
Use Your Mind to Change Your Brain

Tools for Cultivating Happiness, Love and Wisdom

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Topics

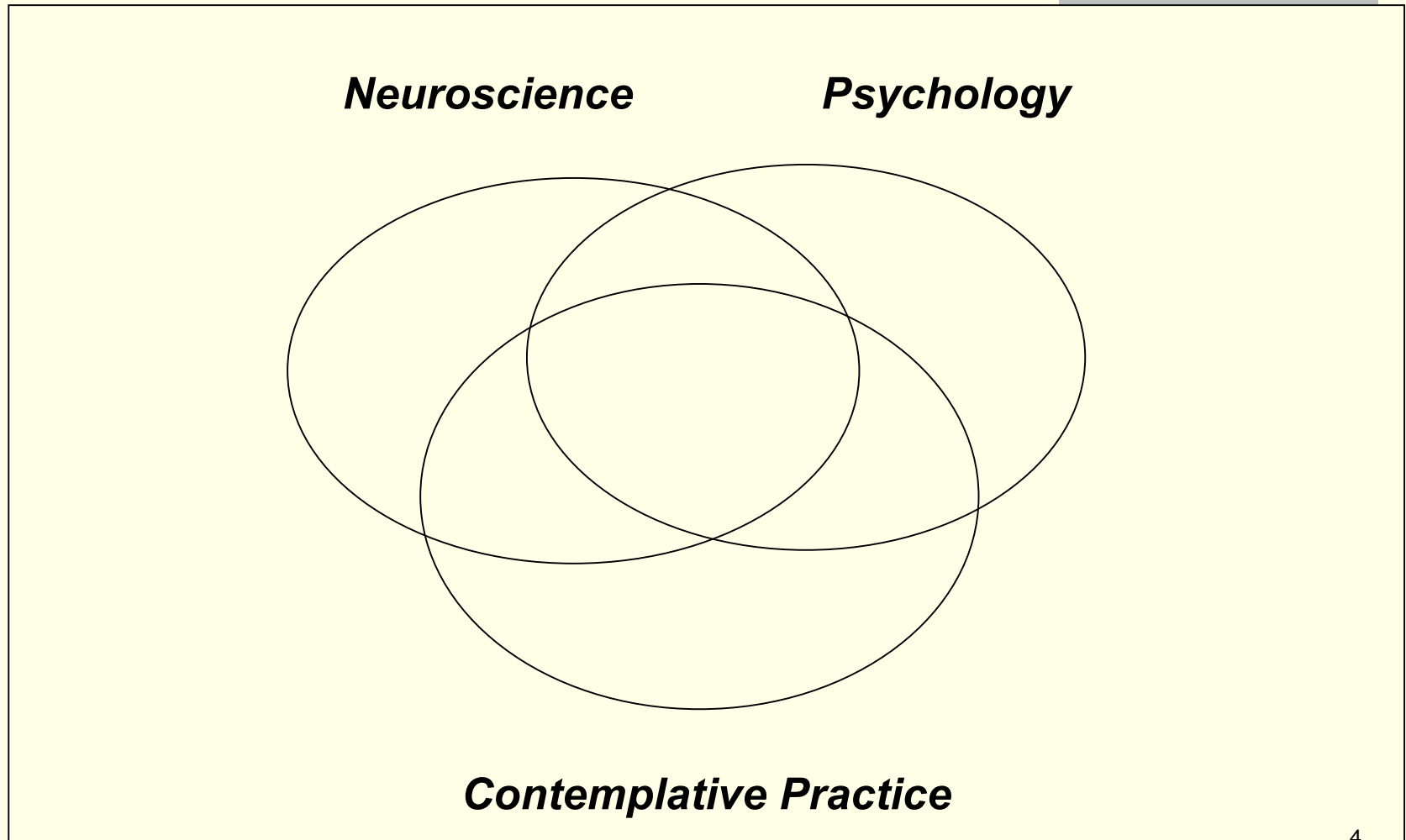
- **Perspectives**
- **Self-directed neuroplasticity**
- **Mindfulness**
- **Taking in the good**
- **Compassion**





Perspectives

Common - and Fertile - Ground



*The history of science is rich in the example
of the fruitfulness of bringing
two sets of techniques, two sets of ideas,
developed in separate contexts
for the pursuit of new truth,
into touch with one another.*

J. Robert Oppenheimer

*Great questioning, great enlightenment;
little questioning, little enlightenment;
no questioning, no enlightenment.*

Dogen

We ask, "What is a thought?"

We don't know,

yet we are thinking continually.

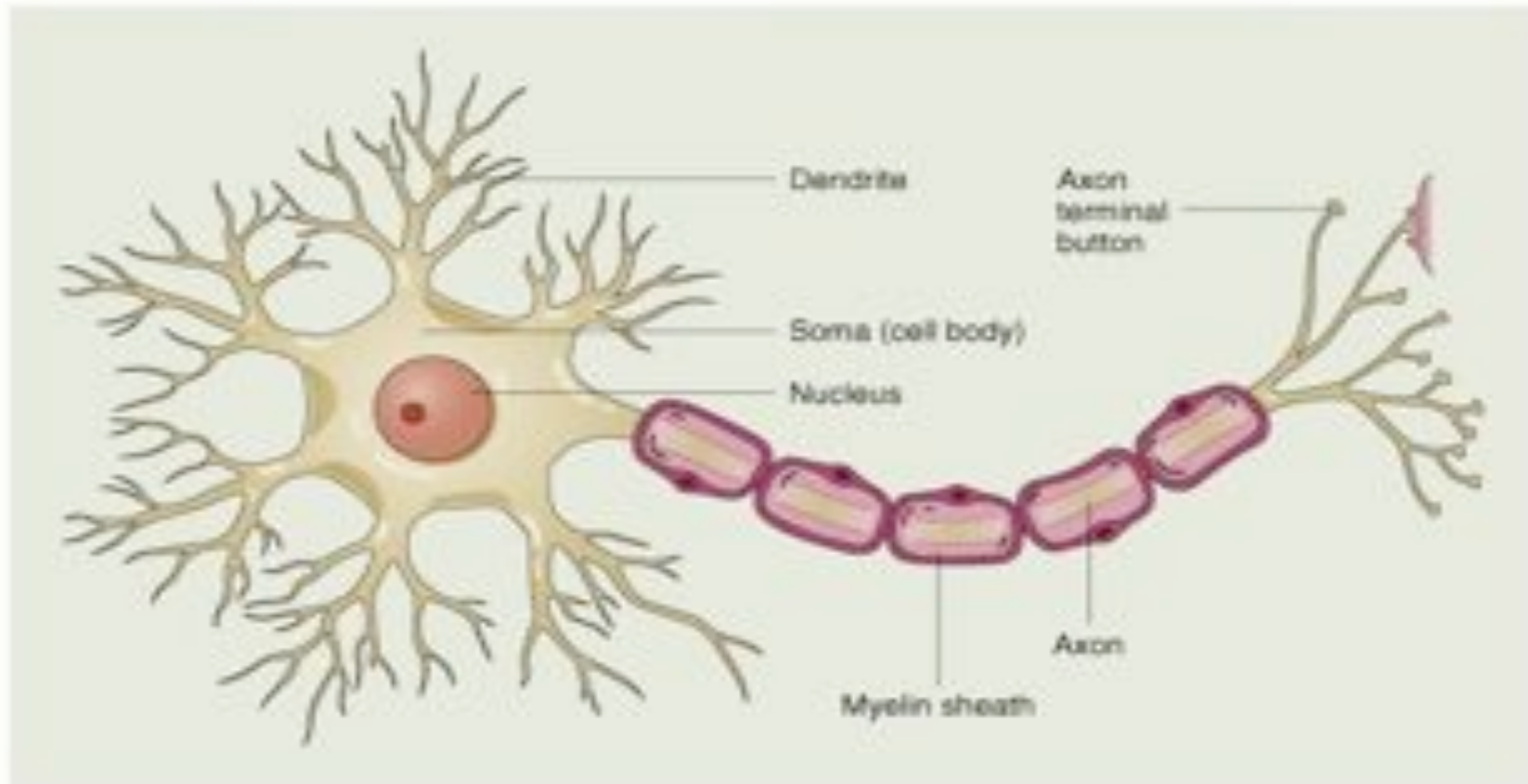
Venerable Tenzin Palmo



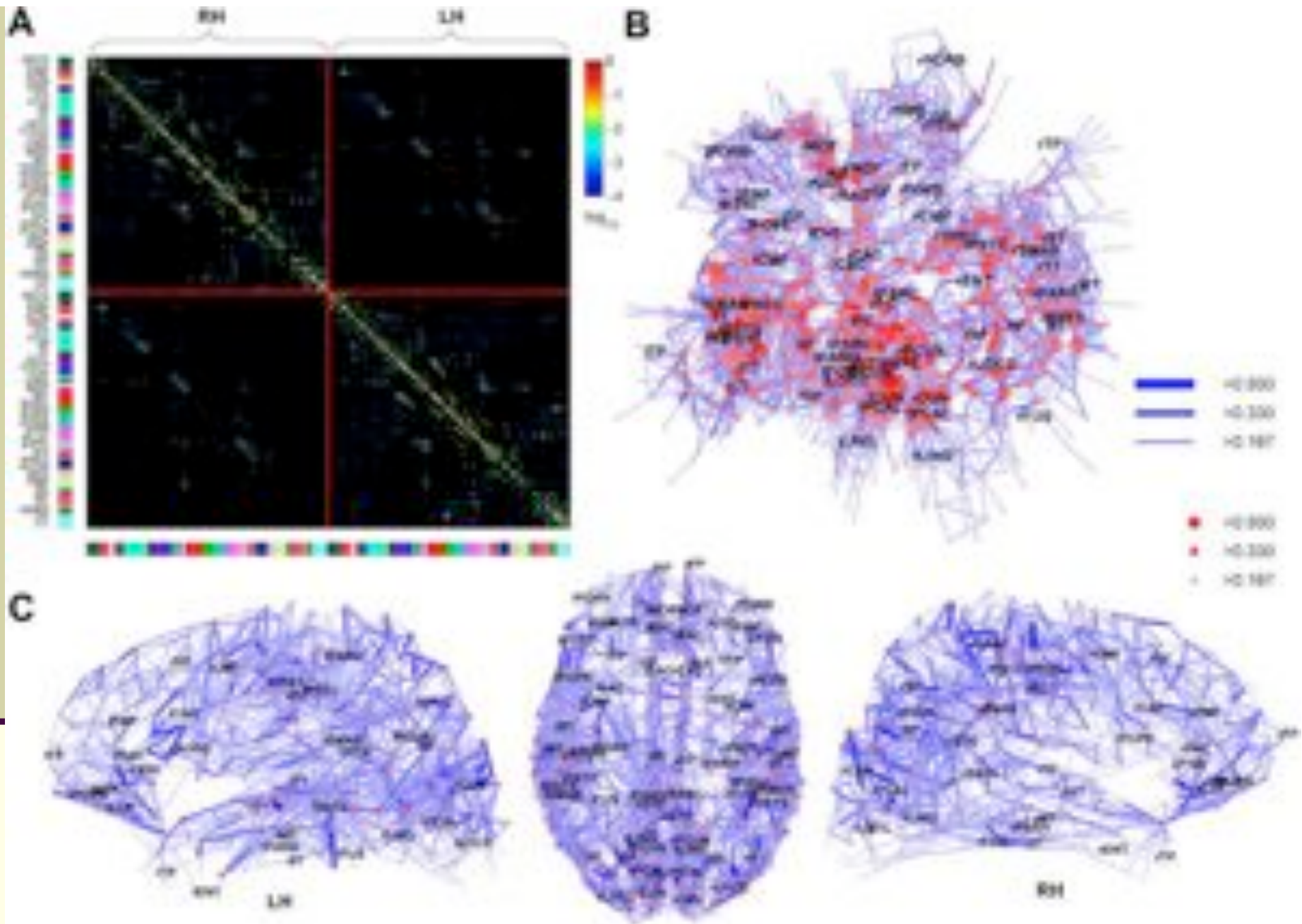
Self-Directed Neuroplasticity



A Neuron



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All cells have specialized functions. Brain cells have particular ways of processing information and communicating with each other. Nerve cells form complete circuits that carry and transform information.

Electrical signaling represents the language of mind, the means whereby nerve cells, the building blocks of the brain, communicate with one another over great distances. Nerve cells generate electricity as a means of producing messages.

All animals have some form of mental life that reflects the architecture of their nervous system.

The Mind/Brain System

- “Mind” = flow of information within the nervous system:
 - Information is represented by the nervous system.
 - Most mind is unconscious; awareness is an aspect of mind.
 - The headquarters of the nervous system is the brain.
- In essence then, apart from hypothetical transcendental factors, the mind *is* what the brain *does*.
- Brain = necessary, *proximally* sufficient condition for mind:
 - The brain depends on the nervous system, other bodily systems, nature, and culture.
 - As we’ll see, the brain also depends on the mind.
- Therefore, the brain and mind are two aspects of one system, interdependently arising.

Fact #1

As your brain changes, your mind changes.



Ways That Brain Can Change Mind

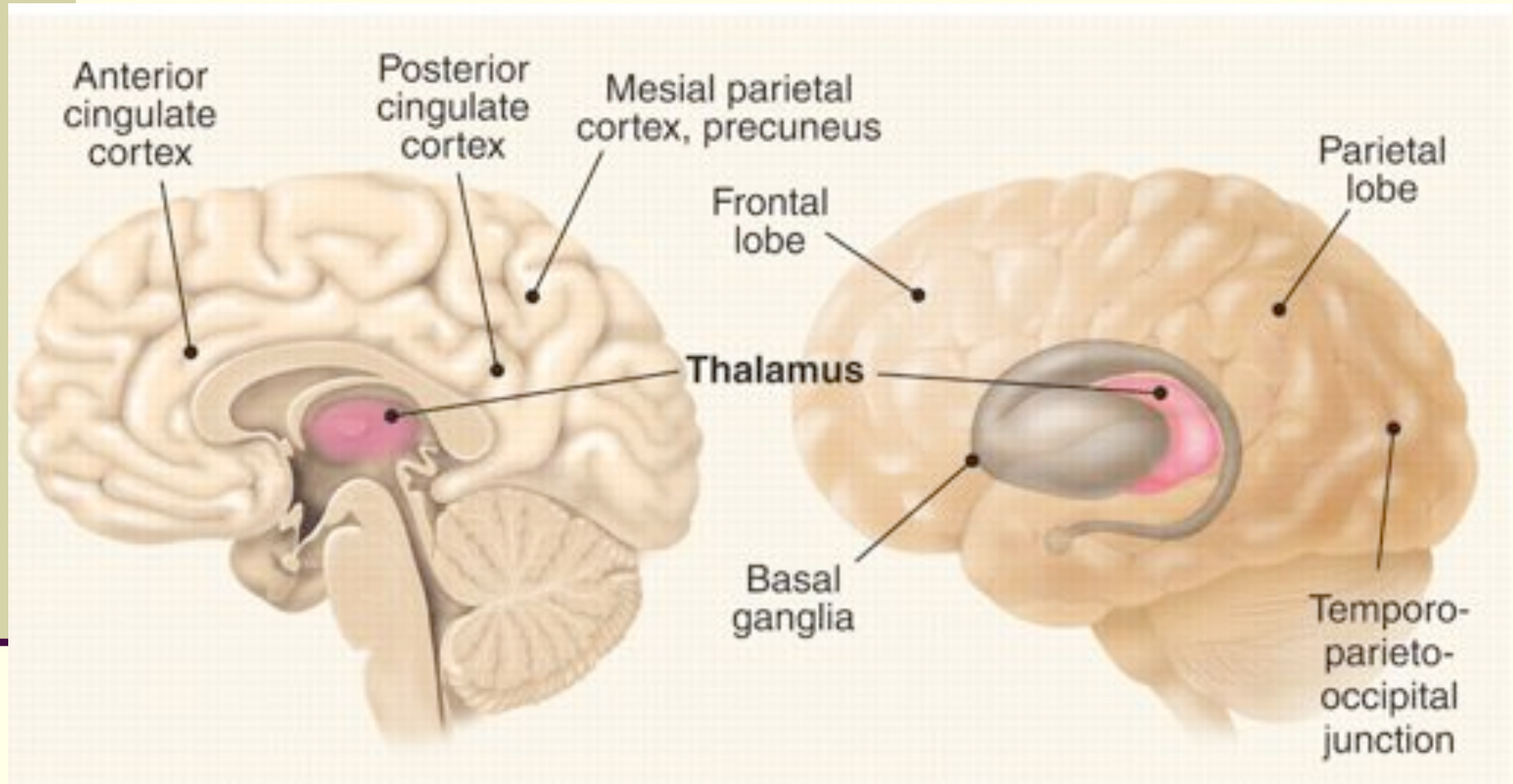
■ For better:

- Caffeine: more alertness; ibuprofen: less pain
- SSRIs: more serotonin in synapses
- Thicker insula: more self-awareness, empathy
- More left prefrontal activation: more happiness

■ For worse:

- Injury; Phineas Gage
- Concussion, stroke, tumor, Alzheimer's
- Intoxication; imbalances in neurotransmitters
- Cortisol-based shrinkage of hippocampus: less capacity for contextual memory

Key Brain Areas for Consciousness



(adapted from) M. T. Alkire et al., *Science* 322, 876-880 (2008)

Fact #2

As your mind changes, your brain changes.

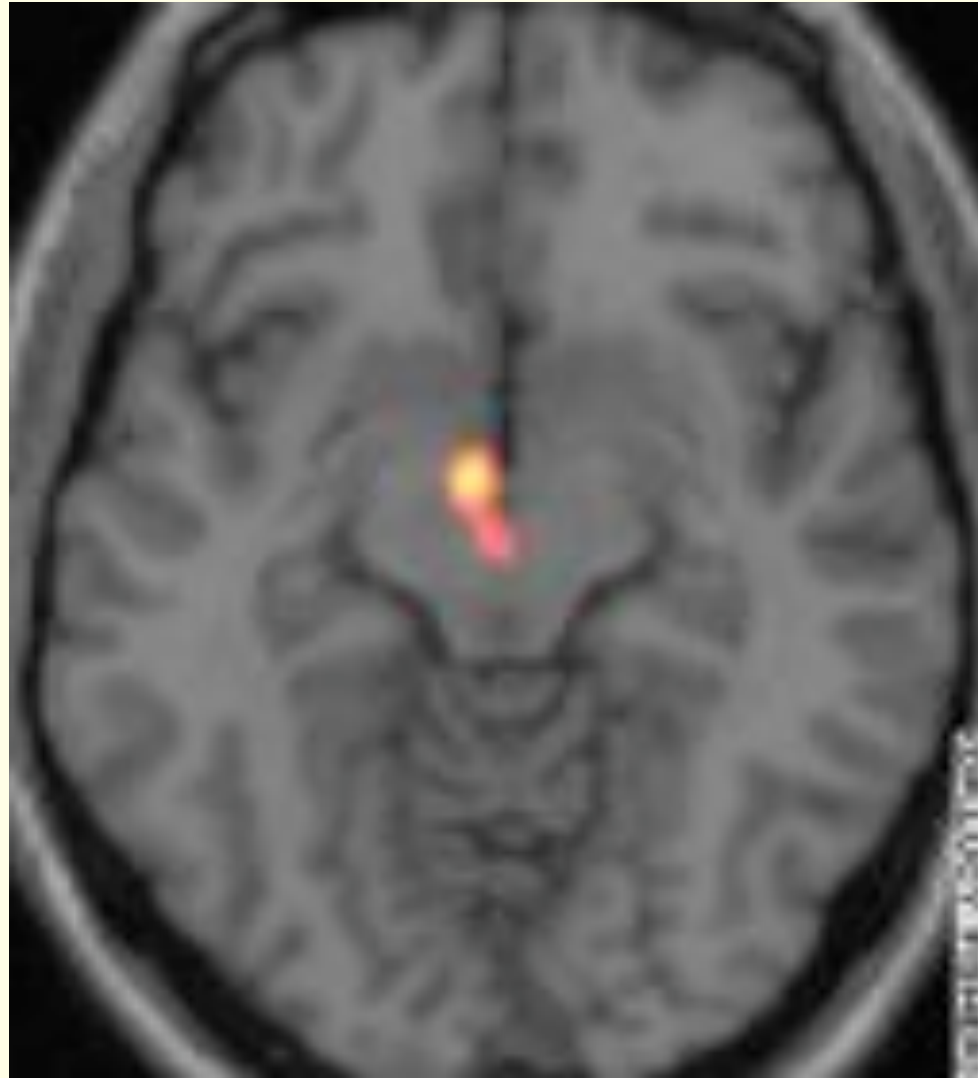
Immaterial mental activity maps to material neural activity.

This produces temporary changes in your brain and lasting ones.

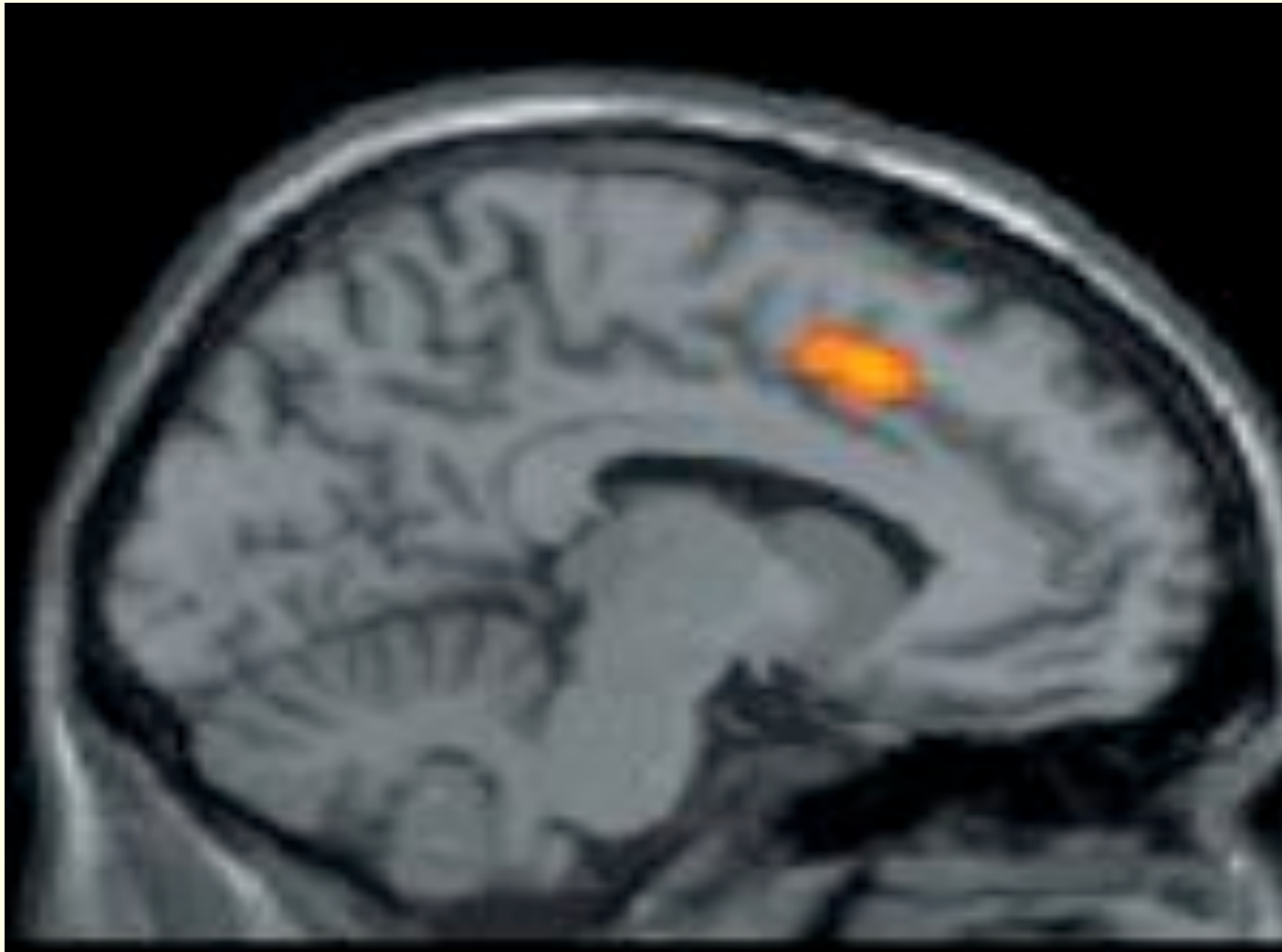
Temporary changes include:

- Alterations in brainwaves (= changes in the firing patterns of synchronized neurons)
- Increased or decreased use of oxygen and glucose
- Ebbs and flows of neurochemicals

The Rewards of Love

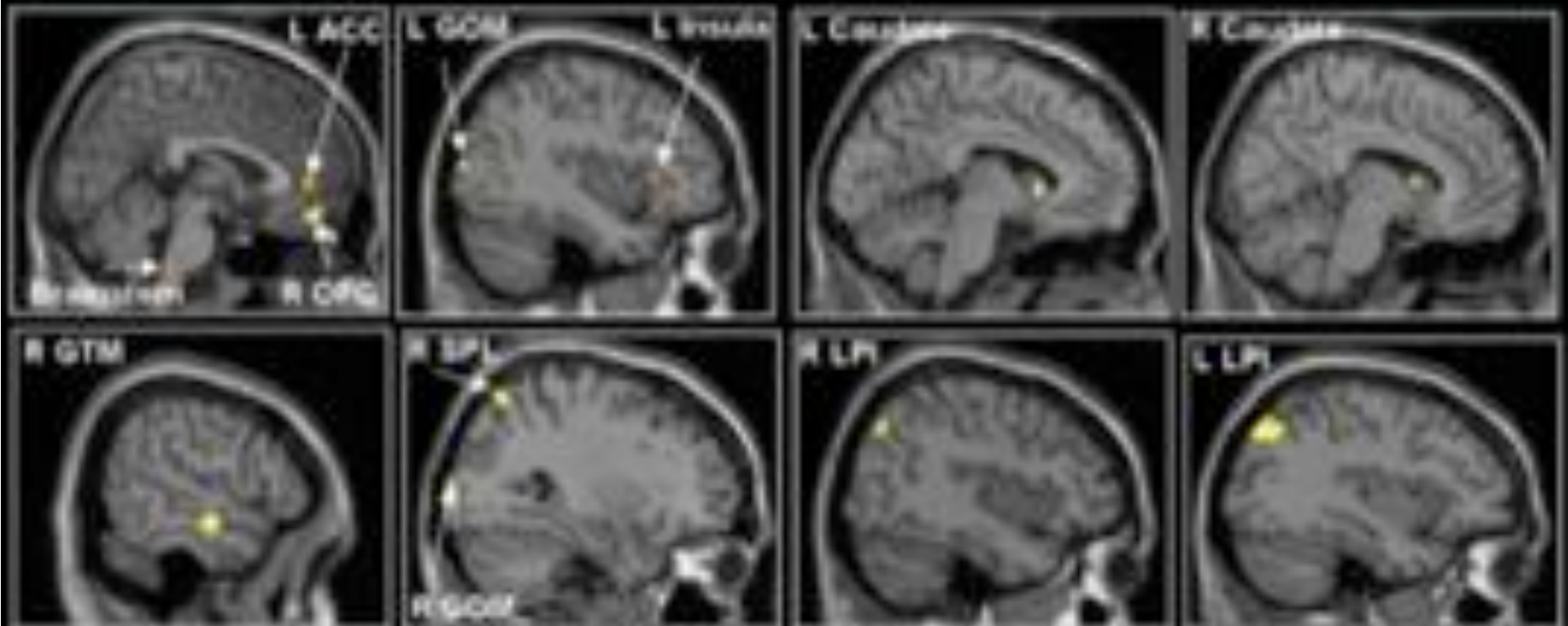


Tibetan Monk, Boundless Compassion



Christian Nuns, Recalling a Profound Spiritual Experience

Mystical > Baseline



Mind Changes Brain in Lasting Ways

- What flows through the mind sculpts your brain. Immaterial experience leaves material traces behind.
- Increased blood/nutrient flow to active regions
- Altered epigenetics (gene expression)
- “Neurons that fire together wire together.”
 - Increasing excitability of active neurons
 - Strengthening existing synapses
 - Building new synapses; thickening cortex
 - Neuronal “pruning” - “use it or lose it”

Honoring Experience

One's experience *matters*.

Both for how it feels in the moment and for the lasting residues it leaves behind, woven into the fabric of a person's brain and being.

Fact #3

You can use your mind
to change your brain
to change your mind for the better.

This is self-directed neuroplasticity.

How to do this, in skillful ways?



The Power of Mindfulness

The Power of Mindfulness

- Moment to moment non-judgmental awareness of experience
- Bringing attention to what is typically automatic or unconscious
- Being rather than doing

The Power of Mindfulness

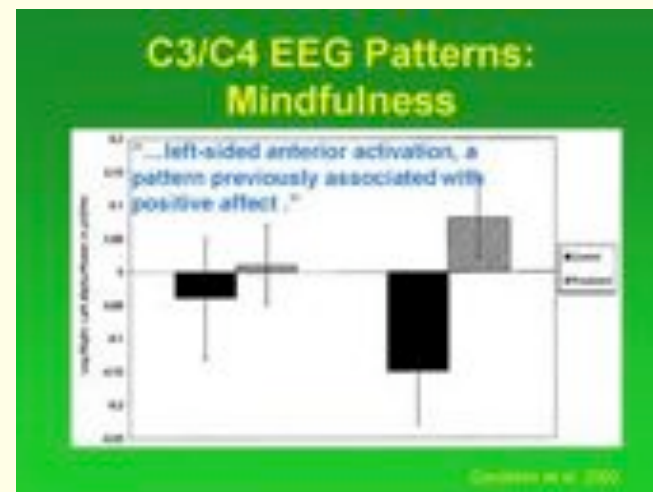
- Attention is like a spotlight, illuminating what it rests upon.
- Because neuroplasticity is heightened for what's in the field of focused awareness, attention is also like a vacuum cleaner, sucking its contents into the brain.
- Directing attention skillfully is therefore a fundamental way to shape the brain - and one's life over time.

Functional Change

Davidson, et al. 2003.

Training in mindfulness causes changes in left-sided anterior activation.

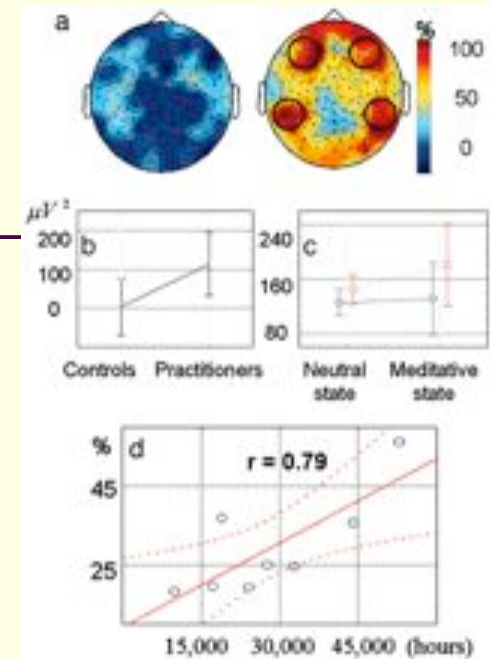
Psychosomatic Medicine, 65, 564-570



Functional Change

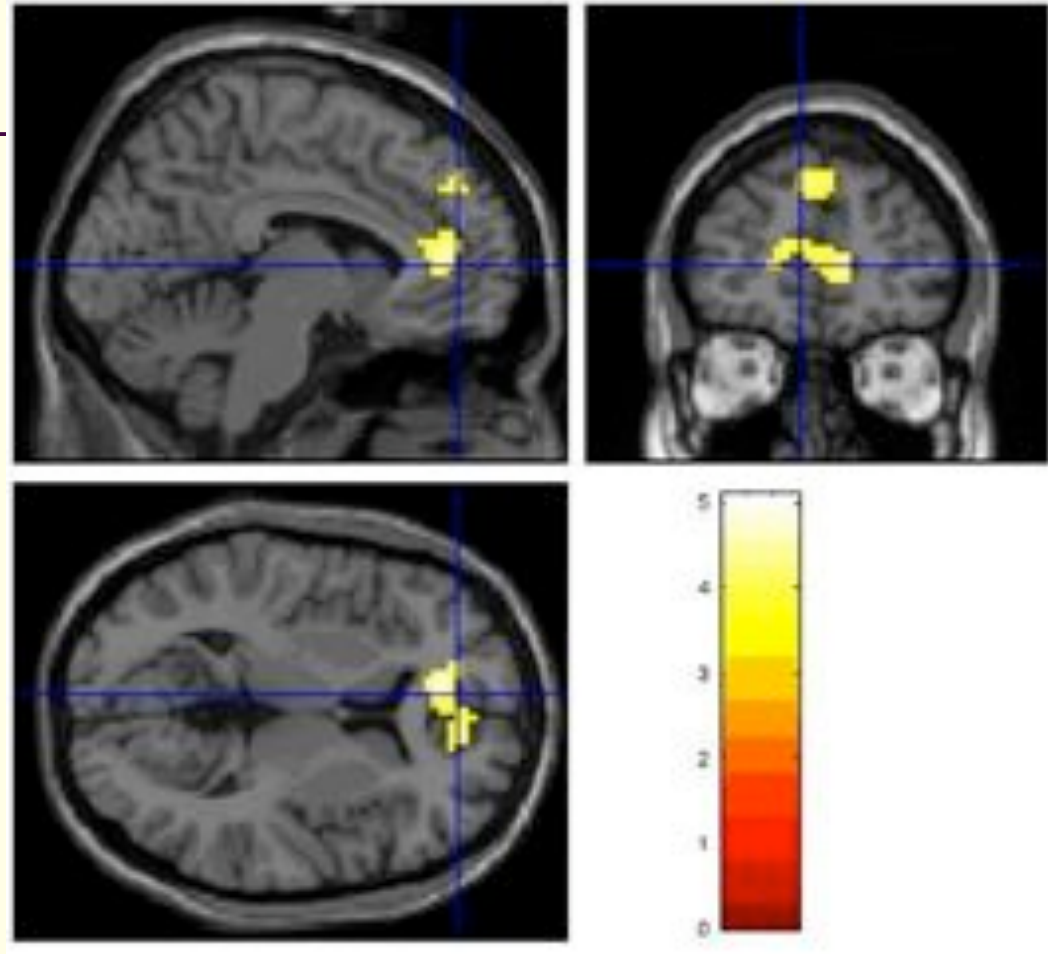
Lutz, et al. 2004. **Long-term Buddhist practitioners self-induce sustained electroencephalographic high-amplitude gamma-band oscillations and phase-synchrony during meditation.**
PNAS, 101:46

- mental training involves temporal integrative mechanisms and may induce short-term and long-term neural change
- gamma-band synchrony found here could reflect a change in the quality of moment-to-moment awareness
- It remains for future studies to show that these EEG signatures are caused by long-term training itself and not by individual differences before the training



Functional Change

An MRI comparison of the averaged brain activity of advanced meditators and non-meditators. Compared to the latter, the former showed more activity in the anterior cingulate cortex (large yellow area) and the upper part of the frontal lobes (small yellow area) (Hölzel et al., 2007).



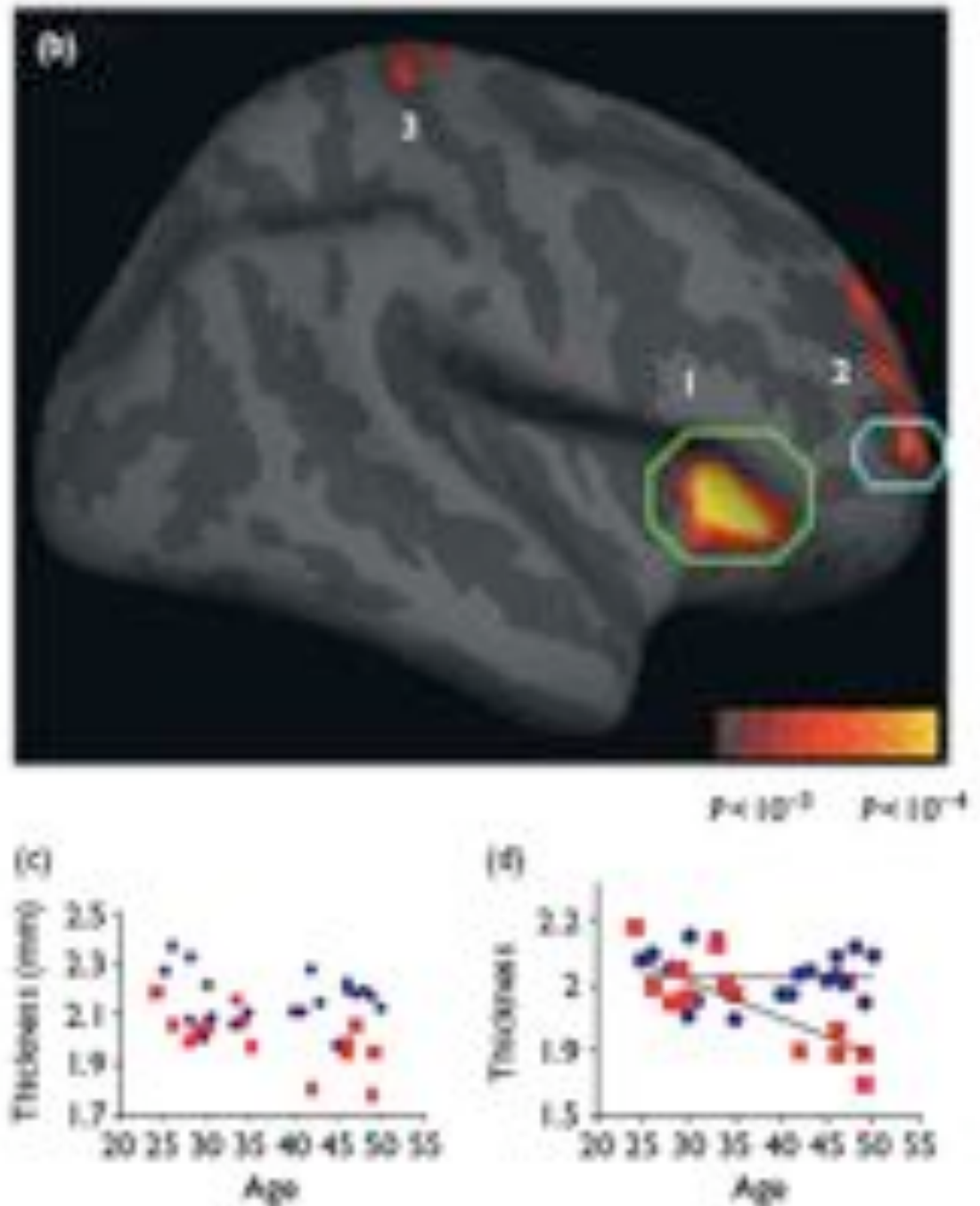
Structural Change

Meditation can “sculpt the brain” (Jim Austen, 1998)

Structural Change

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

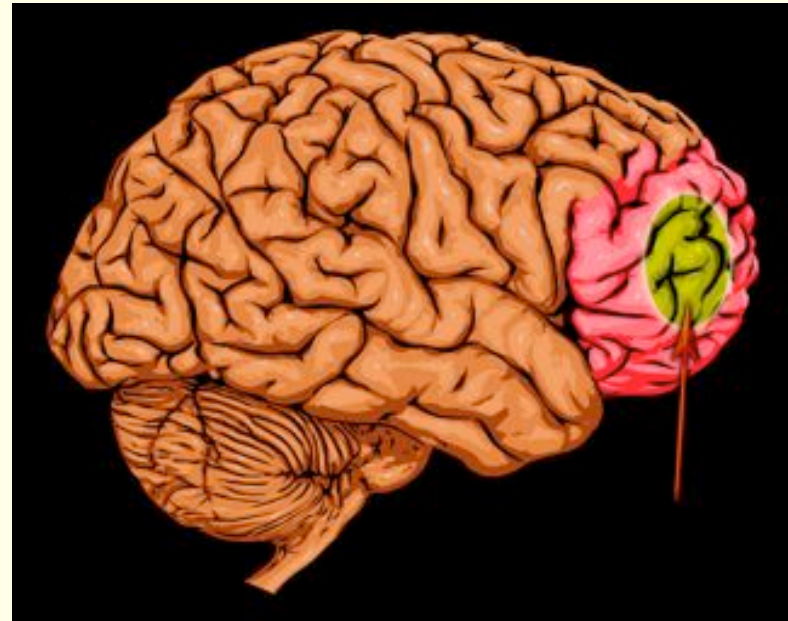
the brain regions associated with attention and sensor processing were thicker in meditators than in the controls



Structural Change

Holzel, et al. (2011) **Mindfulness practice leads to increases in regional brain gray matter density**. *Psychiatry Research: Neuroimaging*; 191 (1): 36

MR images of participants' brain structure were taken two weeks prior to and immediately following an eight week mindfulness based stress reduction program



Increased grey-matter density in the hippocampus, known to be important for learning and memory, and in structures associated with self-awareness, compassion and introspection. Participant-reported reductions in stress also were correlated with decreased grey-matter density in the amygdala

Compassion

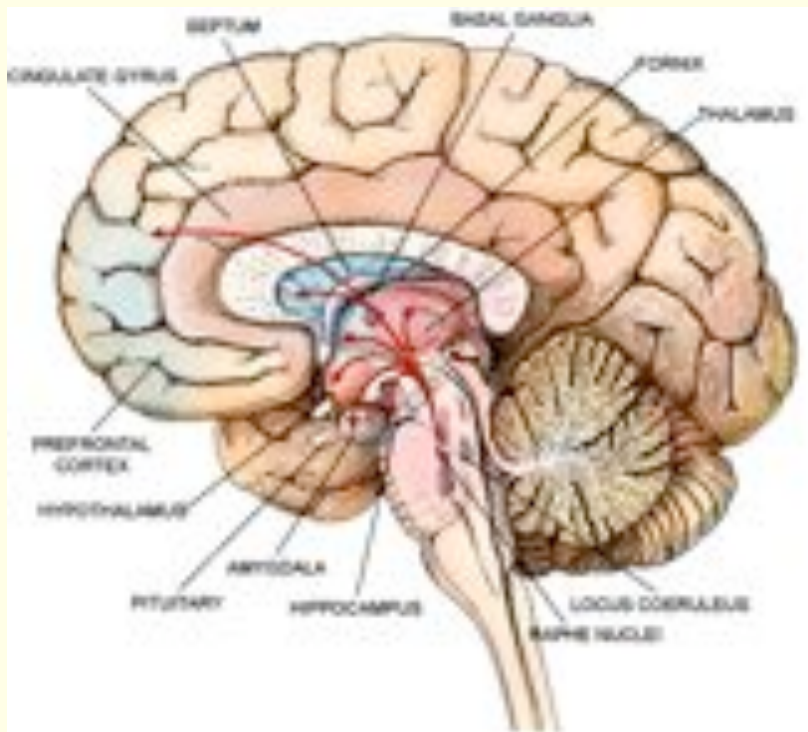
Holzel, et al. (2011) **Mindfulness practice leads to increases in regional brain gray matter density.** *Psychiatry Research: Neuroimaging*; 191 (1): 36

Positive emotions such as loving-kindness and compassion can be learned in the same way as playing a musical instrument or being proficient in a sport.



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Structural Change



Toga, et al., (2011) **Enhanced brain connectivity in long-term meditation practitioners**, *NeuroImage*, 2011

Stronger connections between brain regions, less age-related brain atrophy, according to the researchers. Stronger connections influence the ability to rapidly relay electrical signals in the brain. And significantly, these effects are evident throughout the entire brain, not just in specific areas.

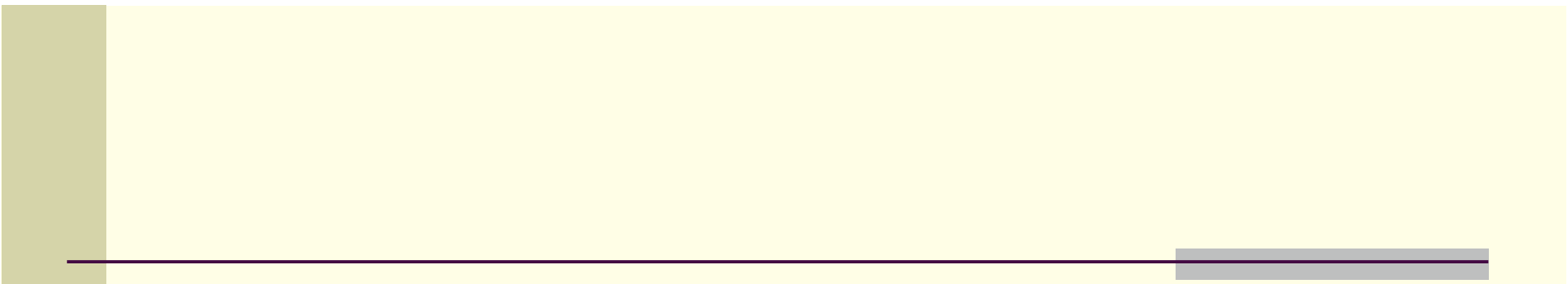
*The education of attention
would be the education par excellence.*

William James

Know the mind.

Shape the mind.

Free the mind.



Taking in the Good

Just having positive experiences is not enough.

They pass through the brain like water through a sieve, while negative experiences are caught.

We need to engage positive experiences actively to weave them into the brain.

How to Take in the Good

1. Look for positive **facts**, and let them become positive experiences.
2. Savor the positive experience:
 - Sustain it for 10-20-30 seconds.
 - Feel it in your body and emotions.
 - Intensify it.
3. Sense and intend that the positive experience is soaking into your brain and body - registering deeply in emotional memory.

Kinds of “Good” to Take in

- Things are alright; nothing is wrong; there is no threat
- Feeling safe and strong
- The peace and relief of forgiveness

- The small pleasures of ordinary life
- The satisfaction of attaining goals or recognizing accomplishments - especially small, everyday ones
- Feeling grateful, contented, and fulfilled

- Being included, valued, liked, respected, loved by others
- The good feelings that come from being kind, fair, generous
- Feeling loving

- Recognizing your positive character traits
- Spiritual or existential realizations

Why It's Good to Take in the Good

- Rights an unfair imbalance, given the negativity bias
- Gives oneself today the caring and support one should have received as a child, but perhaps didn't get in full measure; an inherent, implicit benefit
- Increases positive resources, such as:
 - Positive emotions
 - Capacity to manage stress and negative experiences
- Can help bring in missing “supplies” (e.g., love, strength, worth)
- Can help painful, even traumatic experiences

*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

*The good life, as I conceive it, is a happy life.
I do not mean that if you are good you will be happy;
I mean that if you are happy you will be good.*

Bertrand Russell

Benefits of Positive Emotions

- The benefits of positive emotions are a proxy for many of the benefits of TIG.
- Emotions organize the brain as a whole, so positive ones have far-reaching benefits, including:
 - Promote exploratory, “approach” behaviors
 - Lift mood; increase optimism, resilience
 - Counteract trauma
 - Strengthen immune and protect cardiovascular systems
 - Overall: “broaden and build”
 - Create positive cycles

Potential Synergies of TIG and MBSR

- Improved mindfulness from MBSR enhances TIG.
- TIG increases general resources for MBSR (e.g., heighten the PNS activation that promotes stable attention).
- TIG increases specific factors of MBSR (e.g., self-acceptance, self-compassion, tolerance of negative affect)
- TIG heightens internalization of key MBSR experiences:
 - The sense of stable mindfulness itself
 - Confidence that awareness itself is not in pain, upset, etc.
 - Presence of supportive others (e.g., MBSR groups)
 - Peacefulness of realizing that experiences come and go

Compassion

Feeling Cared About

- As we evolved, we increasingly turned to and relied on others to feel safer and less threatened.
 - Exile from the band was a death sentence in the Serengeti.
 - Attachment: relying on the secure base
 - The well-documented power of social support to buffer stress and aid recovery from painful experiences
- Methods:
 - Recognize it's kind to others to feel cared about yourself.
 - Look for occasions to feel cared about and take them in.
 - Deliberately bring to mind the experience of being cared about in challenging situations.
 - Be caring yourself.

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

Pema Chodren

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. Different than self-esteem.
- 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
 - Sink into the experience of compassion in your body
 - Then shift the compassion to yourself, perhaps with phrases like: “May I not suffer. May the pain of this moment pass.”



Self-Compassion Exercise

based on Kristen Neff's work

Three Doorways

- Give yourself kindness
- Remind yourself of your commonality with others
- Hold thoughts and emotions in mindful awareness

Beyond the Brain

- **Gene expression – epigenetics**
- **Cell death and regeneration – telomeres**
- **Behavioral responses – neuroeconomics**
- **Spiritual well-being & awakening**

Resources

- **IONS Meditation Bibliography**
- **Rick's website and book: *Buddha's Brain***
- **Cassi's books – *Living Deeply* and *Mindful Motherhood***
- **Rick and Cassi upcoming workshops**

Great Books

See www.RickHanson.net for other great books.

- Austin, J. 2009. *Selfless Insight*. MIT Press.
- Begley, S. 2007. *Train Your Mind, Change Your Brain*. Ballantine.
- Carter, C. 2010. *Raising Happiness*. Ballantine.
- Hanson, R. (with R. Mendius). 2009. *Buddha's Brain: The Practical Neuroscience of Happiness, Love, and Wisdom*. New Harbinger.
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- LeDoux, J. 2003. *Synaptic Self*. Penguin.
- Linden, D. 2008. *The Accidental Mind*. Belknap.
- Sapolsky, R. 2004. *Why Zebras Don't Get Ulcers*. Holt.
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