Compassion/Loving-kindness Meditation

Neurobiological Correlates
M. Kathleen B. Lustyk, PhD
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klustyk@spu.edu
http://www.spu.edu/LustykLab

Outline

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lacktriangle

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compassion meditation

Conclusions

Compassion vs. Loving-kindness Meditation

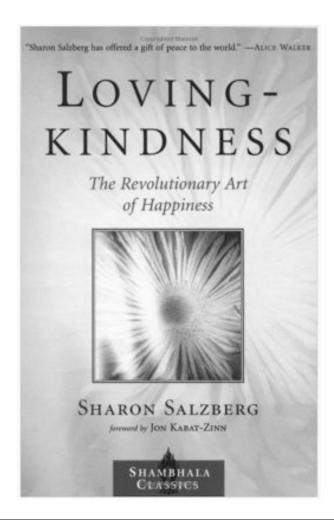
- cultivate compassion, or deep, genuine sympathy for those stricken by misfortune, together with an earnest wish to ease this suffering press; Hopkins, 2001).
 - Karunaa in Pali (the language of the Buddha)
- Loving-kindness meditation (LKM) aims to develop an affective state of unconditional kindness to all people (Hofmann, Grossman, & Hinton, 2011).
 - Metta in Pali
- Often practiced together.

Compassion/loving-kindness meditation

- state in which an "... unconditional feeling of loving-kindness and compassion pervades the whole mind as a way of being, with no other consideration, or discursive thoughts".
- The long-term goal of the practice is to enhance empathy for oneself and others and to inspire altruism.



Sharon Salzberg on Loving Kindness



http://www.sharonsalzberg.com/

Brief Exercise

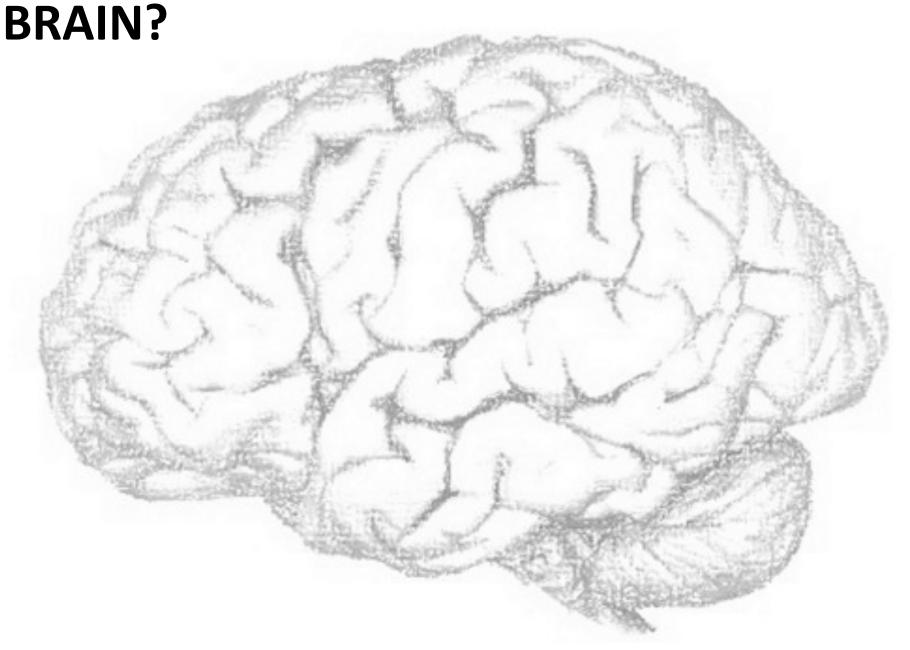
 Christopher K. Germer, PhD: recorded meditations that you can download can be found at:

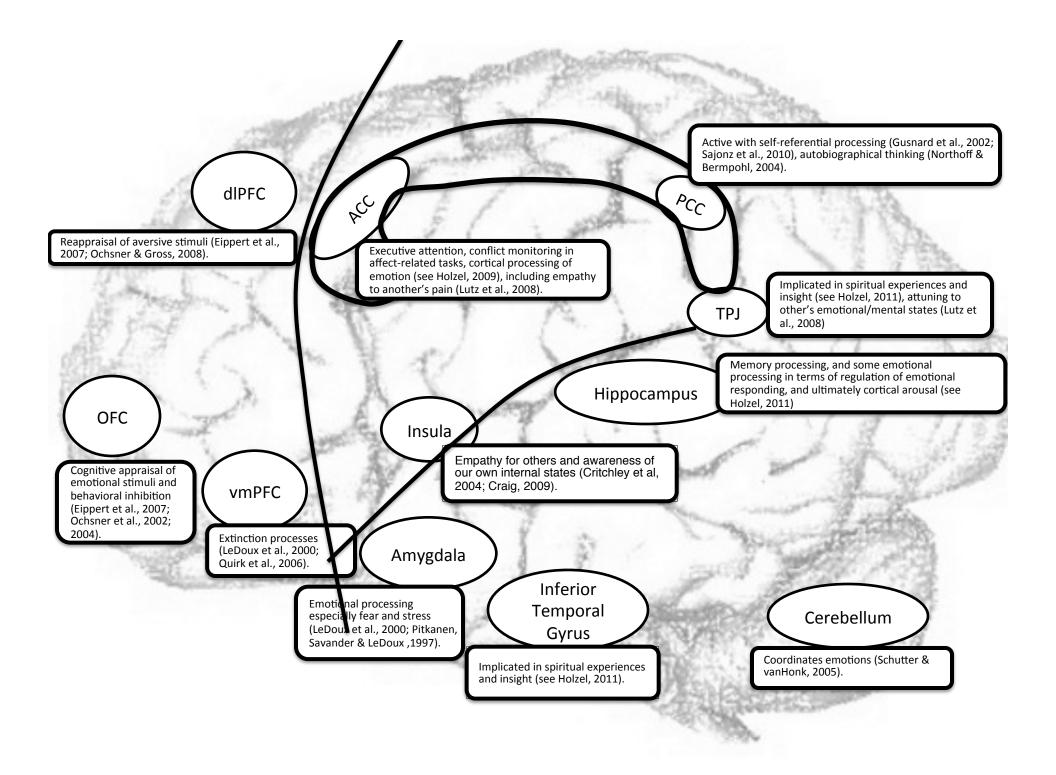
http://www.mindfulselfcompassion.org/ meditations selfcompassion.html



10 minute exercise for beginners

WHAT IS HAPPENING IN THE "MINDFUL" BRAIN?





Sample study with MM

Norman Farb, Zindel Segal, et al. at the Univ. of Toronto used fMRI to study two aspects of self- awareness: the narrative "me" and the experiential "I".

2 groups

- Waitlist controls (novice)
- 2. MBSR grads (MT)

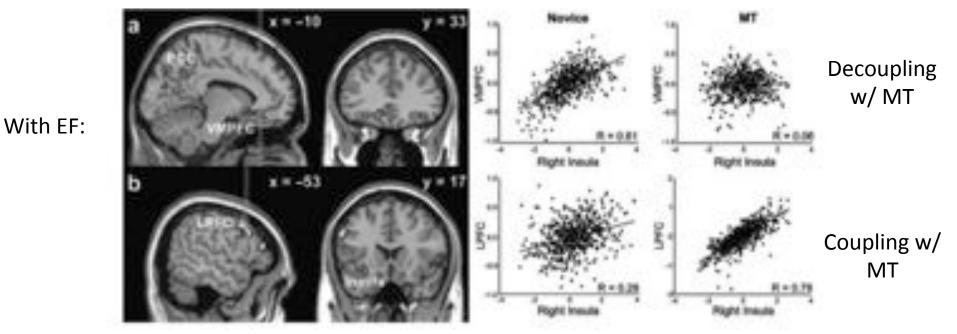
Trait-related adjective task in scanner:

charming – lively – hopeful – greedy – indecisive

Narrative Focus: "me" & my story

or

Experiential Focus: current moment "I" (mindful practice)



Activity pattern associated with detached or objective modes of self-focus.

Farb et al. (2007). Attending to the present: Mindfulness meditation reveals distinct neural modes of self-reference. SCAN, 2, 313-322.

Function: Increased BOLD signal during Structure: awareness of mind-wandering in Increased GM in MM experts vs novices (Lazar et al., 2005). MM experts (Hasenkamp et al., 2011). Function: dACC Increased coupling with insula post-MBSR (Farb et al., 2008). P_{CC} Structure: dIPFC Increased GM post-MBRP vs. Structure: controls (Holzel et al., 2011). Network analyses revealed more connections with greater efficiency following Structure: MM training vs relaxation (Xue et al., 2011). rACC Increased GM in left TPJ post-MBRP vs. controls (Holzel et al., 2011). Function: Increased BOLD signal during MM in experts vs novices (Hölzel et al., 2007). **TPJ** Structure: Increased GM in right hippocampus in MM experts vs. novices (Hölzel et al., 2008; Luders Hippocampus et al., 2009). Increased GM in left hippocampus post-MBSR vs. controls (Holzel et al., 2011). Insula **OFC** Increased GM in right anterior insula in MM experts vs **mPFC** novices (Lazar et al., 2005; Holzel et al., 2008). Function: Decreased coupling with mPFC post-MBSR (Farb et Function: Structure: Increased BOLD signal al., 2008). Increased GM in Increased BOLD signal during awareness of mindduring MM in experts right OFC in MM wandering in MM experts (Hasenkamp et al., 2011). vs novices (Hölzel et al., experts vs 2007). novices (Luders Decoupling with insula et al., 2009). post-MBSR (Farb et al., Amygdala 2008). Structural: Inferior Cerebellum Decreased GM post-MBSR **Temporal** (Hölzel et al., 2010). Gyrus Functional: Increased GM post-MBRP vs. Decreased BOLD signal in controls (Holzel et al., 2011). Structure: left amygdala in novices vs Increased GM in left gyrus in MM experts during MM experts vs. novices (Holzel emotional processing et al., 2008; Luders et al., 2008). (Taylor et al., 2011).

Sample study with LKM

Antoine Lutz et al., at U of Wisc. Madison studied fMRI responses during compassion meditation.

2 groups

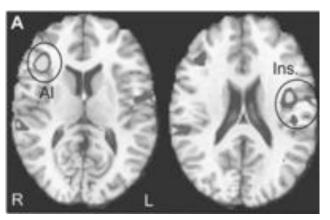
- 1. Experts 10K+ hours
- Novices w/ only 2-wk training period



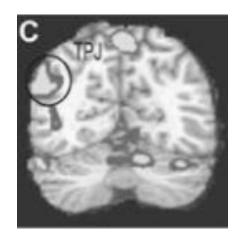








Greater increases in Insula (empathy) in experts.



Greater increases in temporal-parietal junction (TPJ; spiritual, attuning) in experts.

Source: 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*, 1-10.

Executive attention, conflict monitoring in affect-related tasks, cortical processing of emotion (see Holzel, 2009), including empathy to another's pain (Lutz et al., 2008).

Function:

Increased BOLD signal during MM in experts vs novices (Hölzel et al., 2007).

rACC Function with LKM:

Increased BOLD signal during LKM (Lutz et al., 2008, 2009).

Implicated in spiritual experiences and insight (see Holzel, 2011), attuning to other's emotional/mental states (Lutz et al., 2008)

TPJ

Function with LKM: Increased BOLD signal during LKM (Lutz et al., 2008, 2009).

Memory processing, and some emotional processing in terms of regulation of emotional responding, and ultimately cortical arousal (see Holzel, 2011)

Hippocampus

Extinction processes (LeDoux et al., 2000; Quirk et al., 2006).

vmPFC

Function:

Increased BOLD signal during MM in experts vs novices (Hölzel et al., 2007).

Decoupling with insula post-MBSR (Farb et al., 2008).

Function with LKM: Increased BOLD signal during LKM (Engstrom & Soderfeldt, 2010) Empathy for others and awareness of our own internal states (Critchley et al, 2004; Craig, 2009).

Insula

Function:

Decreased coupling with mPFC post-MBSR (Farb et al., 2008).

Increased BOLD signal during awareness of mindwandering in MM experts (Hasenkamp et al., 2011).

Function with LKM:

Increased activation during LKM (Lutz et al., 2008, 2009).

Function with LKM: Increased BOLD signal during LKM (Engstrom & Soderfeldt, 2010)

Conclusions

- With LKM we see less widespread neural activity.
- No structural data with LKM is currently available.
- There is focused activity in the insula
 - Empathy
 - Feeling states
- There is focused activity in the vmPFC w/o decoupling with the insula
 - Can inhibit conditioned learning associated with internal states
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- TPJ activity
 - attunement
 - "spiritual experience"
- Hippocampal activity may lead to processing of more favorable memories.

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Future Directions

• Medline 10/27/2011: Only 8 published studies on LKM.





Thank you