



Compassion - K. Tanahashi

*Empathy & Compassion: The
Convergence of Buddhist &
Social Neuroscience Views*

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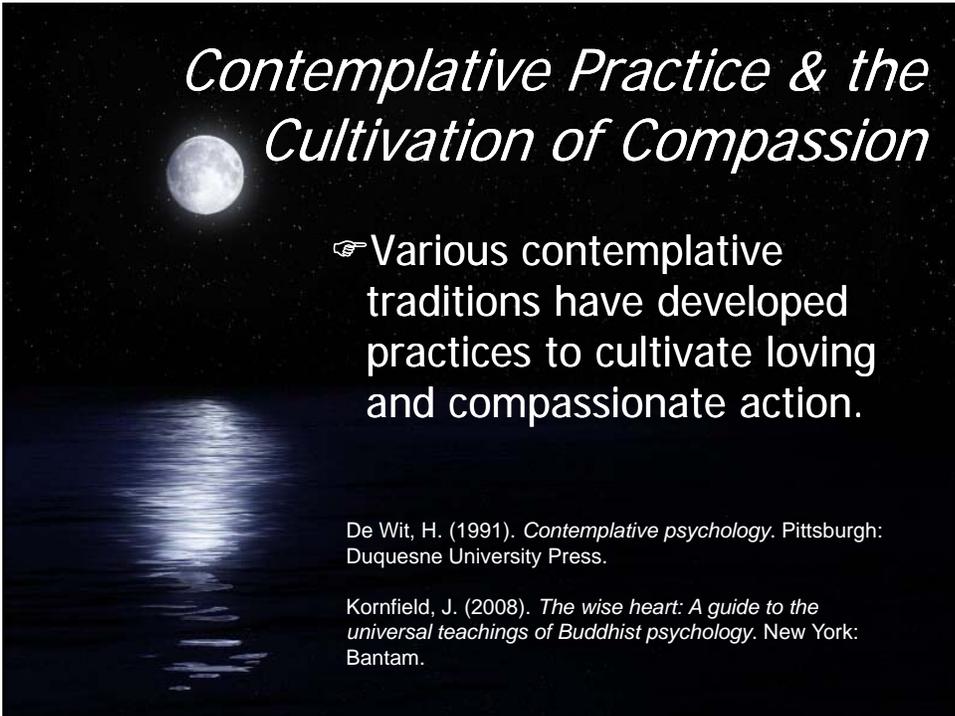


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Disclosure

No off-label and/or investigational use of pharmaceuticals or instruments not yet approved by the FDA will be discussed in this presentation.



Contemplative Practice & the Cultivation of Compassion

☞ Various contemplative traditions have developed practices to cultivate loving and compassionate action.

De Wit, H. (1991). *Contemplative psychology*. Pittsburgh: Duquesne University Press.

Kornfield, J. (2008). *The wise heart: A guide to the universal teachings of Buddhist psychology*. New York: Bantam.



How do we understand compassionate response to suffering?

Historically, contemplative traditions and science have had rather different perspectives...

“An important support for my thesis that human beings are fundamentally compassionate is our natural ability to connect spontaneously and deeply with the suffering of others. There is a certain spontaneity and directness in our natural reaction... it indicates a profound interconnectedness among all living beings.” (p. 73)

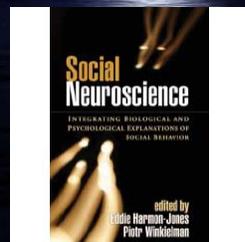
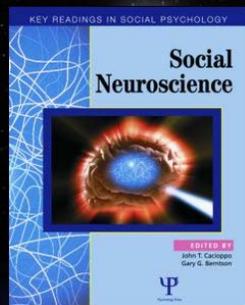
His Holiness The Dalai Lama (2002). Understanding our fundamental nature. In R.J. Davidson & A. Harrington (Eds.), *Visions of compassion: Western scientists and Tibetan Buddhists examine human nature* (pp. 66-80). New York: Oxford University Press

Compassion in the sciences of human behavior

☞ "... another reason that modern sciences of human behavior have not developed a systematic perspective on compassion is that these natural sciences are not really convinced that human beings are 'naturally' compassionate. On the contrary, they tend to tell us that altruism and self-sacrifice are fragile, even slightly puzzling human qualities..." (pp. 21-22)

Harrington, A. (2002). A science of compassion or a compassionate science? What do we expect from a cross-cultural dialogue with Buddhism? In R.J. Davidson & A. Harrington (Eds.). *Visions of Compassion* (pp.18 - 30). Oxford, U.K.: Oxford University Press.

The Social Neuroscience of Empathy



☞ The distance between contemplative and scientific perspectives on compassion has narrowed through results of recent social neuroscience studies of empathy....

Decety's Social Cognitive Neuroscience Model of Human Empathy

- ☞ Four functional components dynamically interacting to produce experience of empathy:
 - ☞ Affective sharing between self & other, based on automatic perception-action coupling
 - ☞ Self-awareness & self-other differentiation
 - ☞ Mental flexibility to adopt subjective perspective of the other
 - ☞ Regulatory processes, including emotion regulation

Decety, J. (2007). A social cognitive neuroscience model of human empathy. In E. Harmon-Jones & P. Winkielman (Eds.), *Social Neuroscience: Integrating biological and psychological explanations of social behavior*. (pp. 246-270). New York: Guilford.

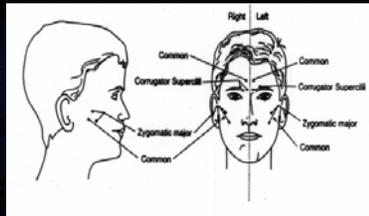
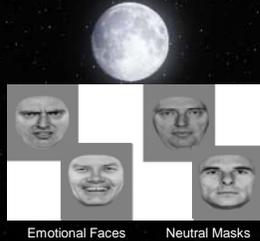
Affective Sharing



- ☞ Humans and other primates tend to automatically mimic and synchronize emotional expression with others.

Preston, S.D., & de Waal, F.B.M. (2002). Empathy: Its ultimate and proximate bases. *Behavioral and Brain Sciences*, 25, 1-72.

Facial Mimicry to Nonconsciously Perceived Emotional Facial Expressions

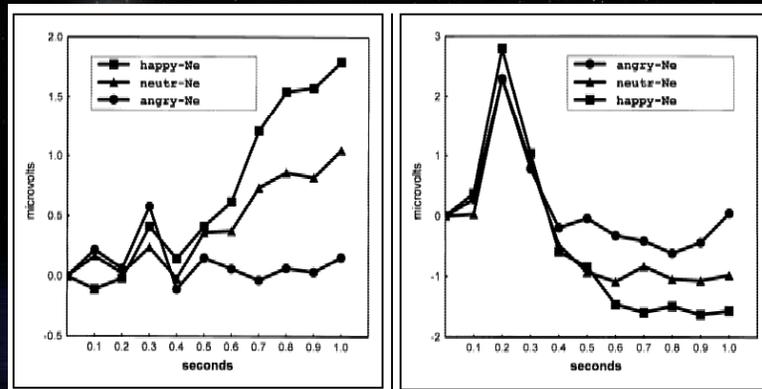


☞ Dimberg & colleagues used very brief exposures of happy, neutral, & angry faces, immediately followed & masked by neutral faces.

☞ Found increased zygomatic ("smile muscle") EMG to happy, and increased corrugator ("frown muscle") EMG to angry faces, despite absence of conscious recognition of target faces.

Dimberg, U., Thunberg, M., & Elmehed, K. (2000). Unconscious facial reactions to emotional facial expressions. *Psychological Science, 11*, 86-89.

Masking Study of Facial Mimicry

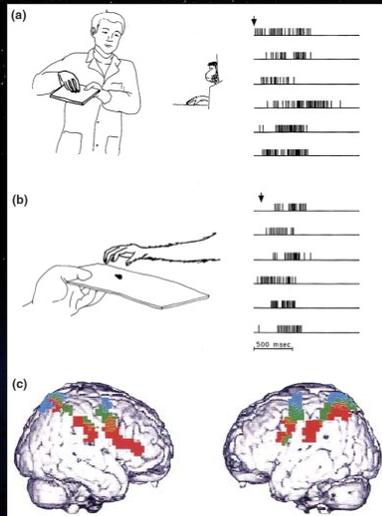


Masked happy faces elicit greater *zygomatic* response.

Masked angry faces elicit greater *corrugator* response

From Dimberg, Thunberg, & Elmehed (2000)

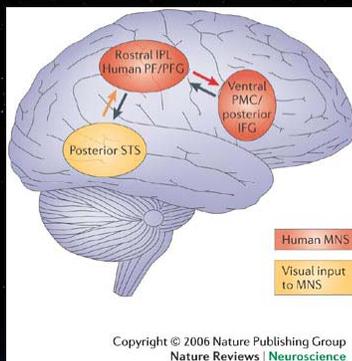
Mirror Neurons



- ☞ Electrophysiologic recordings in monkeys show mirror neurons in ventral premotor & posterior parietal cortices firing during both goal-directed actions and observation of same actions performed by another.

Rizzolatti, G., Fogassi, L., & Gallese, V. (2001). Neurophysiological mechanisms underlying the understanding and the imitation of action. *Nature Reviews Neuroscience*, 2, 661-670.

Human Mirror Neurons & fMRI



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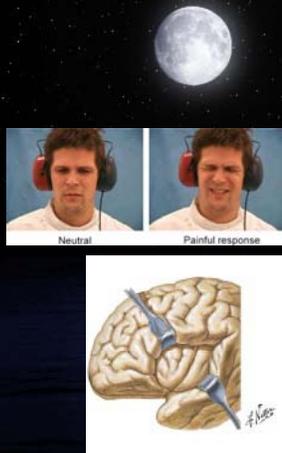


- ☞ fMRI studies have shown that analogous areas of the human brain activate when both performing and observing an action.
- ☞ Activity increases (red in brain model) when the context of an observed action reveals intention

Iacoboni, M., Molinar-Szakacs, I., Gallese, V., Buccino, G., Mazziotta, J.C., & Rizzolatti, G. (2005). Grasping the intentions of others with one's own mirror neuron system. *PLoS Biology*, 3, 529-535.

Iacoboni, M. & Dapretto, M. (2006). The mirror neuron system and the consequences of its dysfunction. *Nature Reviews Neuroscience*, 7, 942-951.

Empathy for Pain



Brain Areas Activated by both Experiencing & Observing Pain

- ☞ Observing facial expression of another in pain activates areas involved in one's own affective response to pain (anterior insula, anterior medial cingulate)
- ☞ Perspective (imagine self vs. other) & appraisal (imagine treatment effective vs. unsuccessful) modulates brain response

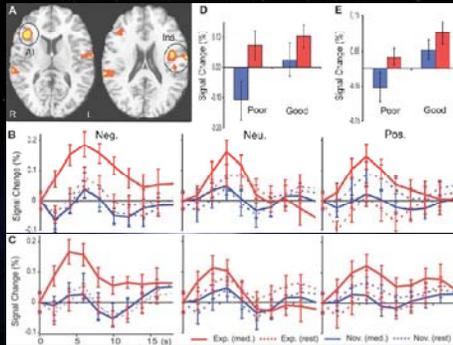
Lamm, C., Batson, C.D., & Decety, J. (2007). The neural substrate of human empathy: Effects of perspective-taking and cognitive appraisal. *Journal of Cognitive Neuroscience*, 19, 42-58.

Referential & Non-referential Compassion



- ☞ Referential: Directed toward a suffering being
- ☞ Non-referential: Objectless (e.g., as cultivated in open presence: shikantaza in Zen; dzogchen in Vajrayana, choiceless awareness in Theravada)

Nonreferential Compassion Meditation Alters Activity in Empathy-Related Areas



☞ "Expert" Vajrayana Buddhist meditators, compared to novices, showed greater activation to emotional vocalizations in insula cortex during nonreferential loving kindness/compassion meditation.

☞ Strength of insula activation was correlated with self-reported intensity of the meditation

Lutz, A., Brefczynski-Lewis, J., Johnstone, T., & Davidson, R.J. (2008). Regulation of the neural circuitry of emotion by compassion meditation: Effects of meditative expertise. *PLoS ONE*, 3(3), e1897. Doi:10.1371/journal.pone.00011897.

Self-Awareness & Self-Other Differentiation



☞ Automatic activation of shared experience alone would likely lead to responses oriented to the self (i.e., empathic over-arousal & distress)

☞ Without processes by which self and other are differentiated, and emotion is regulated, moving from empathy to true compassion would not be possible

Self-Focus & Empathic Overarousal

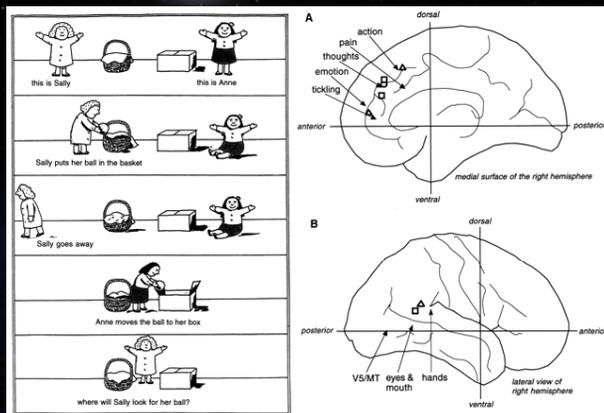
- ☞ Self-focused perspective-taking arouses more intense empathic distress (including its physiological manifestations)
- ☞ Several studies find that those who show greater physiologic emotional response to others' distress tend to be more self-focused, less empathic, and less altruistic in response to others' distress.

Batson, C.D., Early, S., & Salvarani, G. (1997). Perspective taking: Imagining how another feels versus imagining how you would feel. *Personality and Social Psychology Bulletin*, 23, 751-758.

Eisenberg, N. (2002). Empathy-related emotional responses, altruism, and their socialization. In R.J. Davidson & A. Harrington (Eds.), *Visions of compassion* (pp. 131-164). Oxford, UK: Oxford University Press.

"Mentalizing" & Medial Prefrontal Cortex

- ☞ Mentalizing (theory of mind) tasks activate medial prefrontal cortex (MPFC) & inferior parietal/superior temporal cortex
- ☞ MPFC contains spindle (Von Economo) cells found only in great apes, humans, elephants, & cetaceans.



Frith, U., & Frith, C.D. (2003). Development and neurophysiology of mentalizing. *Philosophical Transactions of the Royal Society of London: Series B. Biological Sciences*, 358, 459-473.

Mental Flexibility



- ☞ Errors in taking perspective of others appear to stem from inability to shift from self-perspective
- ☞ Dorsomedial frontal regions play a key role in flexibly shifting between self- and other-perspectives

Royzman, E.B., Cassidy, K.W., & Baron, J. (2003). I know you know: Epistemic egocentrism in children and adults. *Review of General Psychology*, 7, 38-65.

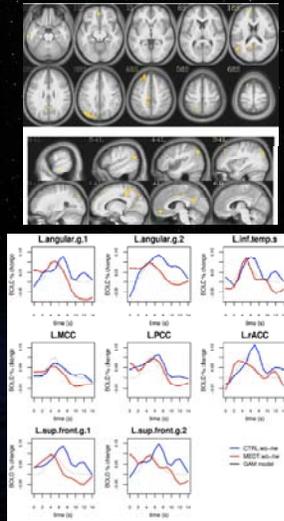
Decety, J. (2007). A social cognitive neuroscience model of human empathy. In E. Harmon-Jones & P. Winkielman (Eds.), *Social Neuroscience: Integrating biological and psychological explanations of social behavior*. (pp. 246-270). New York: Guilford.

Nondual, Nonconceptual Bearing Witness

- ☞ Self-focus is reflected in the conceptual proliferation ("monkey mind") that characterizes our "normal" resting baseline state
- ☞ "The approach in Zen practice is based on penetrating the unknown, on starting out with no concepts or ideas...bearing witness ..." (Glassman, 1998, p. 77)

Glassman, B. (1998). *Bearing witness: A Zen master's lessons in making peace*. New York: Bell Tower.

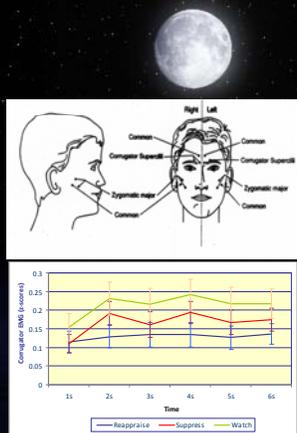
Zen Meditation & Decreased Conceptual Proliferation



- ☞ Compared participants with 3+ yrs daily Zazen practice to meditation naive persons
- ☞ All did simple breath-attention meditation while words & nonwords were flashed
- ☞ Zen meditators showed faster return to baseline in brain "default network" activity associated with conceptual thought & sense of self

Pagnoni, G., Cekic, M., & Guo, Y. (2008). "Thinking about not-thinking": Neural correlates of conceptual processing during Zen meditation. *PLoS ONE* 3 (9): e3083. [Doc10.1371/journal_pone.00-3083](https://doi.org/10.1371/journal.pone.00-3083)

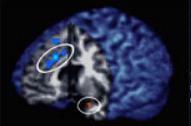
Emotion Regulation



- ☞ Reappraising the meaning & self-relevance of emotional events reduces facial expressive, autonomic physiological, & brain (amygdala) responses

Gross, J.J., Thompson, R.A. (2007). Emotion regulation: Conceptual foundations. In J.J. Gross (Ed.), *Handbook of emotion regulation* (pp. 3-24). New York: Guilford.

Menchola, M., Kaszniak, A.W., & Burton, K.W. (2008). *Interaction between habitual and voluntary emotion regulation and the chronometry of affective responses*. Poster presented at the annual meeting of the Society for Psychophysiological Research.



Nielsen, L., & Kaszniak, A.W. (2006). Awareness of subtle emotional feelings: A comparison of long-term meditators and non-meditators. *Emotion*, 6, 392-405.

Participants



Group	Control (N=17)	Short-term Meditators (N=5)	Long-term meditators (N=11)
Age (years)	52.3 (10.0)	53.0 (6.0)	55.27 (10.4)
Education (years)	18.97 (2.5)	21.0 (3.1)	18.3 (3.4)
Yrs. of Meditation Practice - Range, mean & (S.D.)	No history of practice	4-7 years 6.0 (1.3)	12-29 years 21.2 (4.7)
Type of Practice		2 Mindfulness, 3 Zen	6 Mindfulness, 5 Zen

Note: All meditators are lay practitioners; Mindfulness teacher combines Zen & Vipassana traditions

Unpleasant emotional pictures - Examples



Method of presentation - masked condition

+

4000 ms

45 ms

45ms

2910ms

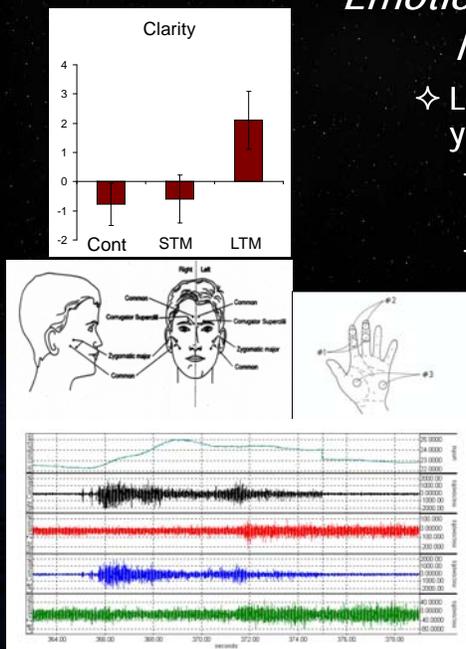
PAUSE

4000 ms

Could you see the hidden picture?

Emotion in Long-Term Zen & Mindfulness Meditators

- ✧ Long-term Meditators (>10 years meditation practice)
 - ✧ Report higher emotional clarity
 - ✧ Those with higher clarity show lower physiological & experienced arousal, & greater subtle positive facial expression in response to masked emotional pictures, consistent with regulation of emotion early in the emotion process.



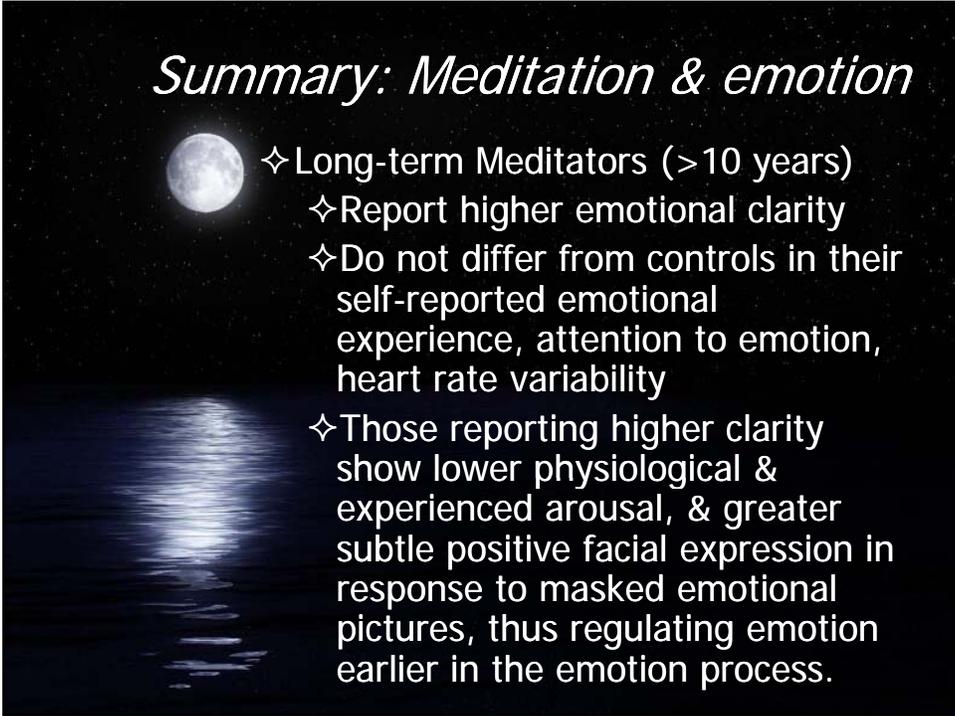
Nielsen, L., & Kaszniak, A.W. (2006). Awareness of subtle emotional feelings: A comparison of long-term meditators and non-meditators. *Emotion*, 6, 392-405.



Summary: Meditation & emotion

✧ Short-term Meditators (<10 years)

- ✧ Tend to pay more attention to emotion, and show a strong positive relationship between attention and self-reported emotional clarity
- ✧ Report more bodily feelings, and trend toward more cognitive actions, in emotional experiences
- ✧ Exhibit greater vagal control / heart rate variability after an emotional stressor, perhaps due to the increased attention to emotion & consequent emotion regulation effort



Summary: Meditation & emotion

✧ Long-term Meditators (>10 years)

- ✧ Report higher emotional clarity
- ✧ Do not differ from controls in their self-reported emotional experience, attention to emotion, heart rate variability
- ✧ Those reporting higher clarity show lower physiological & experienced arousal, & greater subtle positive facial expression in response to masked emotional pictures, thus regulating emotion earlier in the emotion process.

Hypothesized relation of meditation and the experience/regulation of emotion



- ✧ Practice in quiescent attention to experience enables the shift from attachment & reactivity to greater equanimity.
 - ✧ Transformation occurs over many years
- ✧ **Initially:** Attention, awareness of bodily feelings, use of cognitive actions to regulate emotion, and physiological reactivity to emotional stressors increase
- ✧ **Later:** Clarity increases, and explicit attention to emotion may no longer be needed. Clarity may confer emotional regulatory skill, attention to subtle emotion cues may become automatized / preconscious, & appraisal of self relevance may decrease.

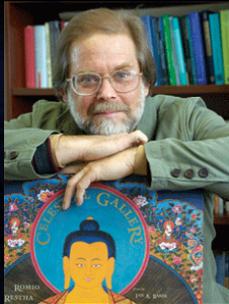
Mimicry, Empathy & Social Feedback



- ☞ Research participants who were mimicked by the experimenter were more generous & helpful toward others than nonmimicked participants
- ☞ Included behavior directed toward people not directly involved in the mimicry situation.

Van Baaren, R.B., Holland, R.W., Kawakami, K., & Van Knippenberg, A. (2004). Mimicry and prosocial behavior. *Psychological Science*, 15, 71-74.

Social Feedback, Action & Motivation



☞ "People not only notice what we do; they notice why we do it... the more my actions are motivated by generosity, lovingkindness, and the wisdom of interdependence, the more I can relax and open up to the world... the less I will be inclined to use others and consequently the more inclined they will be to trust and open up to me. In such ways, transforming my own motivations not only transforms my own life; it also affects those around me, since what I am is not separate from what they are." (p. 85)

Loy, D. (2008). Rethinking karma: How are we meant to understand this key Buddhist teaching? *Tricycle*, 17 (3), 81-85.

Thank You

