

The Neurology of Awakening:

Using the New Brain Research to Steady Your Mind

Spirit Rock Meditation Center

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Topics

- **Foundations of mindfulness**
- **Self-directed neuroplasticity**
- **Self-compassion**
- **Concentration in contemplative practice**
- **Lateral networks of spacious awareness**
- **Resources for concentration**
- **Steady, quiet, and brought to singleness**



Foundations of Mindfulness

Basics of Meditation

- Relax
- Posture that is comfortable and alert
- Simple good will toward yourself
- Awareness of your body
- Focus on something to steady your attention
- Accepting whatever passes through awareness, not resisting it or chasing it
- Gently settling into peaceful well-being

Mindfulness Factors

- Setting an intention
- Relaxing the body
- Feeling cared about
- Feeling safer
- Encouraging positive emotion
- Absorbing the benefits

Stably Mindful

Let's try it . . .

Neural Basis of Mindfulness Factors

- **Setting an intention** - “top-down” frontal, “bottom-up” limbic
- **Relaxing the body** - parasympathetic nervous system
- **Feeling cared about** - social engagement system, vagus nerve
- **Feeling safer** - inhibits amygdala/hippocampus alarms
- **Encouraging positive emotion** - dopamine, norepinephrine
- **Absorbing the benefits** - positive implicit memories

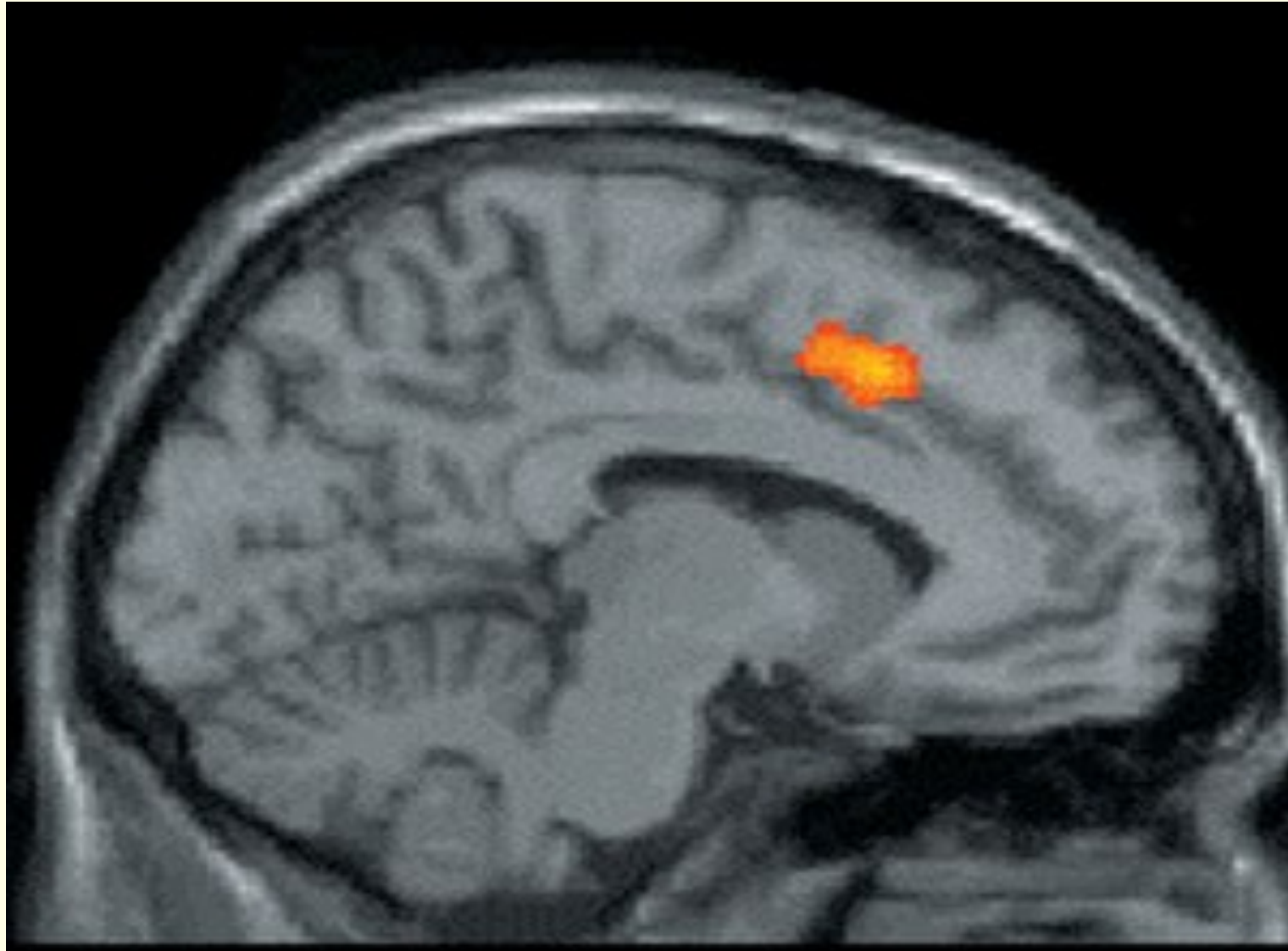


Self-Directed Neuroplasticity



**Mental activity entails
underlying neural activity.**

Ardent, Diligent, Resolute, and Mindful



**Repeated mental activity entails
repeated neural activity.**

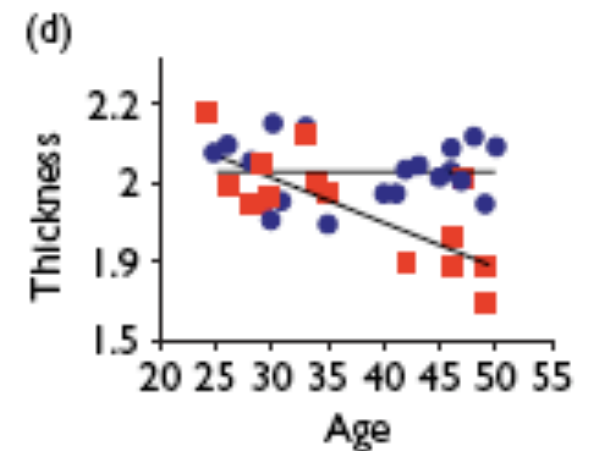
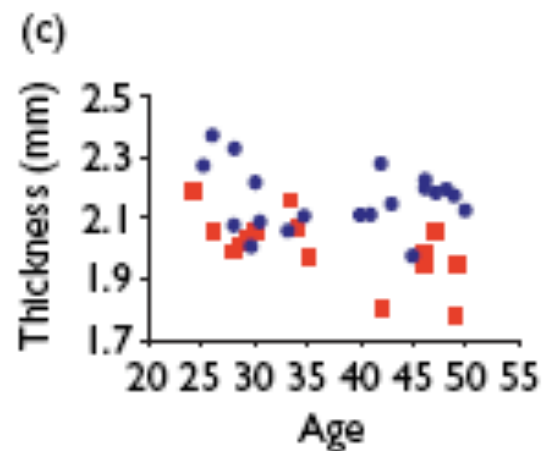
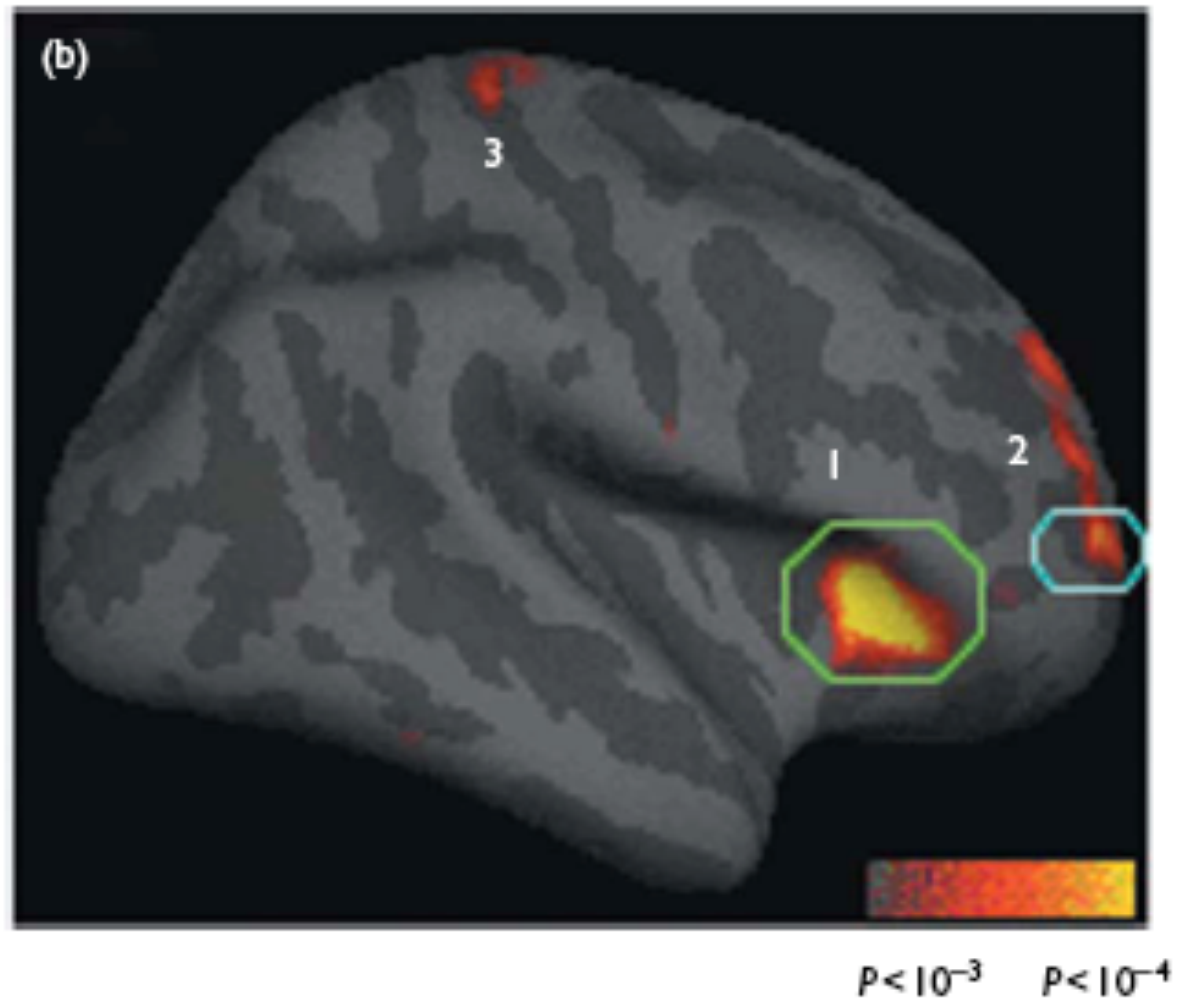
**Repeated neural activity
builds neural structure.**

A network of glowing yellow neurons with a central neuron highlighted in green. The neurons are interconnected by a dense web of thin, yellow fibers. The central neuron has a bright green nucleus and is surrounded by a network of yellow fibers. The background is dark, making the glowing neurons stand out.

Neurons that fire together,

wire together.

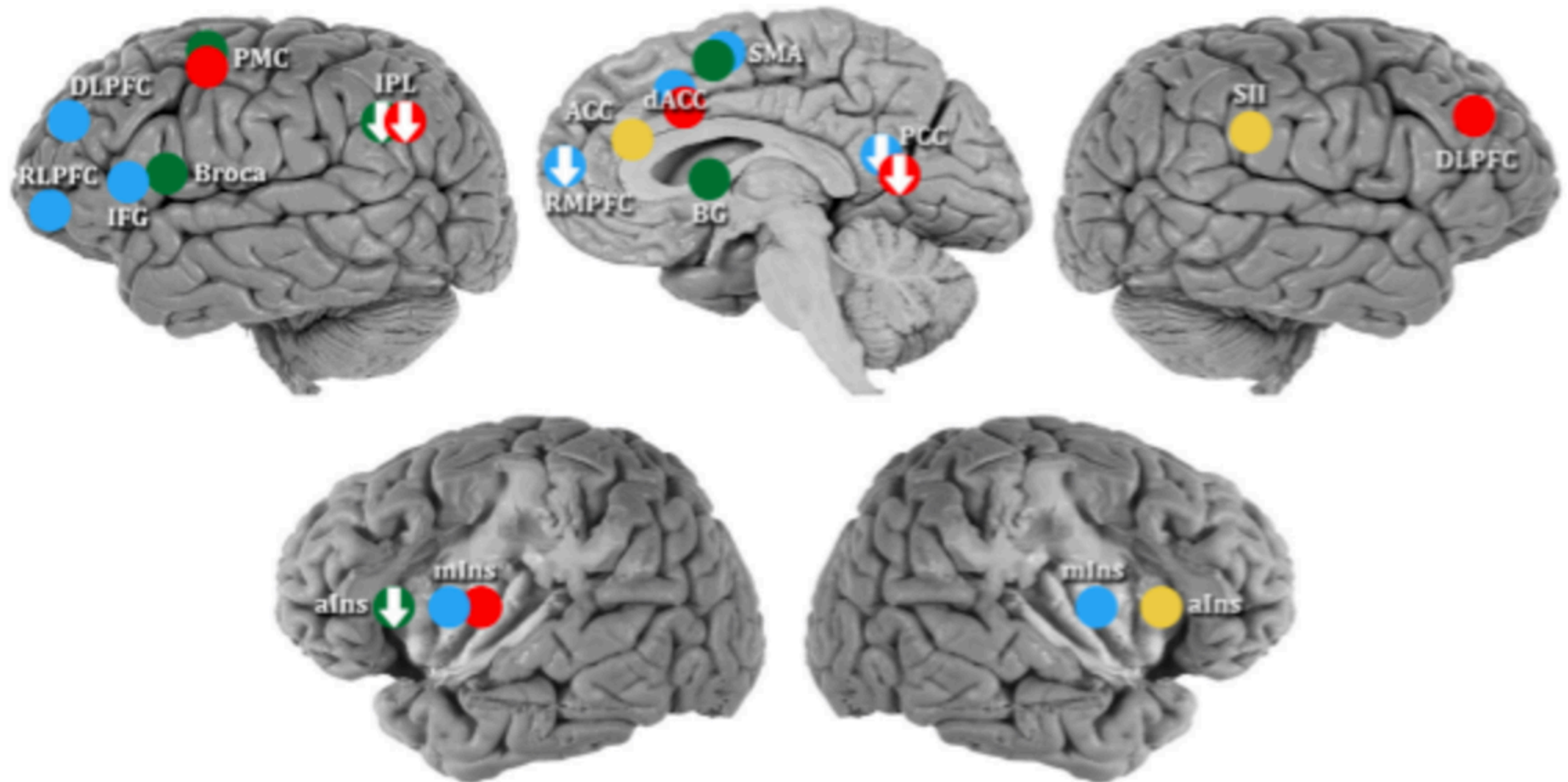
Lazar, et al. 2005.
Meditation
experience is
associated
with increased
cortical thickness.
Neuroreport, 16,
1893-1897.



Effects of Meditation on the Brain

- Increased gray matter in the:
 - Insula - interoception; self-awareness; empathy for emotions
 - Hippocampus - visual-spatial memory; establishing context; inhibiting amygdala and cortisol
 - Prefrontal cortex (PFC) - executive functions; attention control
- Reduced cortical thinning with aging in insula and PFC
- Increased activation of left frontal regions, which lifts mood
- Increased gamma-range brainwaves - may be associated with integration, “coming to singleness,” “unitary awareness”
- Preserved telomere length

● Focused Attention
 ● Open Monitoring
 ● Mantra Recitation
 ● Loving-kindness/Compassion



Fox, et al., 2016, *Neuroscience and Biobehavioral Reviews*, 65, 208-228

Major Buddhist Inner Strengths

Mindfulness

Compassion

View

Investigation

Kindness

Intention

Energy

Altruistic joy

Effort

Bliss

Tranquility

Virtue

Conviction

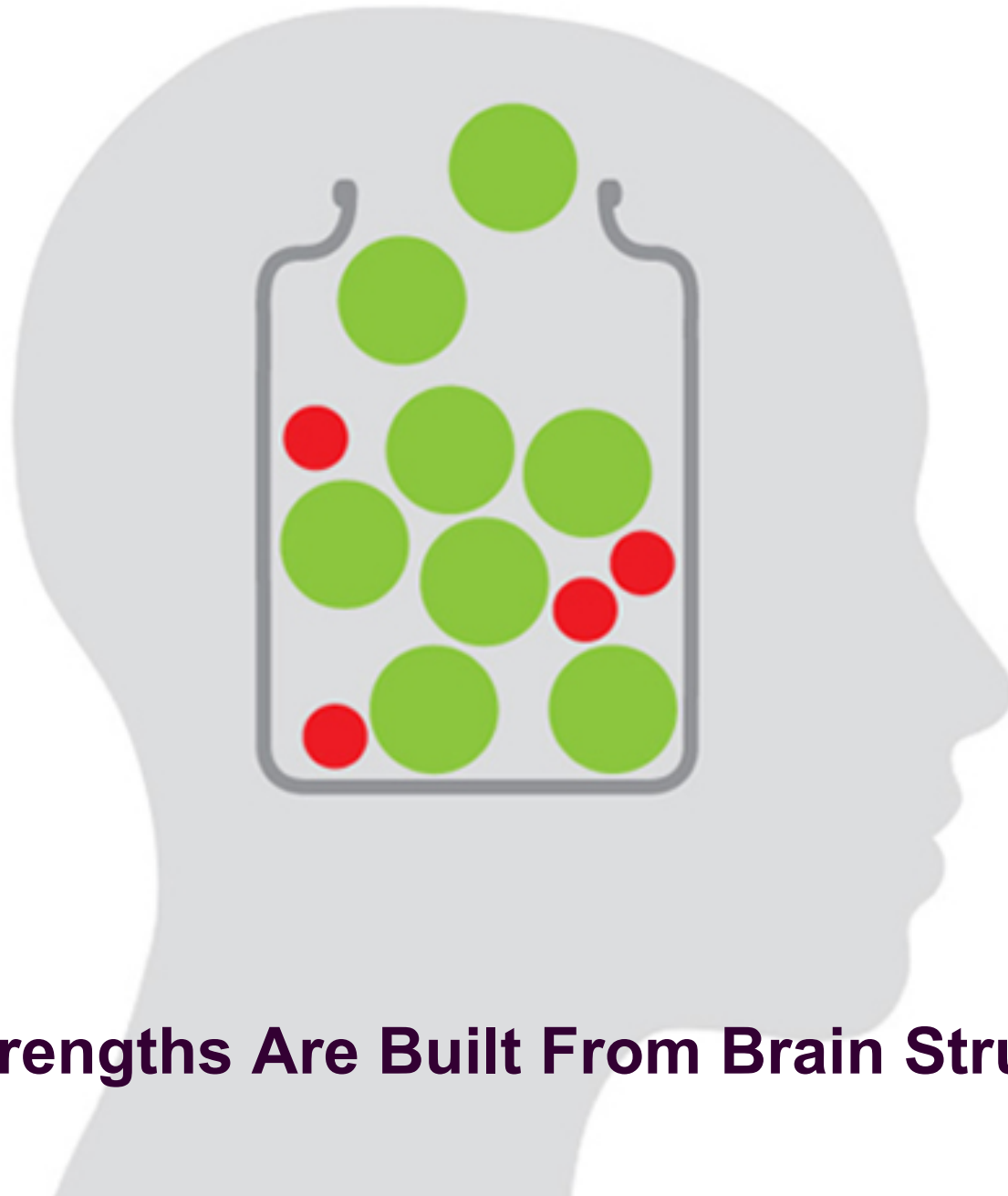
Concentration

Wisdom

Generosity

Equanimity

Patience



Inner Strengths Are Built From Brain Structure

The Activation/Installation Positive Cycle

States are temporary, traits are enduring.

Activated mental states are the basis for installed neural traits.

Positive traits foster positive states.

**Activated states --> Installed traits -->
Reactivated states --> Reinforced traits**

The Opportunity

We can use the mind

To change the brain

To change the mind for the better

To benefit ourselves and other beings.

Cultivation in Context

- Three ways to engage the mind:
 - Be with it. Decrease negative. Increase positive.
 - The garden: Observe. Pull weeds. Plant flowers.
 - Let be. Let go. Let in.
 - Mindfulness present in all three ways to engage mind
- While “being with” is primary, it’s often isolated in mindfulness-based practices.
- Skillful means for decreasing the negative and increasing the positive have developed over 2500 years. Why not use them?



SPIRIT ROCK MEDITATION CENTER



Join us for

Cultivating Inner Strength - Monastic Daylong [Dana - No Fee Day]

with Ayya Anandabodhi
and Ayya Santacitta

on

Sunday, July 8

from 9:30 am - 5 pm.

(Photo by Ed Ritger)

Know the mind.

Shape the mind.

Free the mind.



Self-Compassion

*The root of Buddhism is compassion, and
the root of compassion is compassion for oneself.*

Pema Chodron

*If one going down into a river,
swollen and swiftly flowing,
is carried away by the current --
how can one help others across?*

The Buddha

Self-Compassion

- Compassion is the wish that a being not suffer, combined with sympathetic concern. Self-compassion simply applies that to oneself. It is not self-pity, complaining, or wallowing in pain.
- Studies show that self-compassion buffers stress and increases resilience and self-worth.
- But self-compassion is hard for many people, due to feelings of unworthiness, self-criticism, or “internalized oppression.” To encourage the neural substrates of self-compassion:
 - Get the sense of being cared about by someone else.
 - Bring to mind someone you naturally feel compassion for
 - Then shift the compassion to yourself, perhaps with phrases like: “May I not suffer. May the pain of this moment pass.”

Compassion for Yourself

Let's try it . . .



Concentration in Contemplative Practice

The Three Pillars of Practice

- Virtue (sila) - expressing natural goodness, restraining what's harmful to oneself and others
- Concentration (samadhi) - mindfulness, steadiness of mind, meditative absorption
- Wisdom (panna) - insight, understanding the Four Noble Truths
- A path of practice in which one both uncovers the true nature that is already present, and purifies and transforms the mind and heart
- The path itself is its own reward. And it ultimately culminates in enlightenment and complete freedom from suffering.

The Importance of Concentration

- We'll focus on one aspect of one pillar: meditative depth.
- That aspect has often been under-emphasized as Buddhism came to the West.
- But strong concentration is recommended by the Buddha and traditional teachers. It brings heft to insight, strengthens the will, and purifies the mind.
- The Noble Eightfold Path includes Wise Concentration, which is the four jhanas: profound states of meditative absorption.
- We're not teaching the jhanas, but how to nourish the brain states that support their five mental factors.

*Concentration is
the proximate cause of wisdom.*

*Without concentration, one cannot even secure
one's own welfare, much less the lofty goal of
providing for the welfare of others.*

Acariya Dhammapala

Right Concentration

And what, friends, is right concentration? Here, quite secluded from sensual pleasures, secluded from unwholesome states, a person enters upon and abides in the first jhana, which is accompanied by applied and sustained thought, with rapture and pleasure born of seclusion.

With the stilling of applied and sustained thought, the person enters upon and abides in the second jhana, which has self-confidence and singleness of mind without applied and sustained thought, with rapture and pleasure born of concentration.

With the fading away as well of rapture, the person abides in equanimity, and mindful and fully aware, still feeling pleasure with the body, enters upon and abides in the third jhana, on account of which noble ones announce: 'He or she has a pleasant abiding who has equanimity and is mindful.'

With the abandoning of pleasure and pain, and with the previous disappearance of joy and grief, he or she enters upon and abides in the fourth jhana, which has neither-pain-nor-pleasure and purity of mindfulness due to equanimity. This is called right concentration.

The Jhana Factors

- Applied attention - bringing it to bear
- Sustained attention - staying with the target
- Rapture - great interest in the target, bliss
- Joy - happiness, contentment, and tranquility
- Singleness - unification of awareness

Cultivating Vipassana

- Insight is the ultimate aim.
- Insight is nourished by stable, quiet, collected, and concentrated states . . . of the brain.
- Liberating insight - and Nibbana itself - is the fruit of virtue, wisdom, and contemplative practice.

*Even if the ripe apple falls ultimately by grace,
its ripening was caused
by the watering, feeding, protecting, and shaping of its tree.*

Penetrative insight

joined with calm abiding

utterly eradicates

afflicted states.

Shantideva

Heartwood

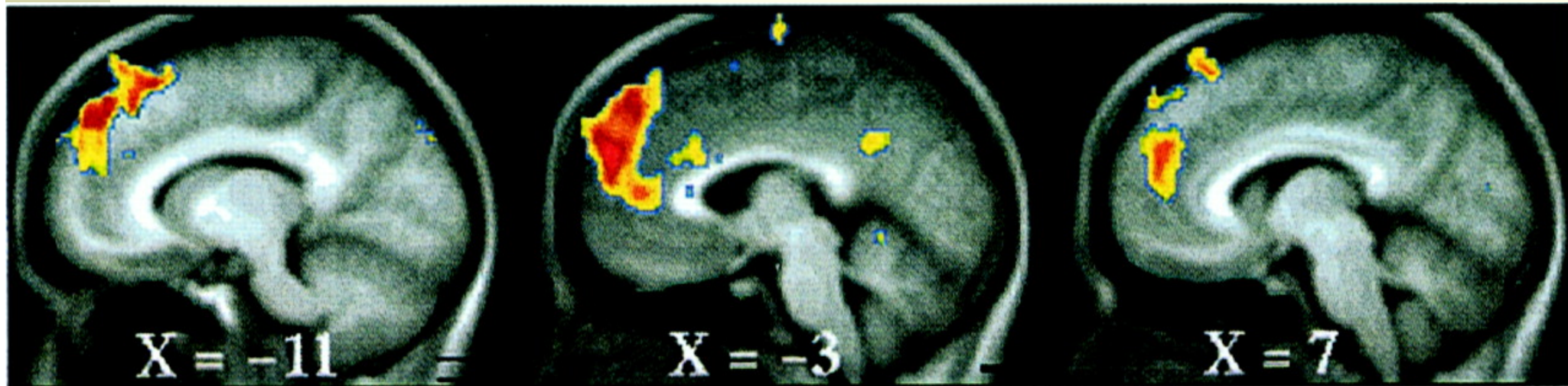
This spiritual life does not have gain, honor, and renown for its benefit, or the attainment of moral discipline for its benefit, or the attainment of concentration for its benefit, or knowledge and vision for its benefit.

But it is this unshakable liberation of mind that is the goal of this spiritual life, its heartwood, and its end.



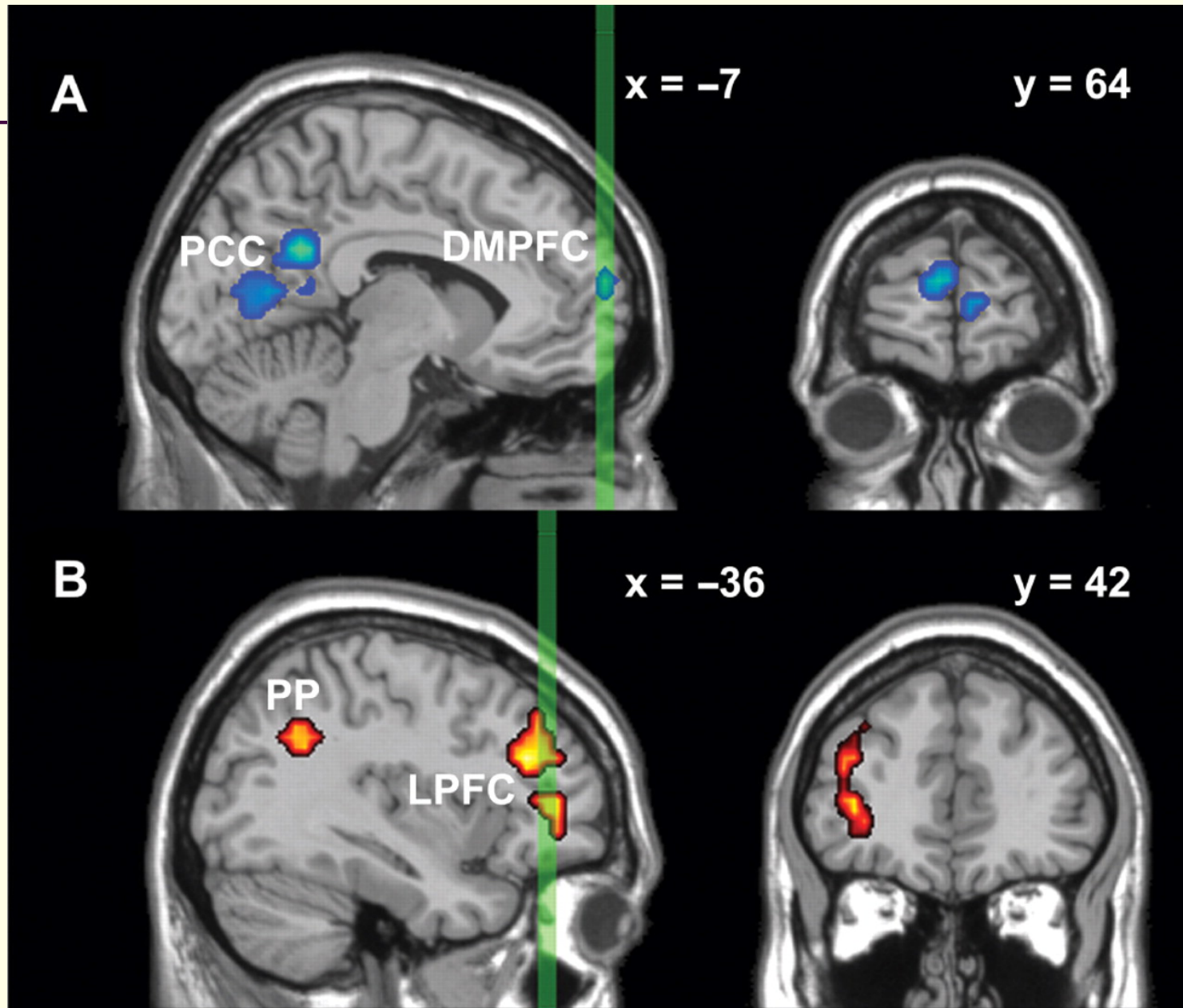
Lateral Networks of Spacious Awareness

Increased Medial PFC Activation Related to Self-Referencing Thought

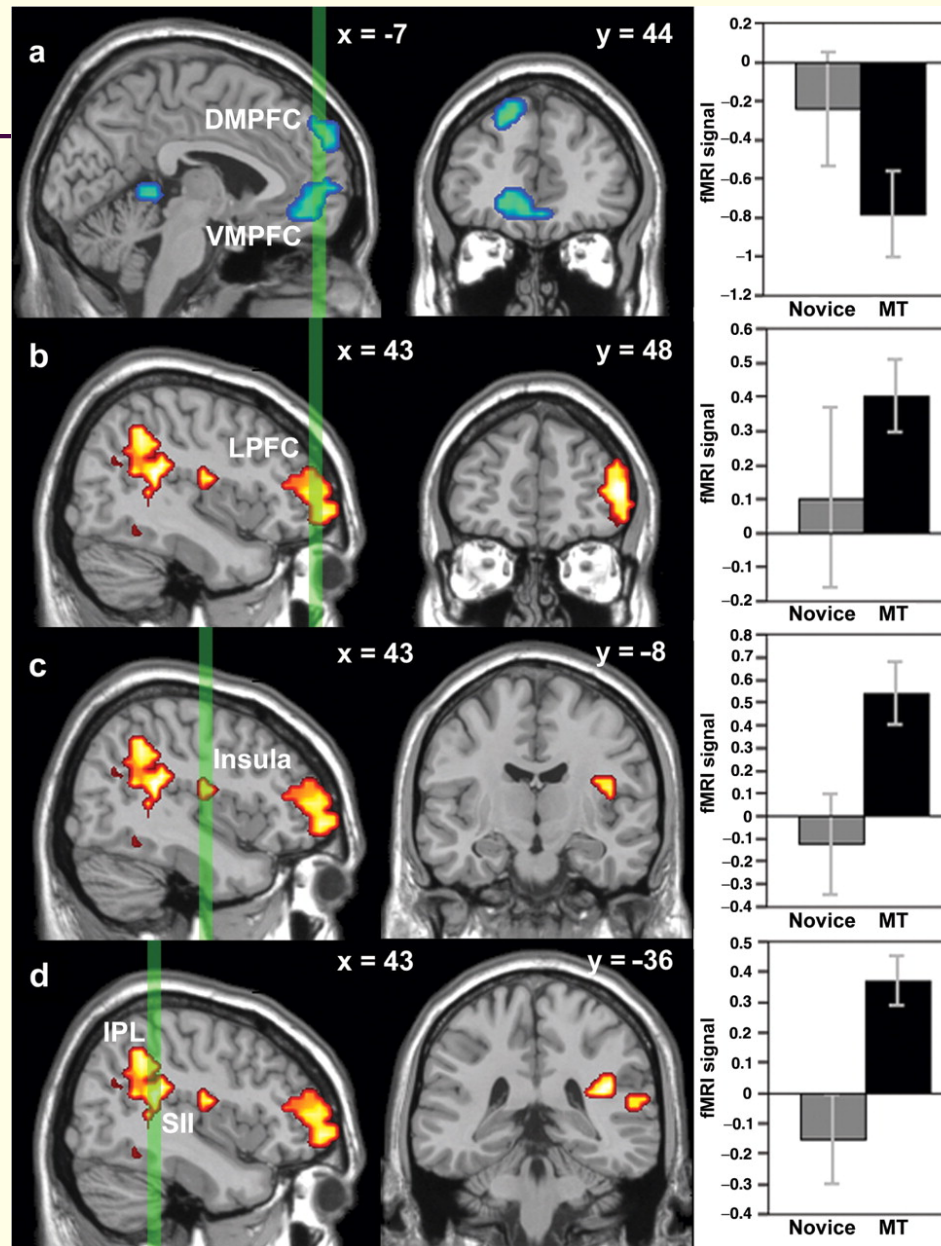


Gusnard D. A., et.al. 2001. *PNAS*, 98:4259-4264

Self-Focused (blue) and Open Awareness (red) Conditions (in the novice, pre MT group)



Self-Focused (blue) and Open Awareness (red) Conditions (following 8 weeks of MT)



Ways to Activate Lateral Networks

- Relax.
- Focus on bare sensations and perceptions.
- Sense the body as a whole.
- Take a panoramic, “bird’s-eye” view.
- Engage “dont-know mind”; release judgments.
- Don’t try to connect mental contents together.
- Let experience flow, staying here now.
- Relax the sense of “I, me, and mine.”

Whole Body Awareness

- Involves insula and middle parietal lobes, which integrate sensory maps of the body, plus right hemisphere, for holistic (gestalt) perception
- Practice
 - Sense the breath in one area (e.g., chest, upper lip)
 - Sense the breath as a whole: one gestalt, percept
 - Sense the body as a whole, a whole body breathing
 - Sense experience as a whole: sensations, sounds, thoughts . . . all arising together as one unified thing
- This sense of the whole may be present for a second or two, then crumble; just open up to it again.

Abiding as a Whole Body Breathing

Let's try it . . .



Steady, Quiet, and Brought to Singleness

A Road Map from the Buddha

The Buddha described a progressive process in which:

...the mind is steadied internally, quieted, brought to singleness, and concentrated - Anguttara Nikaya 3:100 - leading to liberating insight.

- *Steady* - attention is stable
- *Quiet* - tranquility, little verbal or emotional activity
- *Single* - integrative awareness, minimal thought, deep and nearly effortless engagement with the target of attention
- *Concentrated* - the jhanas or related non-ordinary states of consciousness; great absorption; often powerful feelings of rapture, bliss, happiness, contentment, and equanimity

Steadied Internally

A stable

stability of attention . . .

Quiet

- Little verbal activity
- Minimal sensorimotor stimuli
- Little goal-directedness
- A still pond with few waves

Concentrated

- Profound absorption in non-ordinary state of consciousness: e.g., the “form” and “formless” jhanas; samadhi; mystical transport
- Pervading sense of rapture, bliss, happiness, contentment, tranquillity, equanimity
- Penetrating clarity into fine-grained details of experience, e.g., transience, interdependence, selflessness



Resources for Concentration

The Jhana Factors

- Applied attention - bringing it to bear
- Sustained attention - staying with the target
- Rapture - great interest in the target, bliss
- Joy - happiness, contentment, and tranquility
- Singleness - unification of awareness

Increase the Stimulation of the Object of Attention

- Re-orient to each breath as a fresh stimulus
 - Beginner's mind, "don't-know mind"
- Intensify contact (= more stim): details, subtleties
- Attend to breath as a whole
- Move attention among its parts
- Walking meditation

Be Satisfied with Less

- Mindfulness thickens cortical layers, so less stimuli are still rewarding.
- Practice focusing on neutral - neither pleasant nor unpleasant - experiences. (*“The neutral is actually very close to peace and ease. It’s a real doorway to resting in the eventless.”* Christina Feldman)
- Recall the truth that all stimuli are fundamentally impermanent, empty, and ultimately unsatisfying.
- Call up a sense of disenchantment with the inner and outer worlds.

*In the deepest forms of insight,
we see that things change so quickly
that we can't hold onto anything,
and eventually the mind lets go of clinging.*

*Letting go brings equanimity.
The greater the letting go, the deeper the equanimity.
In Buddhist practice, we work to expand
the range of life experiences in which we are free.*

U Pandita

Steady and Quiet

Let's try it . . .

Joy

■ Experience

- Spectrum of happiness, contentment, and tranquility
- Happiness - Gratitude, gladness, delight
- Contentment - Well-being plus no wish at all that the moment be any different (hint of equanimity)
- Tranquility - Deep peace; a still pond
- Feelings can be subtle, and still pervade the mind.

■ Neurology

- Stable dopamine, lessening norepinephrine and opioids
- Internal stimulation reduces basal ganglia need for external stim.

■ Practice

- Settle down from rapture.
- Softly think: “May joy (*sukha*) arise.”
- OK to think of cues to joy.
- Explore the spectrum of joy; know each state.

Rapture

- Experience
 - Feelings of pleasure, even bliss, in the body; pulses, waves of energy; rising quality
 - Range of capacity for rapture
 - Can come to feel a little overwhelming
- Neurology
 - Intensifies dopamine, closing the gate to working memory
 - Intensifies norepinephrine and alertness (“brightening the mind”)
 - Both neurotransmitters promote synaptic formation, thus learning.
 - Intensifies natural opioids
- Practice
 - Softly think: “May rapture (*piti*) arise.”
 - Perhaps gently arouse the body: strong inhale; pulse muscles at base of spine.
 - If rapture doesn’t come, return to the breath.

Cultivating Singleness

■ Experience

- A sense of all contents of experience appearing as a unified whole, as a single gestalt, moment by moment
- Great collectedness; minimal thought; deep, nearly effortless engagement with the object of attention; non-reactivity; little sense of self

■ Neurology

- Fast gamma wave entrainment
- Less “effortful control” by the ACC

■ Practice

- Relax into whole body awareness
- Softly think: “May singleness (*ekaggata*) arise.”
- Open up to the “ka-woosh” of it all coming together

Resting in Peaceful Happiness

Let's try it . . .

*Think not lightly of good,
saying, "It will not come to me."*

Drop by drop is the water pot filled.

*Likewise, the wise one,
gathering it little by little,
fills oneself with good.*

Great Books

See www.RickHanson.net for other great books.

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- Begley, S. 2007. *Train Your Mind, Change Your Brain*. Ballantine.
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Key Papers - 1

See www.RickHanson.net for other scientific papers.

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- Baumeister, R., Bratlavsky, E., Finkenauer, C. & Vohs, K. 2001. Bad is stronger than good. *Review of General Psychology*, 5:323-370.
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Key Papers - 2

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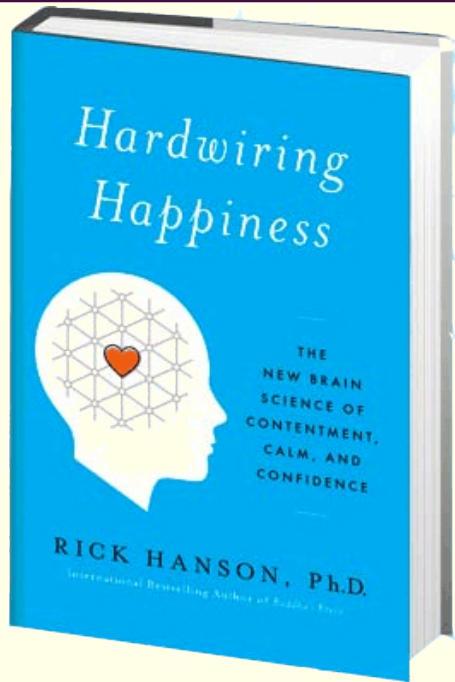
Key Papers - 3

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Where to Find Rick Hanson Online



Hardwiring Happiness: The New Brain Science of Contentment, Calm, and Confidence

www.rickhanson.net/hardwiringhappiness

Personal website: www.rickhanson.net

Wellspring Institute: www.wisebrain.org



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