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

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Sponsored by The University of Arizona College of Medicine at the Arizona Health Sciences Center
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.


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)

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)


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


Affective Sharing

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

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.


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.


Human Mirror Neurons & fMRI

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.


Empathy for 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


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.


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.


“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.

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


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)

Zen Meditation & Decreased Conceptual Proliferation

- Compared participants with 3+ yrs daily Zazen practice to meditation naïve 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


Emotion Regulation

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


Participants

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

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

Unpleasant emotional pictures - Examples
Method of presentation - masked condition

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.

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.

“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)


Thank You