Brainwaves (Source: Ref. 5)

A group activity has been shown to produce a more pronounced effect than an individual practicing alone. By way of corroborative evidence, the Late Lewis Thomas, (MD, Harvard) reported in his book *The Lives of a Cell* (Ref. 7) that a single termite with 50,000 neurons in its brain could hardly be expected to do anything much less think. But when they are in a colony of tens of thousands of termites, however, they succeed in building structures having beautiful arches and symmetrical columns. In another example, the Global Consciousness Project directed by Princeton Physicist Dr. Roger D. Nelson (Ref. 8) found meaningful and statistically significant patterns in the random data from a network of 100 random number generators located in several countries when man-made or natural disasters occurred. For example, Figure 5 pertains to the data at the time of 9/11 attacks. Here, the RNG data remained nonrandom throughout the event. Even more interestingly, the collective human consciousness appeared to have sensed imminent tragedy a few hours before the attacks!

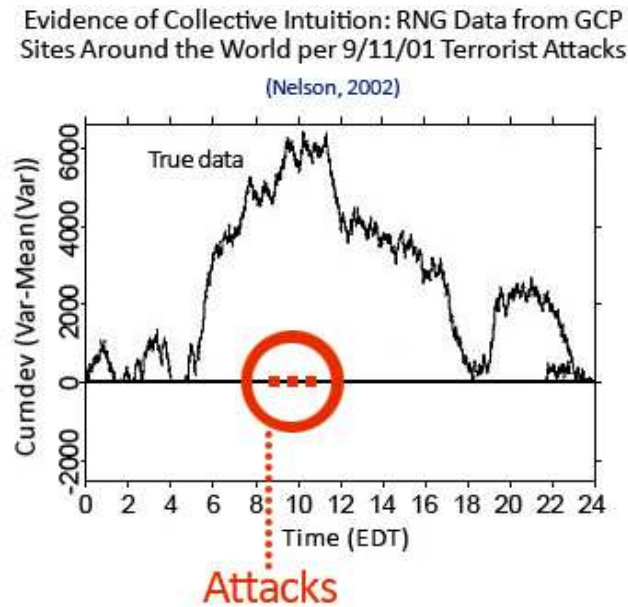


Figure 5. Human Consciousness, Random Number Generators, and Catastrophic Events (Ref. 8)

There is evidence too that the benefits of group activity extend far beyond the meditators physically present. In what has come to be known as the Maharishi Effect, The Late Maharishi Mahesh Yogi suggested that the number of meditators required for world peace equals $\sqrt{1\%}$ of the population. For a city of the size of Metro Louisville, the required number is 100. In the eighties, scientists demonstrated the concept with a project called *The International Peace Project in the Middle East* under the auspices of which 65 to 241 recruits in the Middle East meditated in the morning/afternoon for thirteen days. The dependent variables tracked were such factors as crime, auto accidents, war intensity and war deaths (Alexander, et al., Ref. 9). For sustained benefits, it would appear reasonable to suggest that these efforts have to be continued indefinitely.

II. Breath Control. The second pathway to enhancing compassion is the control of breath. Our bodies have three subsystems: (1) External systems – spine, joints, and muscles, (2) Internal organs and systems - sinuses and nasal systems all the way to GI and urinary tracts, and (3) Mind. For overall good health and wellbeing, it is necessary for all three subsystems to function well. Patanjali (~500 B.C.) (Swami Vivekananda, Ref. 10) pioneered the eight-fold Yoga process for all three subsystems. A Wall Street Journal article (Ref. 11) found a surprisingly high level of interest in Yoga a hundred years after Swami Vivekananda introduced it to America. The component of Yoga that targets internal organs and systems is *Pranayam* which involves ingenious manipulation of breath. Jerky heart wave forms in the top portion of Figure 1 and irregular breathing appear to be intricately related. When done correctly and diligently, Pranayam exercises regularize breathing, increase the lung capacity as evidenced by deeper and fuller breaths so the blood returning to the lungs encounters an Oxygen-rich environment. As the heart pumps this Oxygen-rich blood to all the cells in the body, the nuclei of the cells are enriched with higher Oxygen content and the cells get

healthier as does the body. Benefits of Pranayam include freedom from stress and variety of ailments. There is a meditative aspect to the mechanics of how these exercises are done which is supportive of coherent heart wave patterns. It is estimated that diligent practice of Pranayam would easily save 10% of the US healthcare costs which in current terms translate into \$250 billion annually. The ancient Eastern counsel, “*Eat right, breathe right, think right, feel right, and you will be happy*” appears to have merit.

III. The third pathway for enhancing compassion and perhaps the hardest to grasp for the rational mind, is food. Yogis characterize foods as Positive Pranic, Negative Pranic, and Neutral. Positive Pranic foods are purported to promote the S component and therefore positive emotions while negative Pranic foods promote the R component, and Neutral foods promote the T component; Negative Pranic and Neutral foods are said to promote negative emotions. A number of recipes primarily focusing on Positive Pranic Foods may be found in “*A Taste of Isha*” (Ref. 12). Yogis are said to prefer foods that are primarily Positive Pranic. The author attended a four-day Yoga program in California some years ago. There were forty one participants in the program; thirty six Americans and five Indian-Americans. During the entire program, the group had meals that were primarily Positive Pranic. By the last day, the influence of Positive Pranic foods on positive emotions of the entire group was unmistakable although this may not have been the only contributing factor. The author has since studied numerous individuals with such dietary habits and the correlation of Positive Pranic Foods to Positive emotions appears to be very strong.

For ages, compassion has been recognized as an inner condition of happiness which is always subject to the influence of the outer conditions. Changes in outer conditions are a part and parcel of life but as the level of consciousness rises, the negative impact of the outer conditions on the inner condition becomes less and less (Matthieu Ricard, Ref. 5). In his Google-Tech talk, *Everyday Compassion at Google*, Chade-Ming Tan (Ref. 13) makes a case for how compassion is in the business interest of companies and that compassion can make good leaders and good organizations great.

The ancient wisdom of which compassion is an essential outcome is for the excellence of the internal. It is an ancient and precious gift to humanity. It took the author over four decades to scrutinize and scientifically decipher it and it would not have been possible without six sigma principles and chemical engineering training. It is one of two components for emerging as one’s best. The other component is excellence of the external, from wake up time to bedtime, including all that is done at work. The framework to achieve the excellence in all external activities is six sigma (Deshpande, Ref. 14). Embracing and diligently pursuing both allows us to emerge as our best. Ancient wisdom reveals it; incarnations, The Enlightened One, Son of God, and Prophets teach it, and modern science corroborates it. The only obstacle to progress is us!

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References

- [1] P. B. Deshpande, *A Small Step for Man: Zero to Infinity with Six Sigma, Six Sigma and Advanced Controls, Inc.*, 2008.
- [2] Science of the Heart: Exploring the role of the heart in human performance, (<http://www.heartmath.org/research/science-of-the-heart/entrainment-coherence-autonomic-balance.html>).
- [3] Rollin McCraty, *The Energetic Heart – Bioelectromagnetic Interactions within and Between People*, Institute for HeartMath, Boulder Creek, CA 95006.
- [4] Rollin McCraty, *Science of the Heart*, Institute for HeartMath, Boulder Creek, CA 95006 YouTube Video (<http://www.youtube.com/watch?v=CMQipX-hIDs>).
- [5] Matthieu Ricard, *Habits of Happiness*, <http://www.youtube.com/watch?v=vbLEf4HR74E> Upload April 15, 2008.
- [6] Antoine, Lutz, Lawrence L. Greischar, Nancy B. Rawlings, Matthieu Ricard, and Richard J. Davidson, Long-term meditators self-induce high-amplitude gamma synchrony during mental practice, *Proceedings of the National Science Academy of the United States*, 101, 46, November 16, 2004.
- [7] Lewis Thomas, *The Lives of a Cell*, Penguin Books, 1974.
- [8] Roger D. Nelson, Global Consciousness Project, Meaningful Patterns in Random Data, Princeton Plasma Physics Laboratory Colloquium, October 11, 2006 (<http://noosphere.princeton.edu>).
- [9] Charles, A. Alexander, et al., *Journal of Conflict Resolution*, 32, 4, December 1988.
- [10] Swami Vivekananda, *Raja Yoga: Conquering the Internal Nature*, Trio Press, Kolkata, 2006.
- [11] A. L. Bardach, *What did J. D. Salinger, Leo Tolstoy, and Sarah Bernhardt have in common: The surprising and continuing influence of Swami Vivekananda*, *The Wall Street Journal*, 30 March 2012.
- [12] *A Taste of Isha*, Recipes for the Pranic Lifestyle, Isha foundation, McMinnville, TN.
- [13] Chade-Ming Tan, *Everyday Compassion at Google*, Inc., (http://www.ted.com/talks/lang/en/chade_meng_tan_everyday_compassion_at_google.html)
- [14] Pradeep B. Deshpande, *Six Sigma for Karma Capitalism*, Six Sigma and Advanced Controls, Inc., Louisville, KY 2011.