

Buddha's Brain:

Lighting up Your Own Circuits of Happiness, Love, and Wisdom

Kripalu Center

March 14-17, 2010

Rick Hanson, Ph.D.

Wellspring Institute for Neuroscience and Contemplative Wisdom

www.RickHanson.net

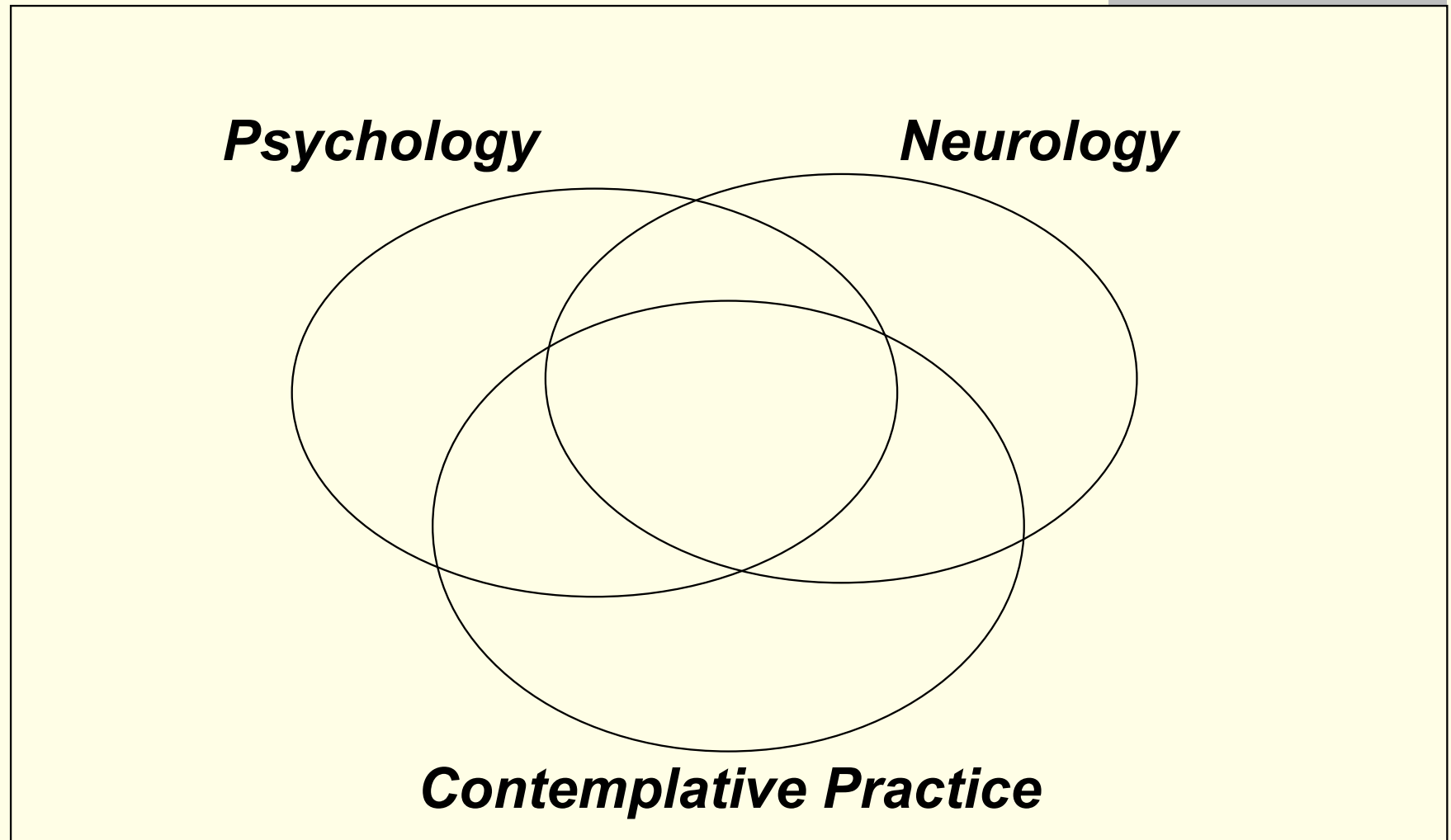
drh@comcast.net

© 2010

Plan

- You and your brain
- Foundations of mindfulness
- Taking in the good
- Concentrating the mind
- Gratitude and goodness
- Inclining the mind toward the wholesome
- Relaxing “self” into love
- Taking all this into your world

Common - and Fertile - Ground



The Frame of Western Science

Our focus is on how to use the mind to change the brain to benefit the mind.

There could well be Transcendental factors at work in the brain and the mind.

Since this cannot be proven either way, a truly scientific attitude is to accept it as a possibility.

Bowing to the possibility of the Transcendental, I'll stay mainly within the frame of Western science.

"We ask, 'What is a thought?'"

We don't know,

yet we are thinking continually."

- Ven. Tenzin Palmo

Your Amazing Brain

■ **Size:**

- 3 pounds of tofu-like tissue
- 1.1 trillion brain cells
- 100 billion “gray matter” neurons

■ **Speed:**

- Neurons firing around 5 to 50 times a second (or faster)
- Signals crossing your brain in a tenth or hundredth of a second

■ **Connectivity:**

- Typical neuron connects with 5000 neurons: ~ 500 trillion synapses
- During one breath, a quadrillion-plus signals coursed through your head.

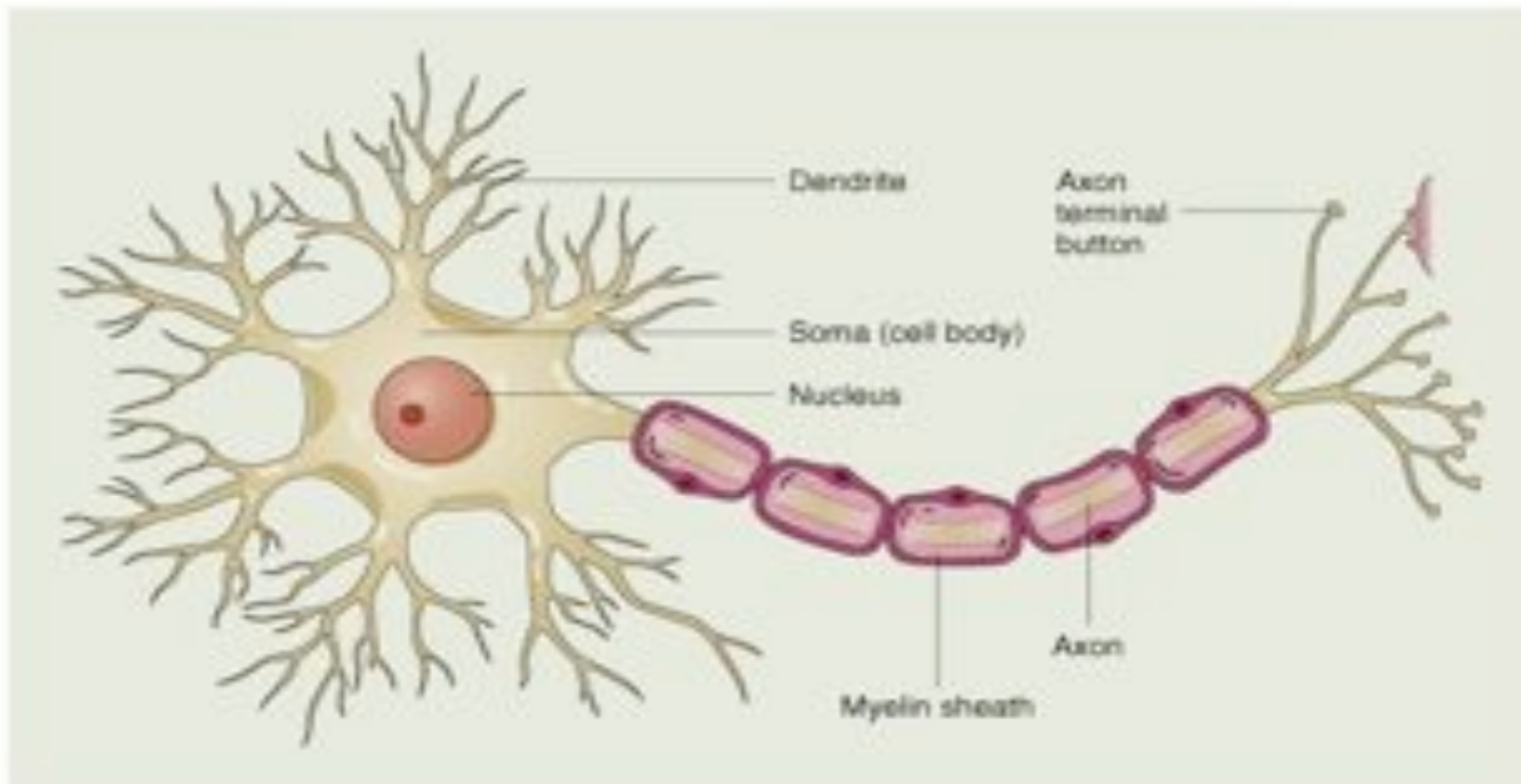
■ **Complexity:**

- Potentially 10 to a millionth power brain states

■ **Activity:**

- Always on 24/7/365 - Instant access to information on demand
- 20-25% of blood flow, oxygen, and glucose

One Simple Neuron . . .



Your Amazing Brain

■ **Size:**

- 3 pounds of tofu-like tissue
- 1.1 trillion brain cells
- 100 billion “gray matter” neurons

■ **Speed:**

- Neurons firing around 5 to 50 times a second (or faster)
- Signals crossing your brain in a tenth or hundredth of a second

■ **Connectivity:**

- Typical neuron connects with 5000 neurons: ~ 500 trillion synapses
- During one breath, a quadrillion-plus signals coursed through your head.

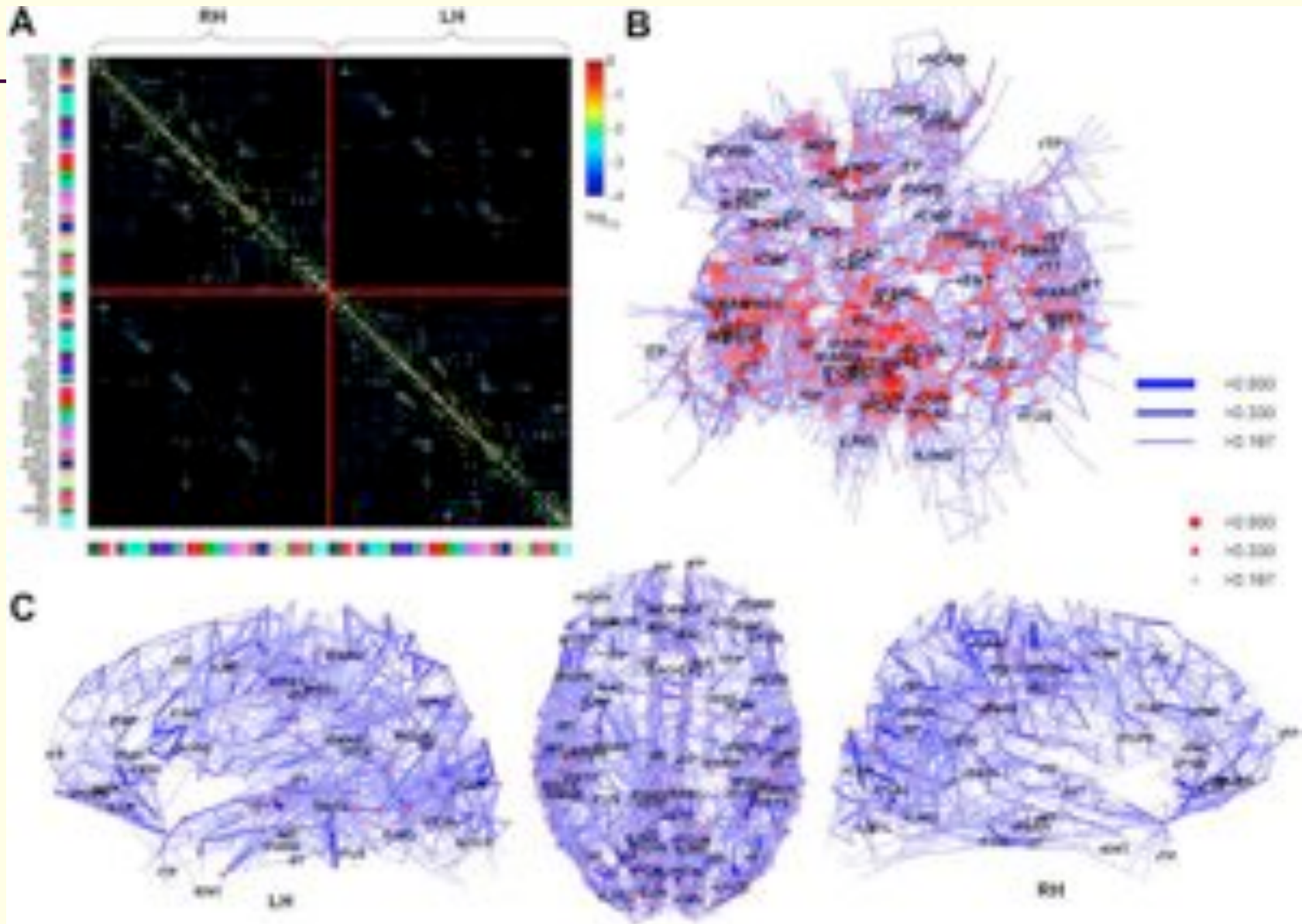
■ **Complexity:**

- Potentially 10 to a millionth power brain states

■ **Activity:**

- Always on 24/7/365 - Instant access to information on demand
- 20-25% of blood flow, oxygen, and glucose

The Connectome - 2



Hagmann, et al., 2008, *PLoS Biology*, 6:1479-1493.

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 part of mind.
 - The headquarters of the nervous system is the brain.
- In essence then, apart from hypothetical transcendental factors, your mind *is* what your brain *does*.
- Brain = necessary, *proximally* sufficient condition for mind.
 - The brain depends on the nervous system, which intertwines with and depends on other bodily systems.
 - These systems in turn intertwine with and depend upon nature and culture, both presently and over time.
 - And as we’ll see, the brain also depends on the mind.

First Fact about Your Brain

As your brain changes, your mind changes.



Ways That Brain Can Change Mind

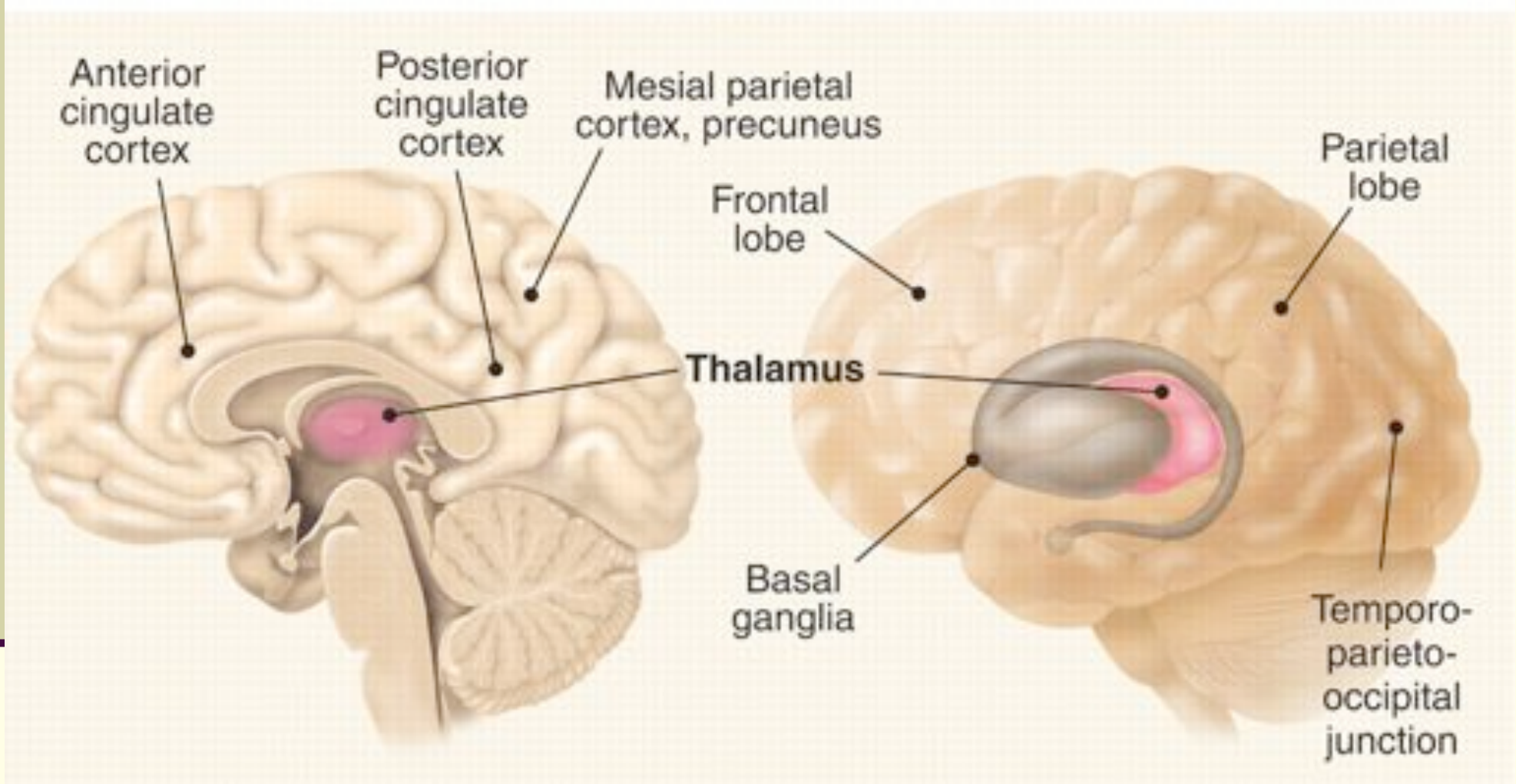
- For better:

- A little caffeine: more alertness
- Thicker insula: more self-awareness, empathy
- More left prefrontal activation: more happiness

- For worse:

- Intoxication; imbalances in neurotransmitters
- Concussion, stroke, tumor, Alzheimer's
- 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)

Second Fact about Your Brain

As your mind changes, your brain changes.

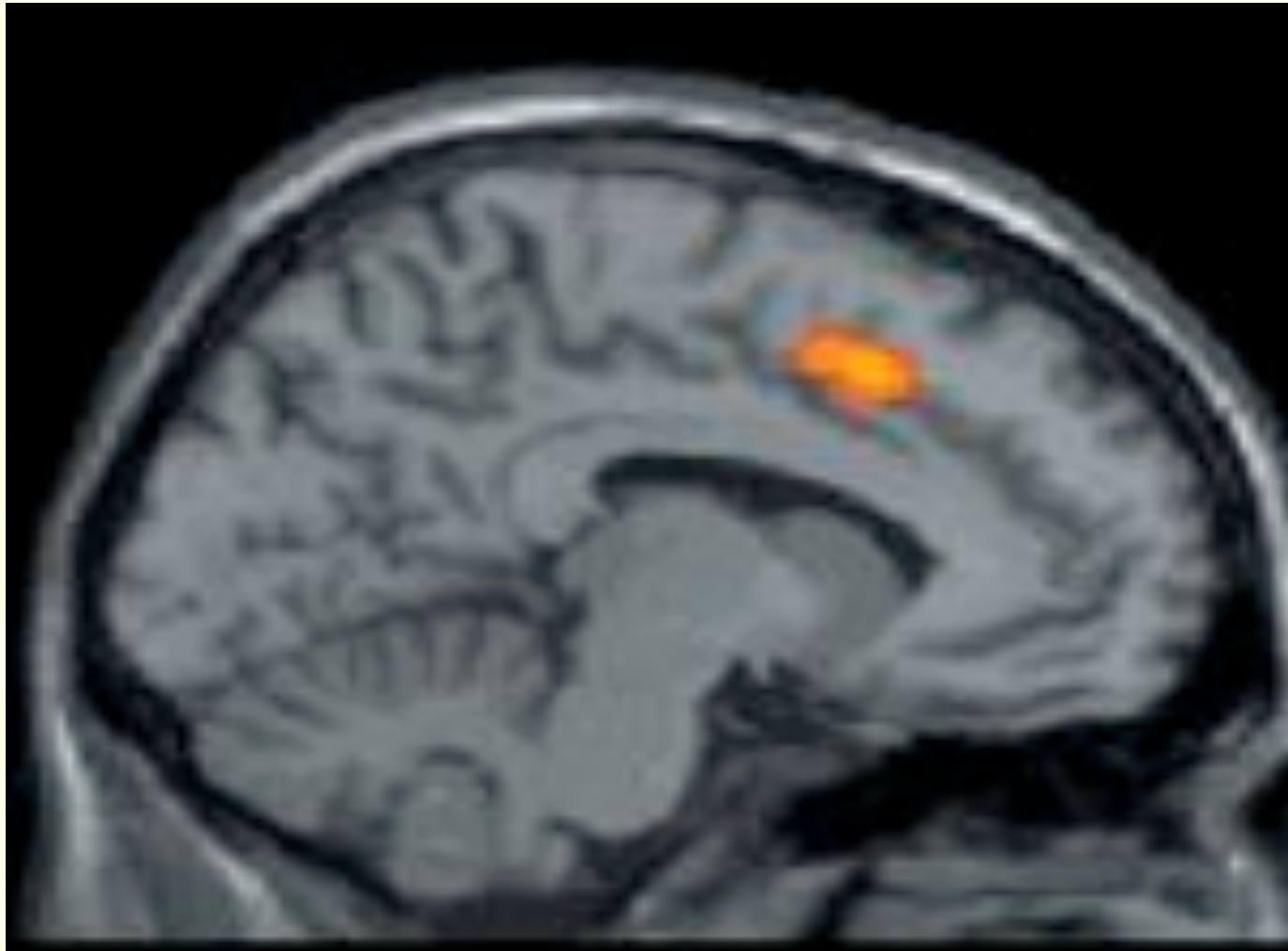
Immaterial mental activity maps to material neural activity.

This produces temporary changes in your brain and lasting ones.

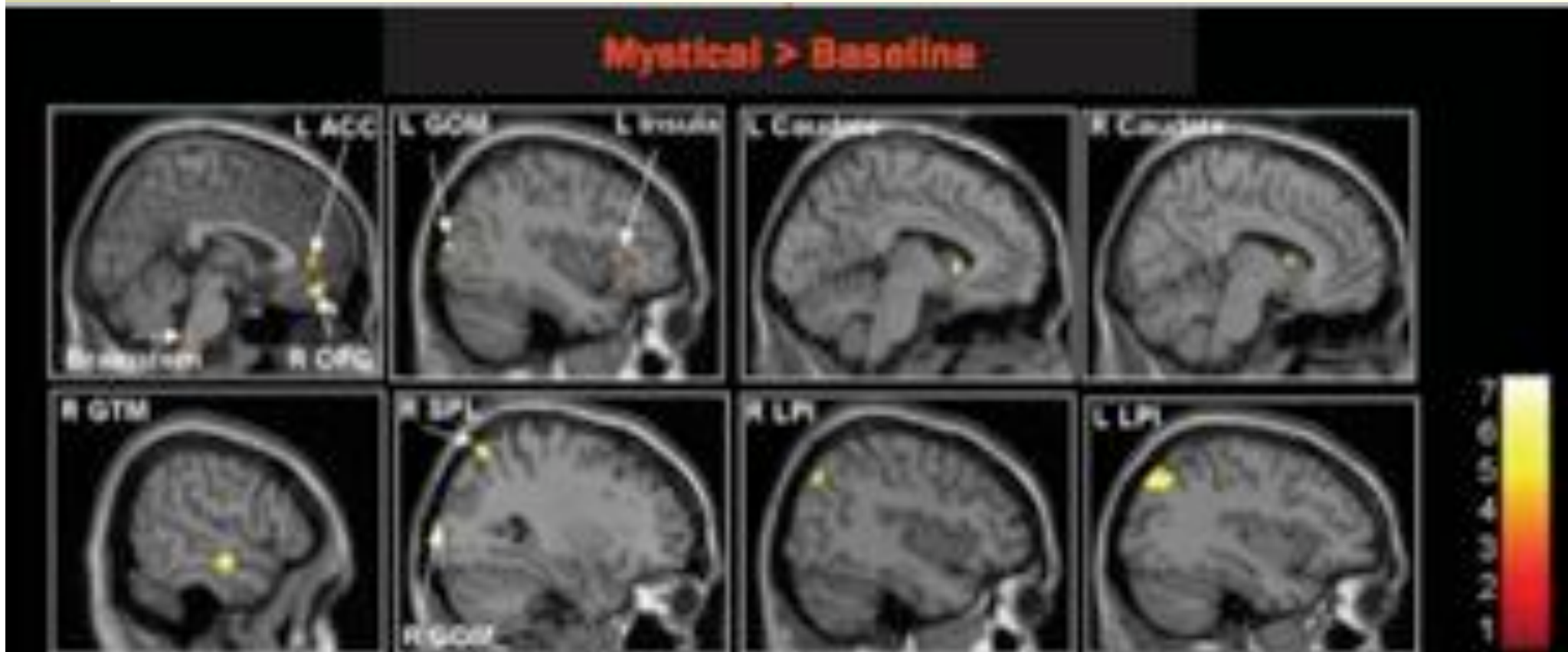
Temporary changes include:

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

“Ardent, Diligent, Resolute, and Mindful”

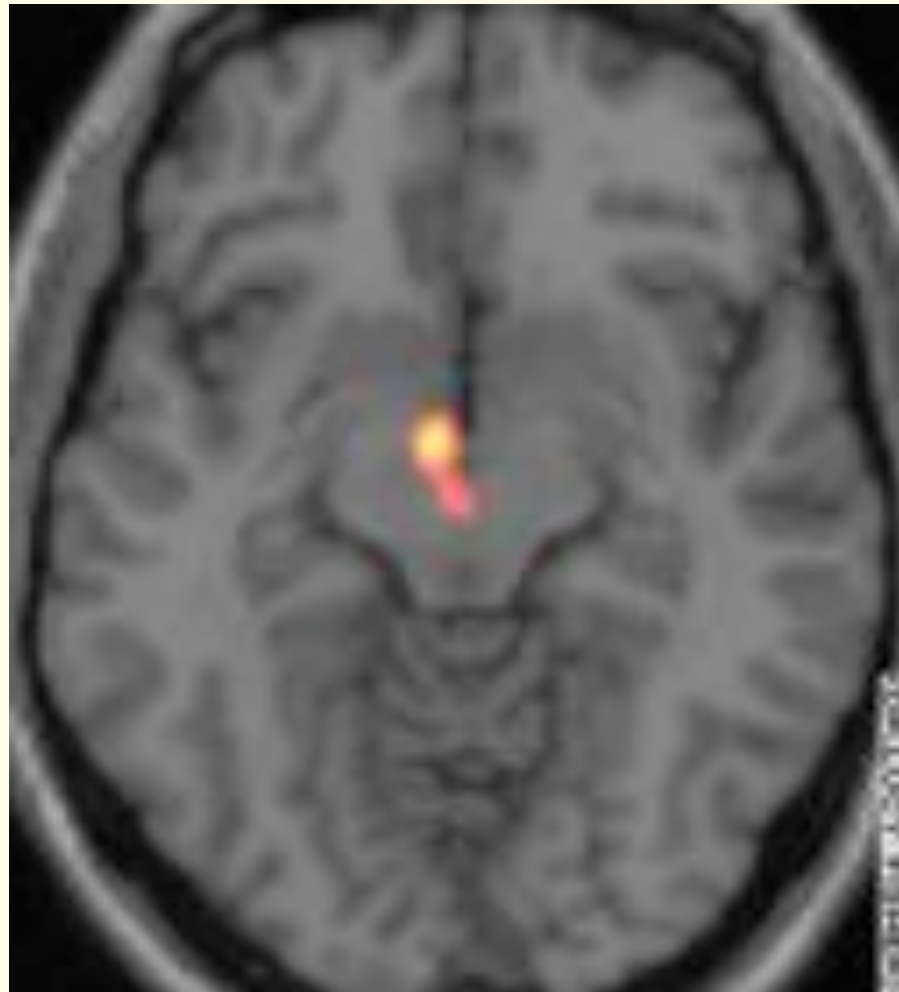


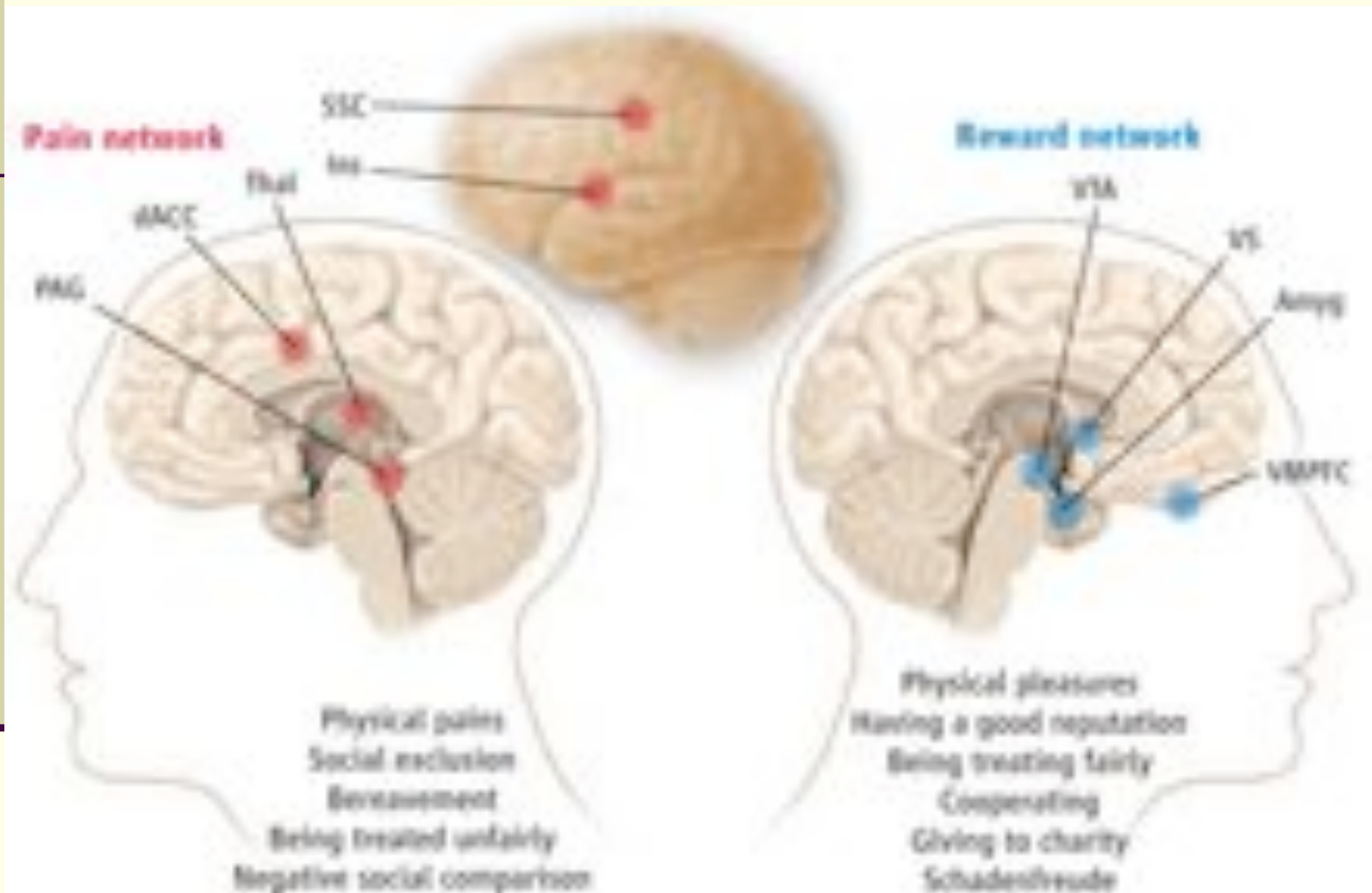
Nuns in Prayer



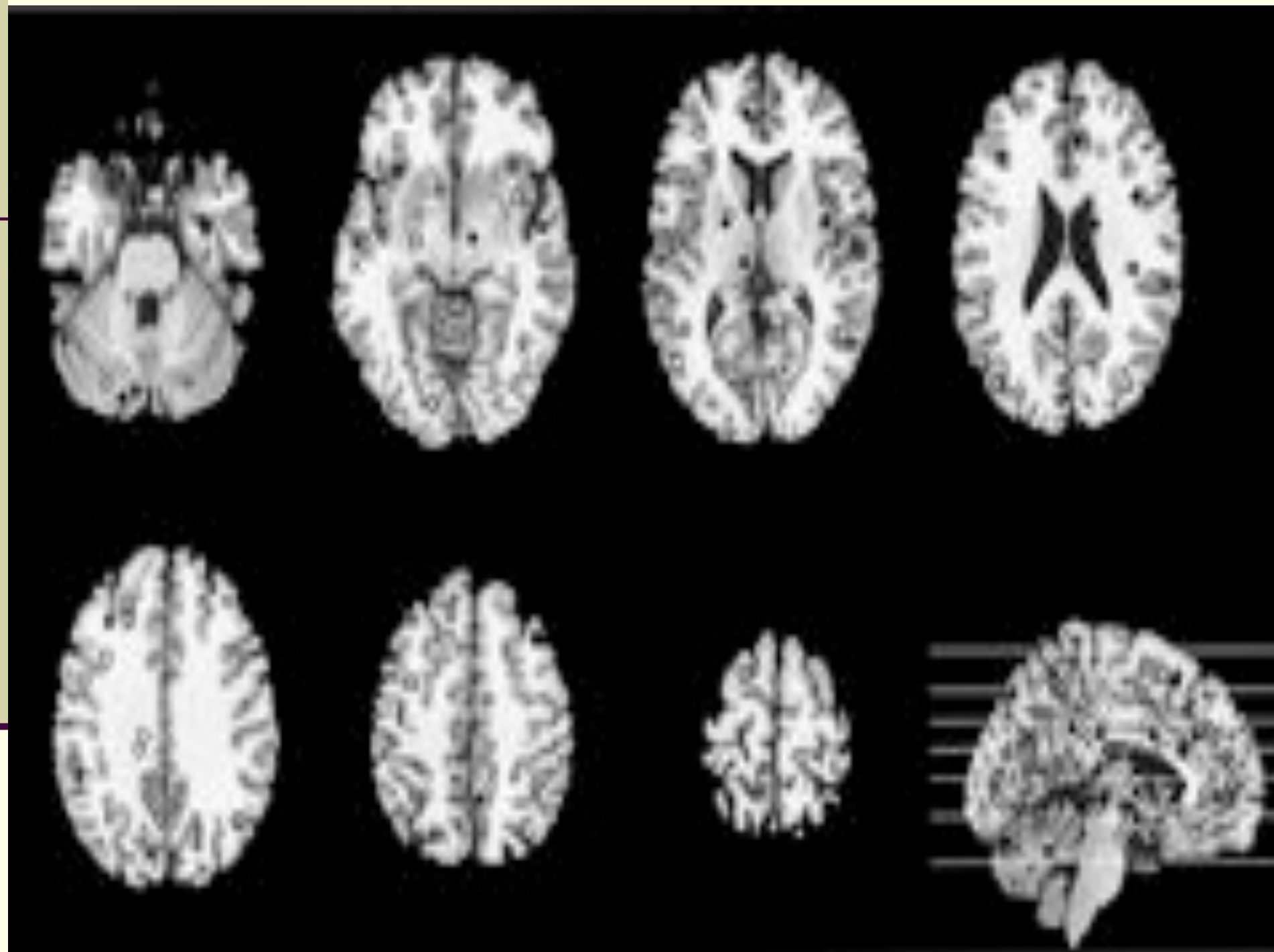
Beauregard, et al., *Neuroscience Letters*, 9/25/06

The Rewards of Love





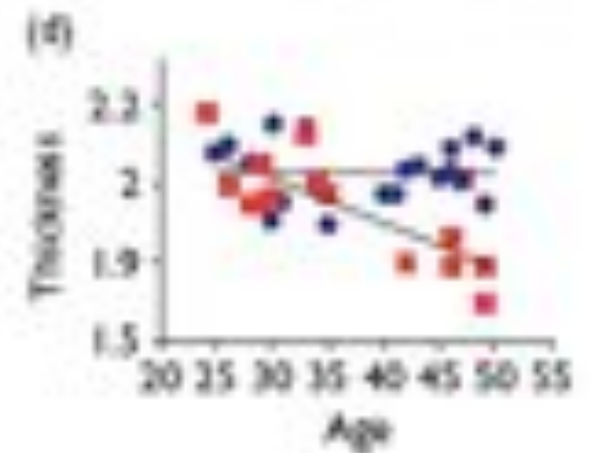
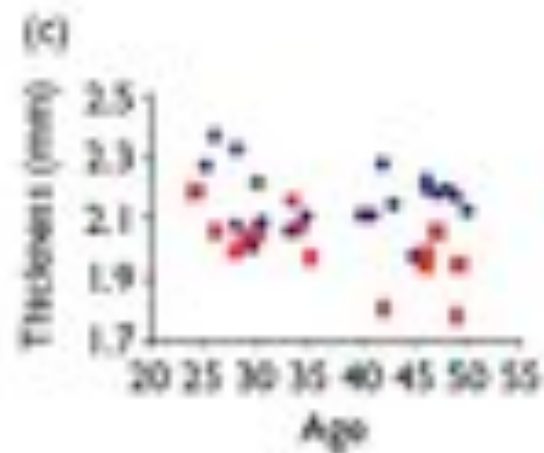
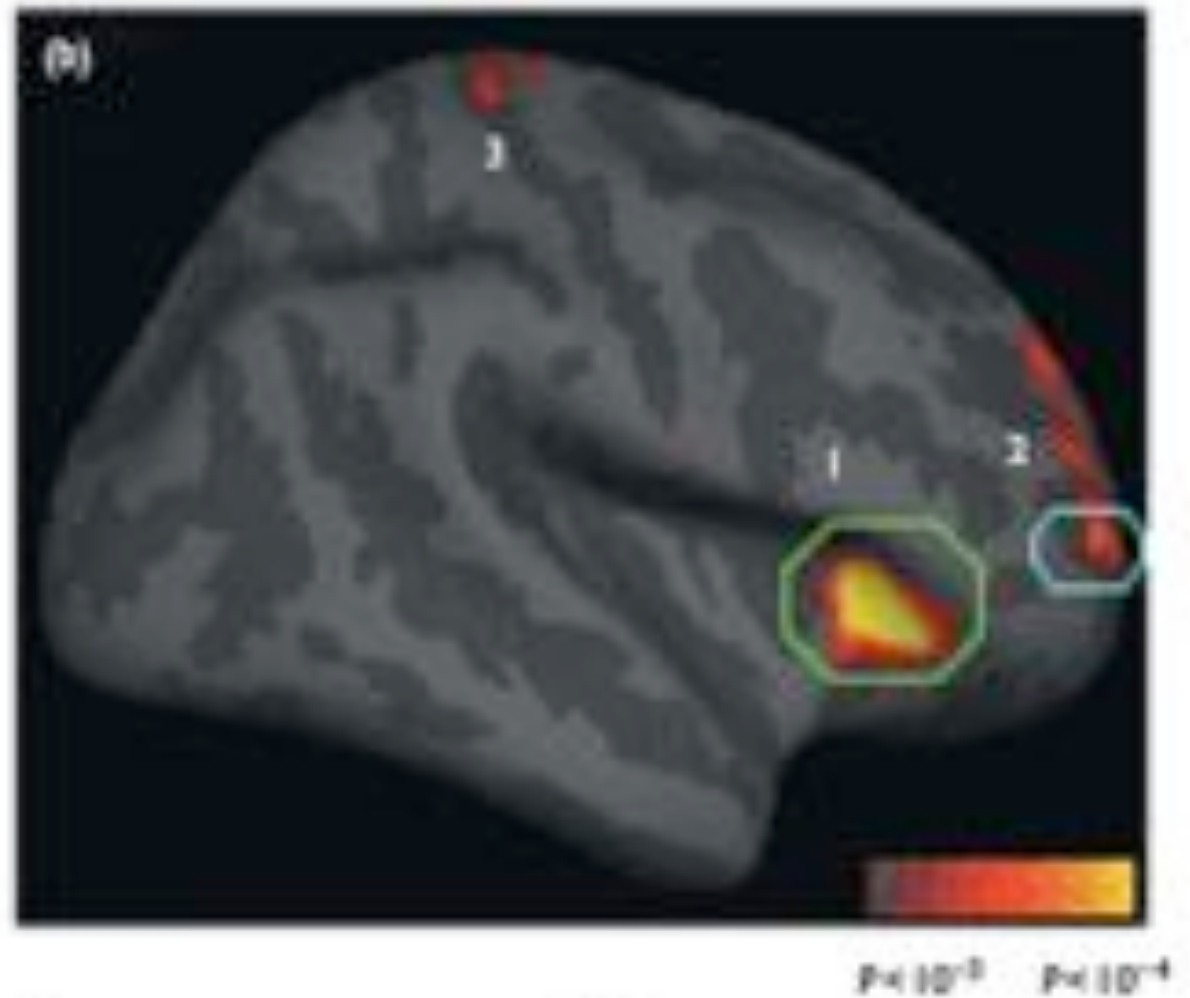
Pain network: Dorsal anterior cingulate cortex (dACC), insula (Ins), somatosensory cortex (SSC), thalamus (Thal), and periaqueductal gray (PAG). Reward network: Ventral tegmental area (VTA), ventral striatum (VS), ventromedial prefrontal cortex (VMPFC), and amygdala (Amyg). K. Sutliff, in Lieberman & Eisenberger, 2009, *Science*, 323:890-891



Mental Activity Shapes Neural Structure

- *What you think and feel changes your brain in numerous ways:*
 - Increased blood/nutrient flow to active regions
 - “Neurons that fire together wire together.”
 - Increasing excitability of active neurons
 - Strengthening existing synapses
 - Building new synapses; thickening your cortex
 - Neuronal “pruning” - “use it or lose it”
- What flows through your mind sculpts your brain.

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



Physical Effects of Meditation

- Thickens and strengthens the anterior (frontal) cingulate cortex and the insula. Those regions are involved with controlled attention, empathy, and compassion – and meditation improves those functions.
- Less cortical thinning with aging
- Increases activation of the left frontal regions, which lifts mood
- Increases the power and reach of fast, gamma brainwaves
- Decreases stress-related cortisol
- Stronger immune system



*The principal activities of brains
are making changes in themselves.*



Marvin L. Minsky

Third Fact about Your Brain

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

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

Foundations of Meditation

- Setting an intention - “top-down” frontal lobes, “bottom-up” limbic system
- Relaxing the body - parasympathetic nervous system
- Feeling safer - inhibits amygdala/ hippocampus vigilance circuits
- Evoking positive emotion - dopamine, norepinephrine
- Absorbing the benefits - primes memory circuits throughout the brain



Know the mind.

Shape the mind.

Free the mind.



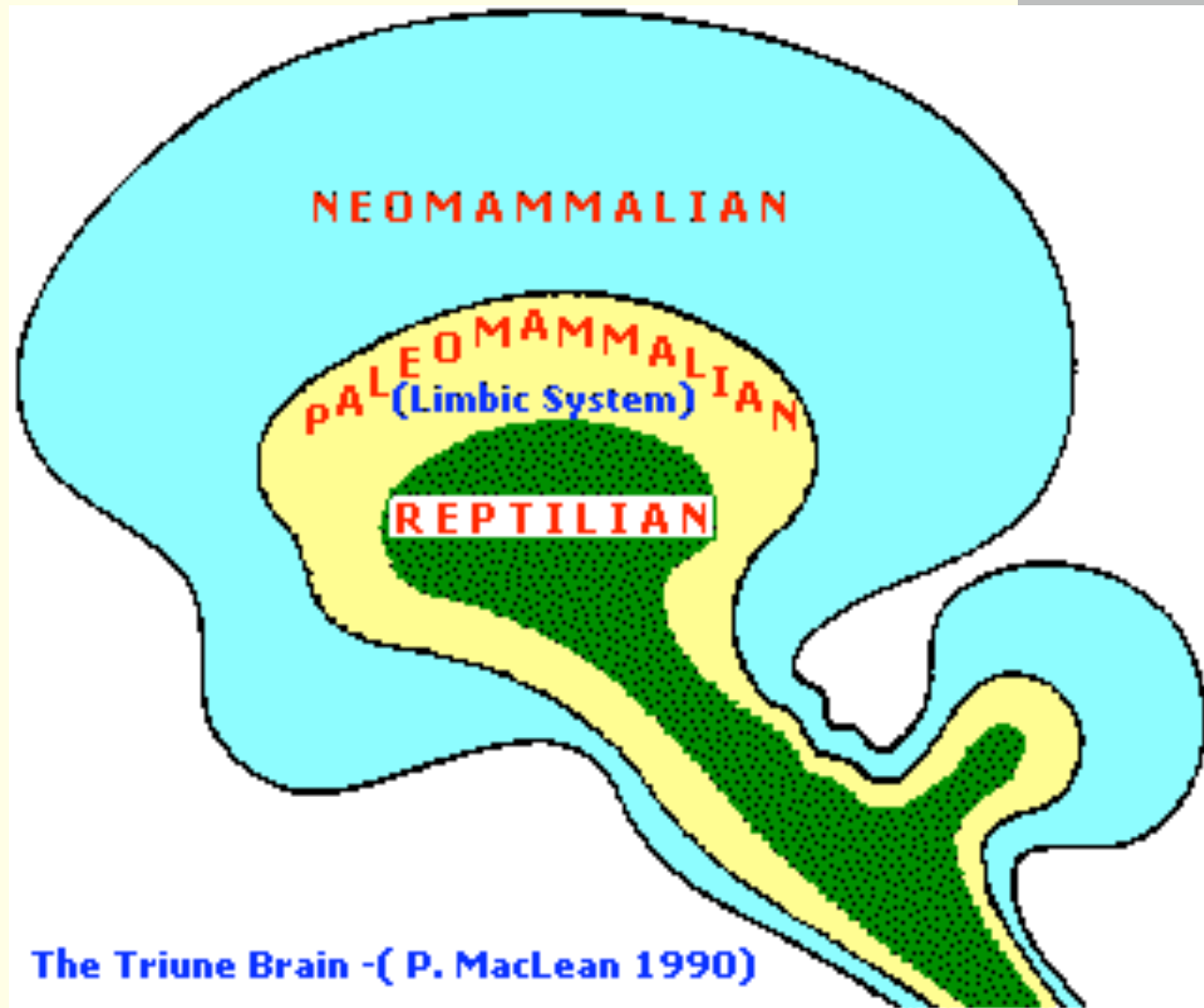
Evolution Grinding Away

- 3.5 billion years of life on this planet
- 600 million years of multi-celled animals
- 80 million years of mammals
- 10 million years of ape-like ancestors
- 2.5 million years of stone tool-using relatives
- 100,000+ years of our own species

Grandchildren!



The “Triune Brain”



The Negativity Bias - Sources and Dynamics

- In evolution, threats had more impact on survival than opportunities. So sticks are more salient than carrots:
 - The amygdala is primed to label experiences negatively.
 - The amygdala-hippocampus system flags negative experiences prominently in memory.
 - The brain is like velcro for negative experiences and teflon for positive ones.
- Consequently, negative trumps positive:
 - It's easy to create learned helplessness, but hard to undo.
 - People will do more to avoid a loss than get a gain.
 - It takes five positive interactions to undo a negative one.
- Negative experiences create vicious cycles.

Negative Experiences Can Have Benefits

- A place for negative emotions:
 - Anxiety alerts us to inner and outer threats
 - Sorrow opens the heart
 - Remorse helps us steer a virtuous course
 - Anger highlights mistreatment; energizes to handle it
- Negative experiences can:
 - Increase tolerance for stress, emotional pain
 - Build grit, resilience, confidence
 - Increase compassion and tolerance for others

Negative Experiences Are Stressful

- Sympathetic nervous system (SNS) and hypothalamic-pituitary-adrenal axis (HPAA)
- Surges of cortisol, norepinephrine, other hormones
- Fight, flight, or freezing behaviors
- Abandoning long-term needs for a short-term crisis

Health Consequences of Chronic Stress

■ Physical:

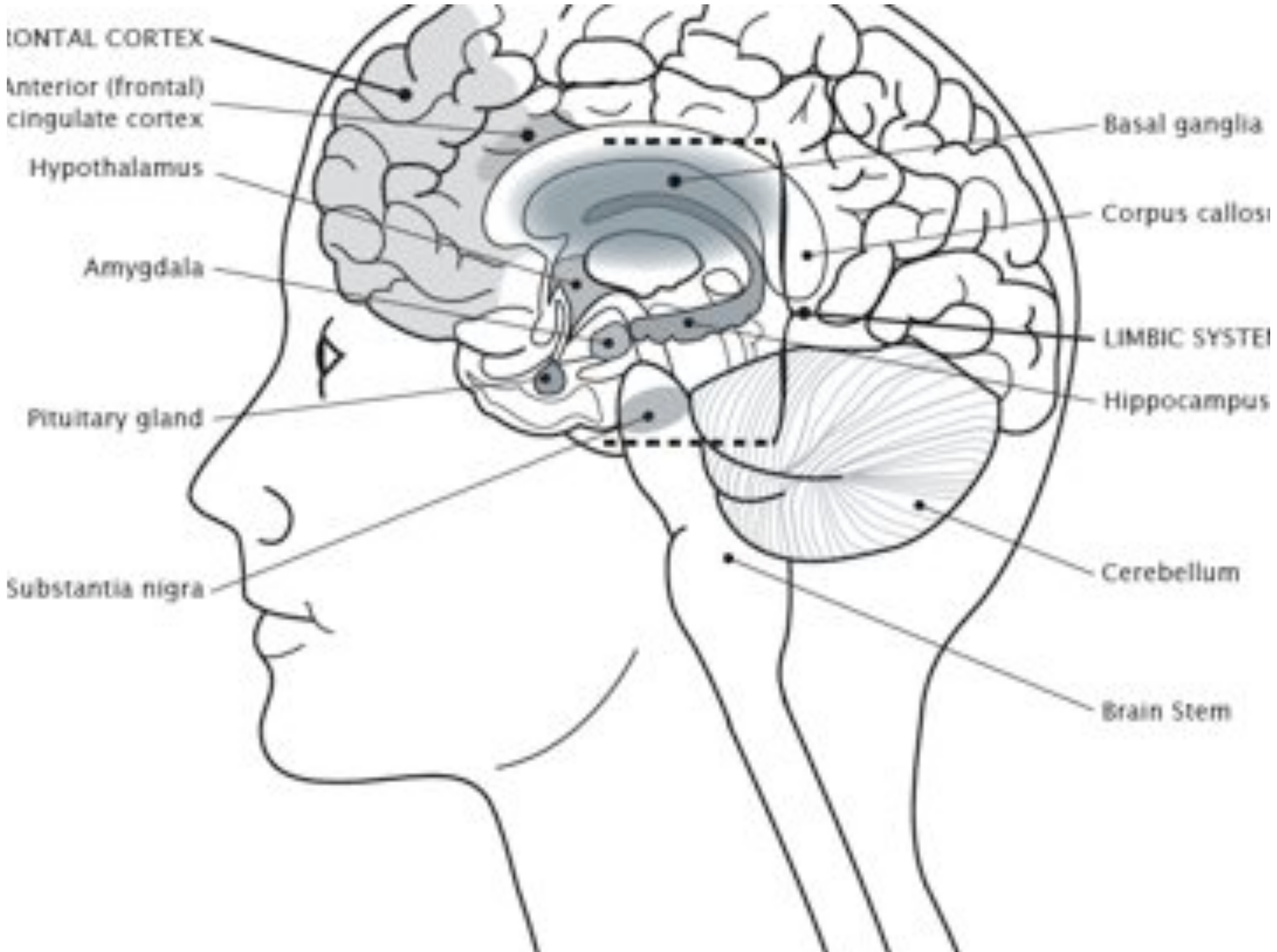
- Weakened immune system
- Inhibits GI system; reduced nutrient absorption
- Reduced, dysregulated reproductive hormones
- Increased vulnerabilities in cardiovascular system
- Disturbed nervous system

■ Mental:

- Lowers mood; increases pessimism
- Increases anxiety and irritability
- Increases learned helplessness (especially if no escape)
- Often reduces approach behaviors (less so for women)
- Primes aversion (due to SNS-HPAA negativity bias)

Neural Consequences of Negative Experiences

- Amygdala initiates stress response (“alarm bell”)
- Hippocampus:
 - Forms and retrieves contextual memories
 - Inhibits the amygdala
 - Inhibits cortisol production
- Cortisol:
 - Stimulates and sensitizes the amygdala
 - Inhibits and can shrink the hippocampus
- Consequently, chronic negative experiences:
 - Sensitize the amygdala alarm bell
 - Weaken the hippocampus: this reduces memory capacities and the inhibition of amygdala and cortisol production
 - Thus creating vicious cycles in the NS, behavior, and mind



Neural Consequences of Negative Experiences

- Amygdala initiates stress response (“alarm bell”)
- Hippocampus:
 - Forms and retrieves contextual memories
 - Inhibits the amygdala
 - Inhibits cortisol production
- Cortisol:
 - Stimulates and sensitizes the amygdala
 - Inhibits and can shrink the hippocampus
- Consequently, chronic negative experiences:
 - Sensitize the amygdala alarm bell
 - Weaken the hippocampus: this reduces memory capacities and the inhibition of amygdala and cortisol production
 - Thus creating vicious cycles in the NS, behavior, and mind

A Poignant Truth

Mother Nature is tilted toward producing gene copies.

But tilted against personal quality of life.

And at the societal level, we have caveman/cavewoman brains armed with nuclear weapons.

What shall we do?

*We can deliberately use the mind
to change the brain for the better.*

Learning and Memory

- Neural structure changes through learning.
- The result is memory, broadly defined.
- Explicit - Personal recollections; semantic memory
- Implicit - Bodily states; emotional residues; “views” (expectations, object relations, perspectives on self, world, past and future); behavioral repertoire and inclinations
- Implicit > Explicit

How to Take in the Good

1. Look for positive **facts** and let them become positive experiences.
2. Savor the experience:
 - Sustain it.
 - Have it be emotional and sensate.
 - Intensify it.
3. Sense 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
- The good feelings that come from being kind, fair, generous
- Small pleasures of ordinary life
- Accomplishments - especially small, everyday ones
- Feeling determined, strong, “at cause”
- Being included, valued, liked, respected, loved by others
- Recognizing your positive character traits
- Spiritual or existential realizations

Targets of TIG

- Bodily states - healthy arousal; PNS; vitality
- Emotions
- Views - expectations; object relations; perspectives on self, world, past and future
- Behaviors - repertoire; inclinations

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

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
- These include:
 - Stronger immune system; less stress-reactive cardiovascular
 - Lift mood; increase optimism, resilience
 - Counteract trauma
 - Promote exploratory, “approach” behaviors
 - Create positive cycles

*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

Being for Yourself

- All the great teachers have told us to be compassionate and kind toward all beings. And that whatever we do to the world affects us, and whatever we do to ourselves affects the world.
- You are one of the “all beings!” And kindness to yourself benefits the world, while hurting yourself harms the world.
- It’s a general moral principle that the more power you have over someone, the greater your duty is to use that power wisely. Well, who is the one person in the world you have the greatest power over? It’s your future self. You hold that life in your hands, and what it will be depends on how you care for it.
- Consider yourself as an innocent child, as deserving of care and happiness as any other.

“Anthem”

*Ring the bells that still can ring
Forget your perfect offering
There is a crack in everything
That's how the light gets in
That's how the light gets in*

Leonard Cohen

*Be wisdom itself,
rather than a person who isn't wise
trying to become wise.*

*Trust in awareness, in being awake,
rather than in transient and unstable conditions.*

Ajahn Sumedho

*How to use taking in the good
for healing painful, even traumatic experiences?*

Key Points about Memory

- Schematic storage of selected features
- Recollections are re-built, not re-called.
- The emergent brain/mind pattern of the memory also associates to whatever else is in awareness, especially if it is emotionally salient.
- When the memory goes back into storage, it takes with it the other emotionally salient associations.
- Therefore, you can gradually imbue memories with positive emotional associations.
- Explicit, episodic memory will not change, but implicit, emotional memory can.

The Fourth Step of TIG

- When you are having a positive experience:
 - Sense the current positive experience sinking down into old pain, and soothing and replacing it.
- When you are having a negative experience:
 - Bring to mind a positive experience that is its antidote.
- In both cases, have the positive experience be big and strong, in the forefront of awareness, while the negative experience is small and in the background.
- You are not resisting negative experiences or getting attached to positive ones. You are being kind to yourself and cultivating wholesomeness of mind.

TIG4 Capabilities, Resources, Skills

■ Capabilities:

- Dividing attention
- Sustaining awareness of the negative material without getting sucked in (and even retraumatized)

■ Resources:

- Self-compassion
- Internalized sense of affiliation (the third fundamental motivational system)

■ Skills:

- Internalizing “antidotes”
- Accessing “the tip of the root”

The Buddha's Words on Lovingkindness

Wishing: In gladness and in safety, may all beings be at ease.

Omitting none, whether they are weak or strong, the great or the mighty, medium, short, or small, the seen and the unseen, those living near and far away, those born and to-be-born: May all beings be at ease.

Let none through anger or ill-will wish harm upon another. Even as a mother protects with her life her child, her only child, so with a boundless heart should one cherish all living beings; radiating kindness over the entire world: spreading upwards to the skies, and downwards to the depths, outwards and unbounded, freed from hatred and ill-will.

One should sustain this recollection.

This is said to be the sublime abiding.

*With dewdrops dripping,
I wish somehow I could wash
this perishing world*

Basho

Self-Compassion

- Compassion is the wish that someone not suffer, combined with feelings of sympathetic concern. Self-compassion simply applies that to oneself. It is not self-pity, complaining, or wallowing in pain.
- Self-compassion is a major area of research, with studies showing that it 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
 - Sink into the experience of compassion in your body
- Then shift the focus of compassion to yourself, perhaps with phrases like: “May I not suffer. May the pain of this moment pass.”

Feeling Strong

- Relaxed, feeling the strength in awareness itself, never sullied or rattled by what passes through it.
- Sense the vitality in your body.
- Recall a time you felt really strong, and sense those feelings. . . . Energy and strength in your breathing, in your whole being . . .
- A spacious strength that lets others flow through
- In relationship and at peace
- Relaxed in a spacious world; no need for struggle

Penetrative insight

joined with calm abiding

utterly eradicates

afflicted states.

Shantideva

Psychological Antidotes

- Look for positive experiences that are the specific antidote to negative material.
- Examples:
 - Being safe, secure antidoting feeling threatened, attacked, insecure
 - Being strong, effective antidoting feeling weak, helpless, pessimistic
 - Being happy, content, grateful antidoting feeling sad, depressive, unsatisfied, negative
 - Being wanted, included, loved antidoting feeling devalued, rejected, abandoned, unloved

Sam sees *“peeping among the cloud-wrack . . . a white star twinkle for a while. The beauty of it smote his heart, as he looked up out of the forsaken land, and hope returned to him. For like a shaft, clear and cold, the thought pierced him that in the end the Shadow was only a small and passing thing: there was light and high beauty for ever beyond its reach.”*

Tolkein, *The Lord of the Rings*

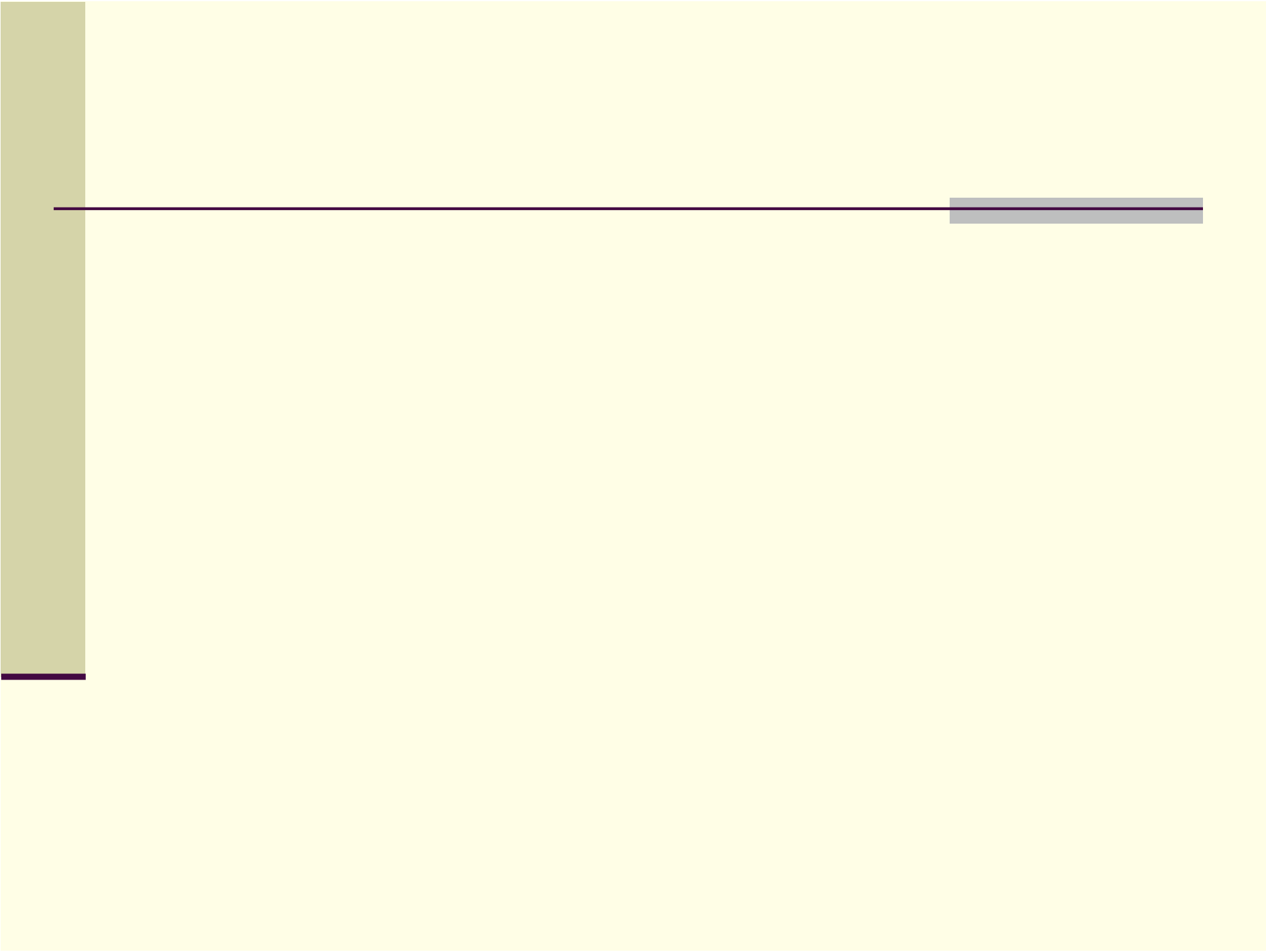
*Be wisdom itself,
rather than a person who isn't wise
trying to become wise.*

*Trust in awareness, in being awake,
rather than in transient and unstable conditions.*

Ajahn Sumedho

The Tip of the Root

- For the fourth step of TIG, try to get at the youngest, most vulnerable layer of painful material.
- The “tip of the root” is commonly in childhood. In general, the brain is most responsive to negative experiences in early childhood.
- Prerequisites
 - Understanding the need to get at younger layers
 - Compassion and support for the inner child
 - Capacity to “presence” young material without flooding



To study the Way is to study the self.

To study the self is to forget the self.

*To forget the self is
To be enlightened by all things.*

Dogen

“Bahiya, you should train yourself thus.”

In reference to the seen, there will be only the seen. To the heard, only the heard. To the sensed, only the sensed. To the cognized, only the cognized.

When for you there will be only the seen in reference to the seen, only the heard in the heard, only the sensed in the sensed, only the cognized in the cognized, then, Bahiya, there's no you in that.

When there's no you in that, there's no you there. When there's no you there, you are neither here nor yonder nor between the two.

This, just this, is the end of all suffering.

Dual Modes of Being

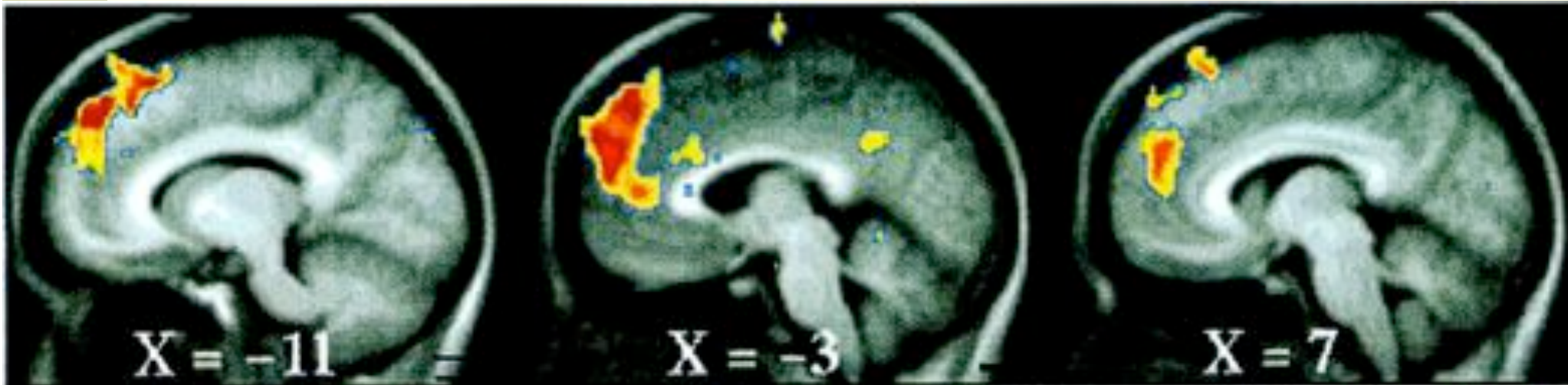
[Medial]

Mainly representational
Much verbal activity
Abstract
Future- or past-focused
Goal-directed
Sense of craving
Personal, self-oriented perspective
Focal view
Firm beliefs
Evaluative
Lost in thought, mind wandering
Reverberation and recursion
Tightly connected experiences
Prominent self-as-object
Prominent self-as-subject

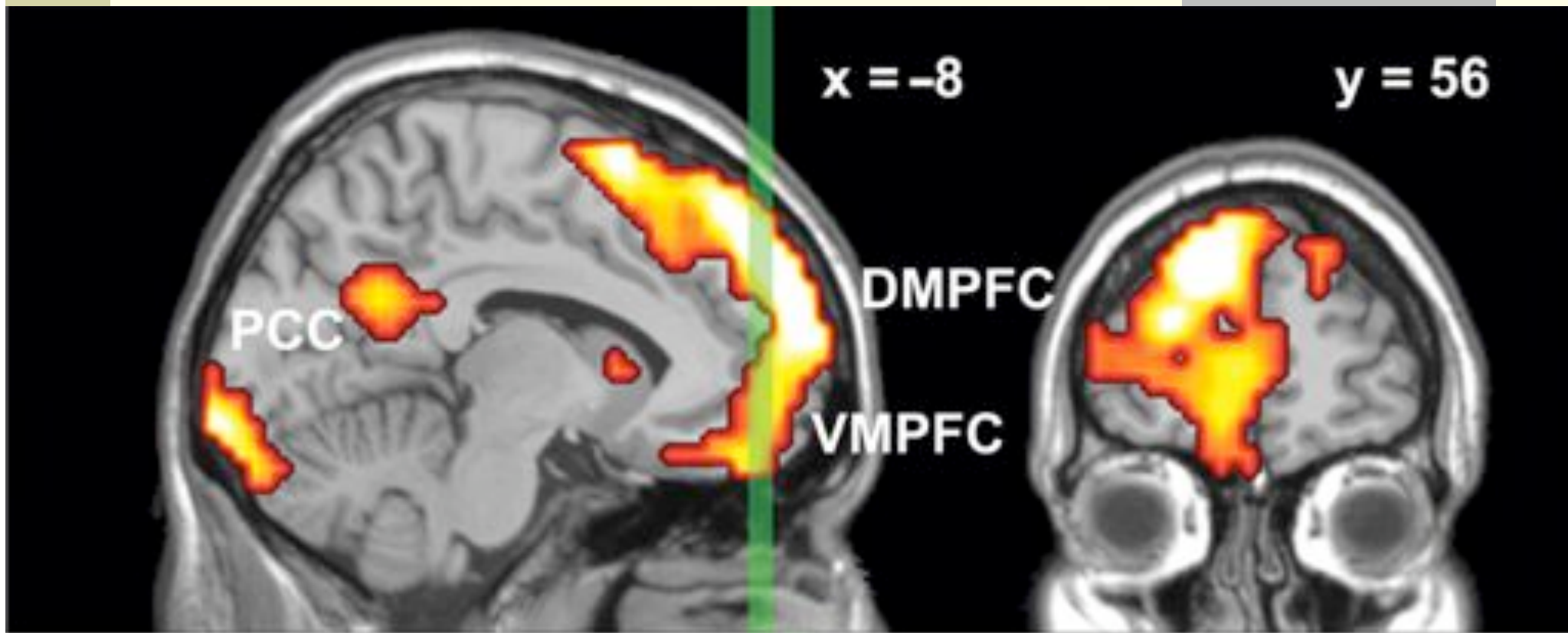
[Lateral]

Mainly sensory
Little verbal activity
Concrete
Now-focused
Nothing to do, nowhere to go
Sense of peace
Impersonal, 3rd person perspective
Panoramic view
Uncertainty, not-knowing
Nonjudgmental
Mindful presence
Immediate and transient;
Loosely connected experiences
Minimal or no self-as-object
Minimal or no self-as-subject

Increased Dorsal MPFC Activation Related to Self-Referencing Thought

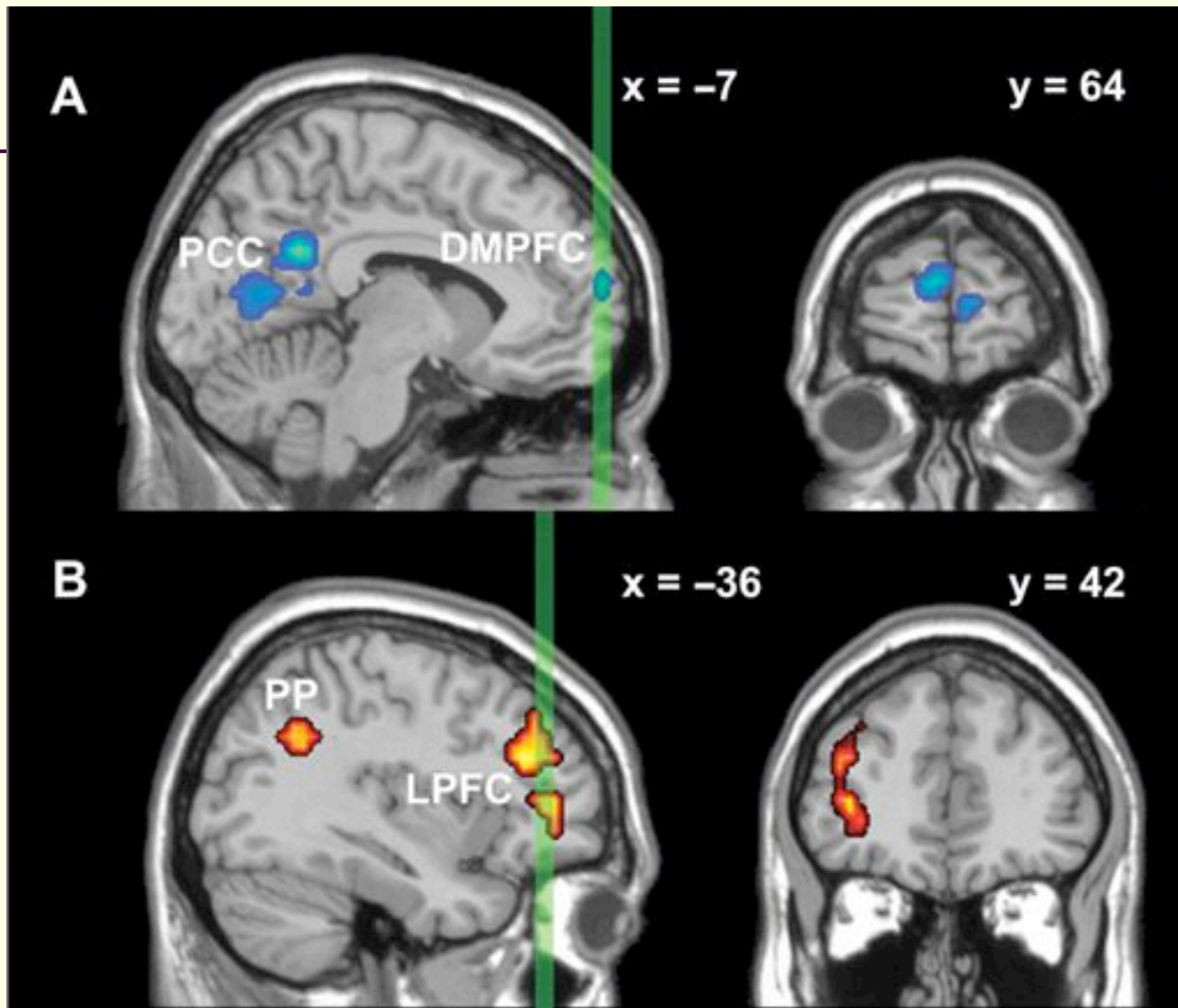


Cortical midline areas associated with the narrative self focus condition, combining both MT (following 8 weeks of mindfulness training) and novice (pre MT) groups

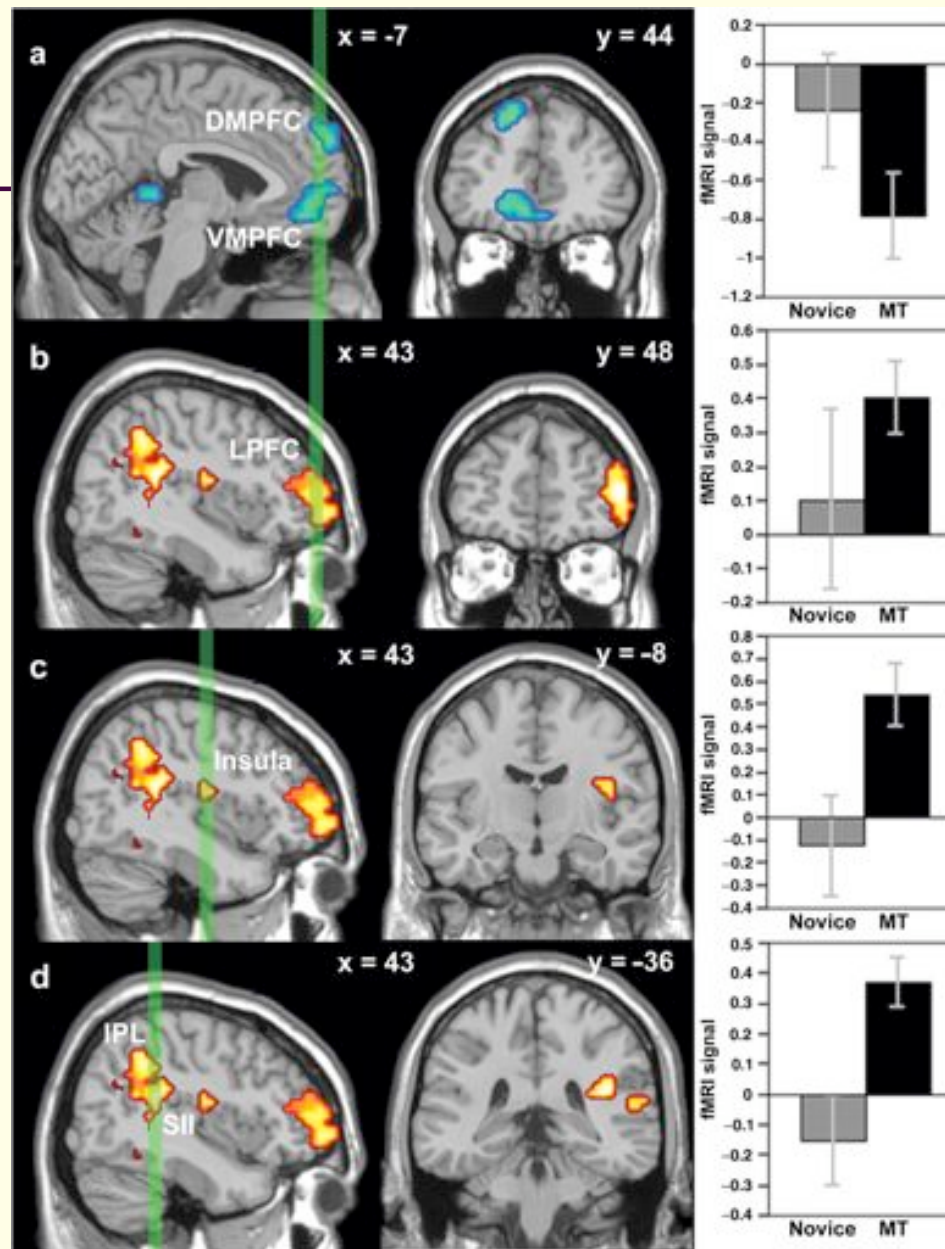


Farb, et al. Soc Cogn Affect Neurosci 2007 2:313-322

Narrative (blue) and Experiential (red) conditions in the novice (pre MT) group



Narrative (blue) vs Experiential (red) conditions following 8 weeks of MT



Farb, et al. Soc Cogn Affect Neurosci 2007 2:313-322

Ways to Activate the Two Modes

- Ways to shift into medial mode:
 - Verbal thought
 - Task focus
 - Sense of threat or opportunity
 - Mini-movies in the mental simulator

- Ways to shift into lateral mode:
 - Sensory awareness
 - Sense of the body as a whole
 - “Don’t-know mind”
 - Panoramic view
 - Open space awareness
 - Boundless compassion

Dual Modes of Being

[Medial]

Mainly representational
Much verbal activity
Abstract
Future- or past-focused
Goal-directed
Sense of craving
Personal, self-oriented perspective
Focal view
Firm beliefs
Evaluative
Lost in thought, mind wandering
Reverberation and recursion
Tightly connected experiences
Prominent self-as-object
Prominent self-as-subject

[Lateral]

Mainly sensory
Little verbal activity
Concrete
Now-focused
Nothing to do, nowhere to go
Sense of peace
Impersonal, 3rd person perspective
Panoramic view
Uncertainty, not-knowing
Nonjudgmental
Mindful presence
Immediate and transient;
Loosely connected experiences
Minimal or no self-as-object
Minimal or no self-as-subject

“Bahiya, you should train yourself thus.”

In reference to the seen, there will be only the seen. To the heard, only the heard. To the sensed, only the sensed. To the cognized, only the cognized.

When for you there will be only the seen in reference to the seen, only the heard in the heard, only the sensed in the sensed, only the cognized in the cognized, then, Bahiya, there's no you in that.

When there's no you in that, there's no you there. When there's no you there, you are neither here nor yonder nor between the two.

This, just this, is the end of all suffering.

To study the Way is to study the self.

To study the self is to forget the self.

*To forget the self is
To be enlightened by all things.*

Dogen

Definitions

- **Person** - The body-mind as a whole
 - Contains knowledge, personal memories, skills, temperament, personality tendencies, mood, etc.
 - Has considerable consistency over time
 - Deserves kindness and justice; is morally culpable
- **Self** - “I, me, and mine”
 - The psychological self; the “I” in “I am happy, I want a cookie, I know $2+2=4$, I am for justice”; the “me” in “Do you love me?”
 - Sense of being the owner of experiences and the agent of actions
- **Awareness** - The field in which the mind (as yet mysteriously) represents aspects of the mind to itself
 - The “global workspace” in which representations of the person, self-related functions, and subjectivity arise and pass away

Conventional Notions of “Self”

- **Unified** - coherent; just one; a being, an entity; some one looking out through your eyes.
- **Stable** - unchanging in its fundamentals; the core self as a child still feels present in you today
- **Independent** - things happen to the self, but it remains free of their effects in its essence.
- **Identity** - That which one is; that with which there is the greatest identification

Actual Experience of “Self”

- **Compounded** – Made up of many parts; one self vows to exercise early, another self turns off the alarm clock
- **Impermanent** – More or less present at different times; different aspects come forward at different times
- **Dependent** – Developed in interactions with caregivers and peers and encounters with the world; grounded in evolution; activating and deactivating as a means to the ends of the organism; especially responsive to opportunities and threats; self organizes around clinging; there is a process of *selfing* rather than a static, fixed, unchanging entity.
- **Part of the person** – There is awareness of aspects of self as contents within awareness like any others

The dualistic ego-mind is essentially a survival mechanism, on a par with the fangs, claws, stingers, scales, shells, and quills that other animals use to protect themselves. By maintaining a separate self-sense, it attempts to provide a haven of security . . . Yet the very boundaries that create a sense of safety also leave us feeling cut off and disconnected.

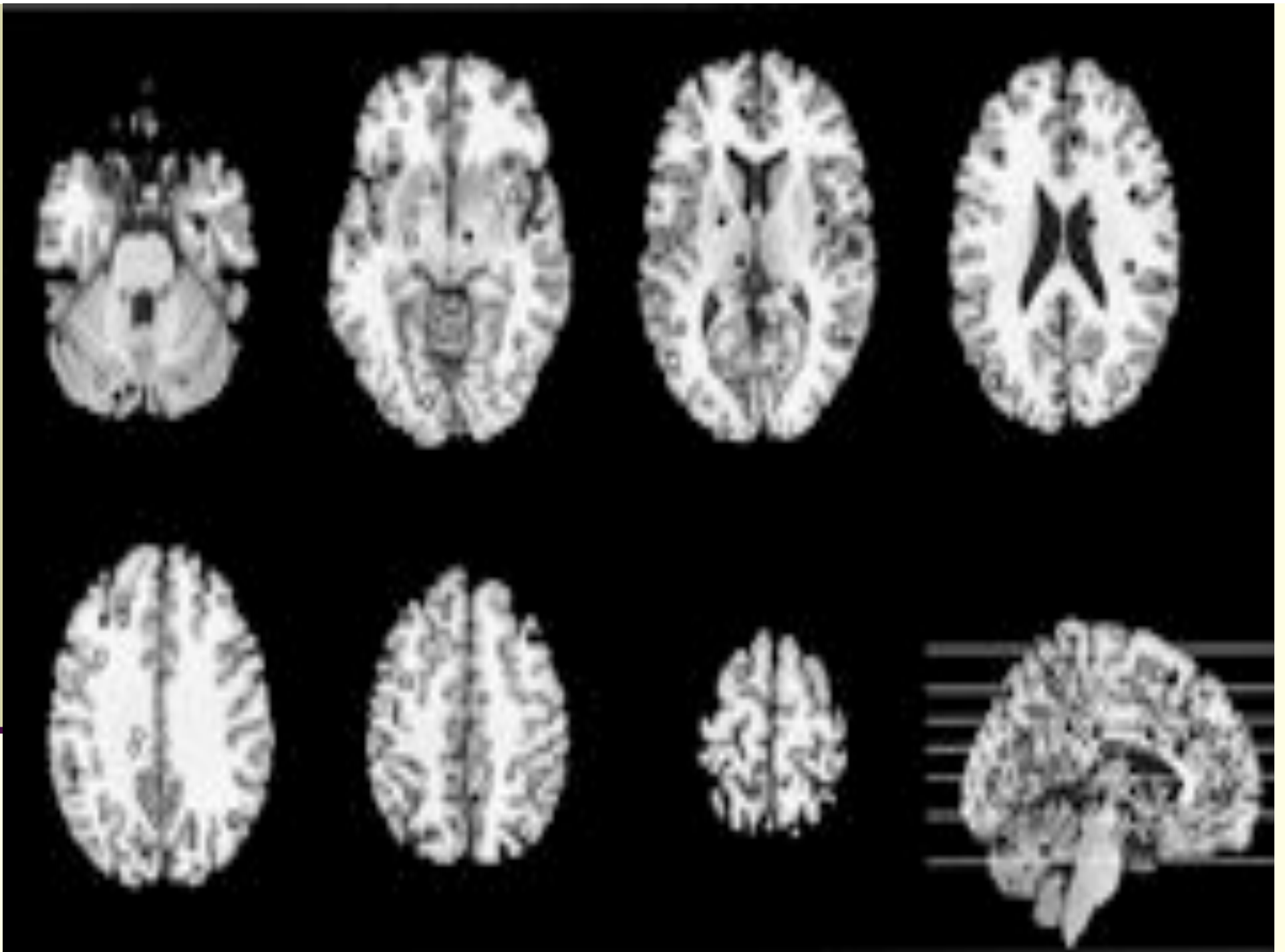
John Welwood

Actual Experience of “Self”

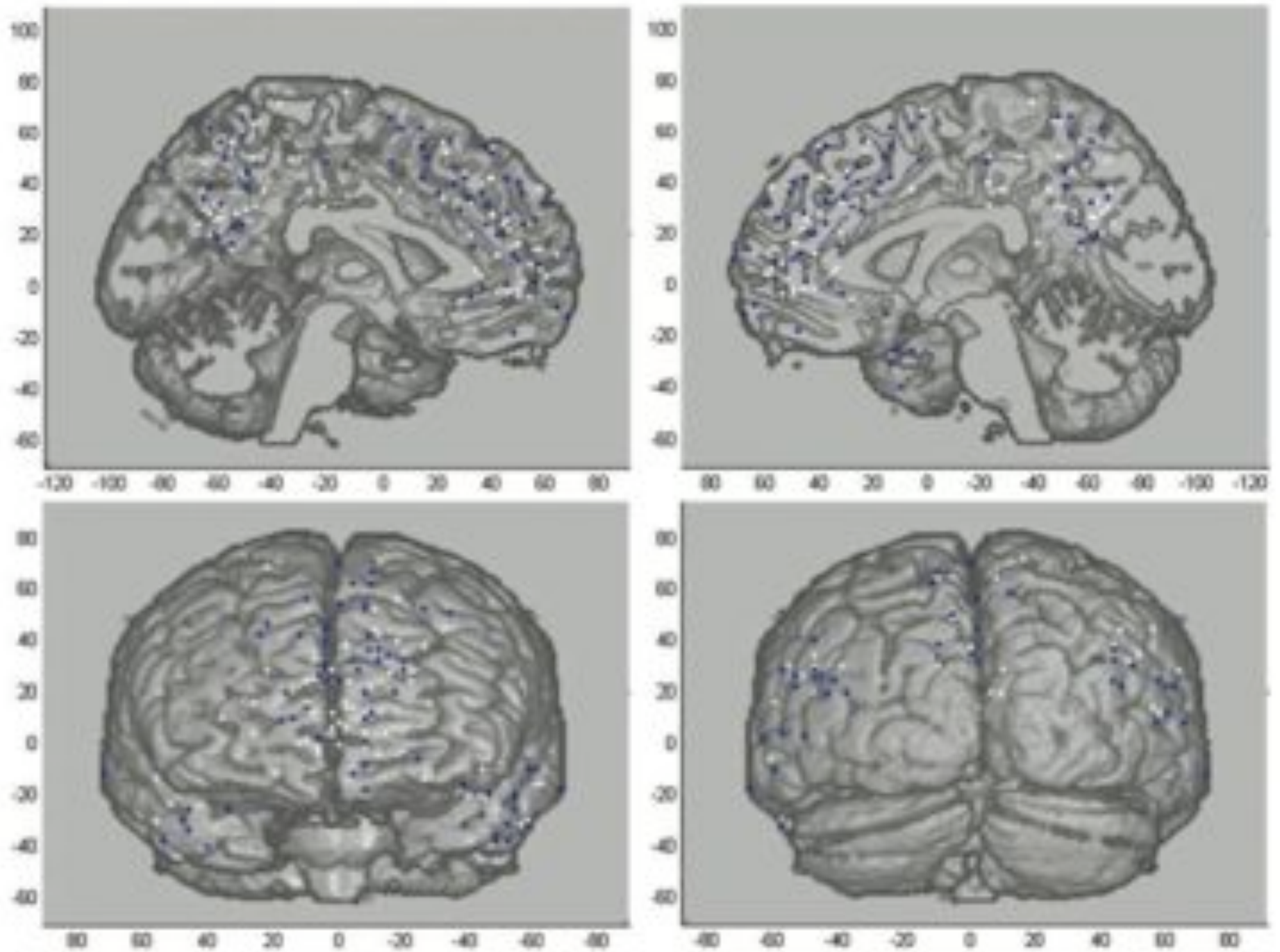
- **Compounded** – Made up of many parts; one self vows to exercise early, another self turns off the alarm clock.
- **Impermanent** – More or less present at different times; different aspects come forward at different times; there is a process of *selfing* rather than a static, fixed, unchanging entity.
- **Dependent** – Developed in interactions with caregivers and peers and encounters with the world; grounded in evolution; activating and deactivating as a means to the ends of the organism; especially responsive to opportunities and threats; self organizes around clinging.
- **Part of the person** – There is awareness of aspects of self as contents within awareness like any others.

Properties of Self in Your Brain

- **Compounded** – Distributed systems and sub-systems; no homunculus looking through your eyes
- **Impermanent** – Circuits light up and deactivate; fluid, transient
- **Dependent** – Dependent on neural structures and processes; dependent on the evolution of specialized neural tissues (e.g., spindle cells); responsive to stimuli;
- **Part of the person** – Self-related activations in neural circuitry are just a tiny fraction of the total activations in the brain
 - The neural circuitry associated with self representations or functions also performs many other activities unrelated to self.
 - In the brain, self is not special.



Brain activations of “selfing” - Gillihan, et al., Psych Bulletin, 1/2005



Legrand and Ruby, 2009. What is self-specific? [White = self; blue = other]

Subjectivity Doesn't Equal a Subject

- Ordinary awareness has an inherent subjectivity, a localization to a particular perspective (e.g., to my body, not yours).
- The brain indexes across experiences of subjectivity to create an apparent subject.
- That apparent subject is elaborated and layered through the maturation of the brain, notably regions of the prefrontal cortex.
- But there is no subject *inherent* in subjectivity!
- Awareness requires subjectivity, but not a subject.

What Self?

In sum, from a neurological standpoint, the everyday feeling of being a unified self is an utter illusion:

- The apparently coherent and solid “I” is actually built from many neural subsystems, with no fixed center.
- The apparently stable “I” is produced by variable and transient activations of neural circuits.
- The apparently independent “I” depends on neural circuitry, the evolutionary processes that built them, critical interactions with others to shape those circuits, and the stimuli of the moment.

Neurologically, self is “empty” - without absolute, inherent existence.

Self Is Like a Unicorn

- Self-related patterns of information and neural activity are as real as those that underlie the smell of roses.
- But that which they point to – a unified, enduring, independent “I” – just doesn’t exist.
- Just because we have a sense of self does not mean that we are a self. The brain strings together heterogenous moments of self-ing and subjectivity into an illusion of homogenous coherence and continuity.
- Real representations in the brain of a horse point to something that is also real. But the real representations of a unicorn in the brain point to something that is not real.
- The real representations of the self in the brain point to another mythical creature: the apparent self.

“Self” Has Its Uses

- A convenient way to distinguish one person from another
- Brings a sense of continuity to life's experiences
- Adds verve and commitment to relationships
- People without self structures have impaired relationships.
- Self-related processes helped our ancestors succeed in increasingly social hunter-gatherer bands in which interpersonal dynamics played a strong role in survival.
- The evolution of relationships fostered the evolution of self and vice versa; the benefits of self have thus been a factor in the evolution of the brain.
- Self has been stitched into human DNA by reproductive advantages slowly accumulating across a hundred thousand generations.

Selfing Leads to Suffering

- When “I, me, and mine” are mental objects like any other, there’s no problem.
 - For example, the Buddha routinely used “I” and “you.”
- But when we privilege self-representations through identifying with them or defending or glorifying them . . . Then we suffer, and create suffering for others.
- The key is to be able to move dextrously into and back out of self-representations; that’s skillful means.

“Bahiya, you should train yourself thus.”

In reference to the seen, there will be only the seen. To the heard, only the heard. To the sensed, only the sensed. To the cognized, only the cognized.

When for you there will be only the seen in reference to the seen, only the heard in the heard, only the sensed in the sensed, only the cognized in the cognized, then, Bahiya, there's no you in that.

When there's no you in that, there's no you there. When there's no you there, you are neither here nor yonder nor between the two.

This, just this, is the end of all suffering.

Selflessness is not a case of something that existed in the past becoming nonexistent. Rather, this sort of “self” is something that never did exist. What is needed is to identify as nonexistent something that always was nonexistent.

The Dalai Lama

When we recognize that the things we identify as our self are impermanent and bound up with suffering, we realize they lack the essential marks of authentic selfhood and we thereby stop identifying with them.

Bhikkhu Bodhi

*Indeed, the sage who's fully quenched
Rests at ease in every way;
No sense desire adheres to him or her
Whose fires have cooled, deprived of fuel.*

*All attachments have been severed,
The heart's been led away from pain;
Tranquil, he or she rests with utmost ease.
The mind has found its way to peace.*

The Buddha



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
- A path of practice in which one both uncovers the 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 education of attention
would be an education par excellence.*

William James

“A Spotlight on Speed”

- Attention:
 - Like a spotlight: Illuminates what it rests upon.
 - Like a vacuum cleaner: Sucks its contents into your brain.
 - Controlling attention is a fundamental way to shape your brain - and therefore your life over time.
- Most people have poor control of their “spotlight.”
- Meditation is the preeminent training of attention.
- Benefits of attention training:
 - Academic performance
 - Sports and music
 - Emotional well-being

How the Brain Pays Attention

- Holding onto information
- Updating awareness
- Seeking stimulation
- Dopamine and the gate to awareness
- The basal ganglia stimostat

Individual Differences in Attention

	<u>Holding Information</u>	<u>Updating Awareness</u>	<u>Seeking Stimulation</u>
High	Obsession Over-focusing	Porous filters Distractible Overload	Hyperactive Thrill-seeking
Mod	Concentrates Divides attention	Flexible Assimilation Accommodation	Enthusiastic Adaptive
Low	Fatigues w/Conc. Small WM	Fixed views Oblivious Low learning	Stuck in a rut Apathetic Lethargic

*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

The Factors of Concentration

- 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

Steady Mind, Coherent Brain

- Attention to an object increases the physical sensitivity of neural networks processing information about it.
- Cingulate gyrus monitors stability of attention (nourished by compassion), playing a leading role in the control of control
- Pleasure circuits reward success, and more dopamine flows with bliss and joy.
- High dopamine helps keep the gates of awareness closed to new and distracting information.
- Norepinephrine surges brightening the mind
- This internal stimulation puts the basal ganglia at ease.
- High frequency resonance synchronizing the whole brain

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

Penetrative insight

joined with calm abiding

utterly eradicates

afflicted states.

Shantideva

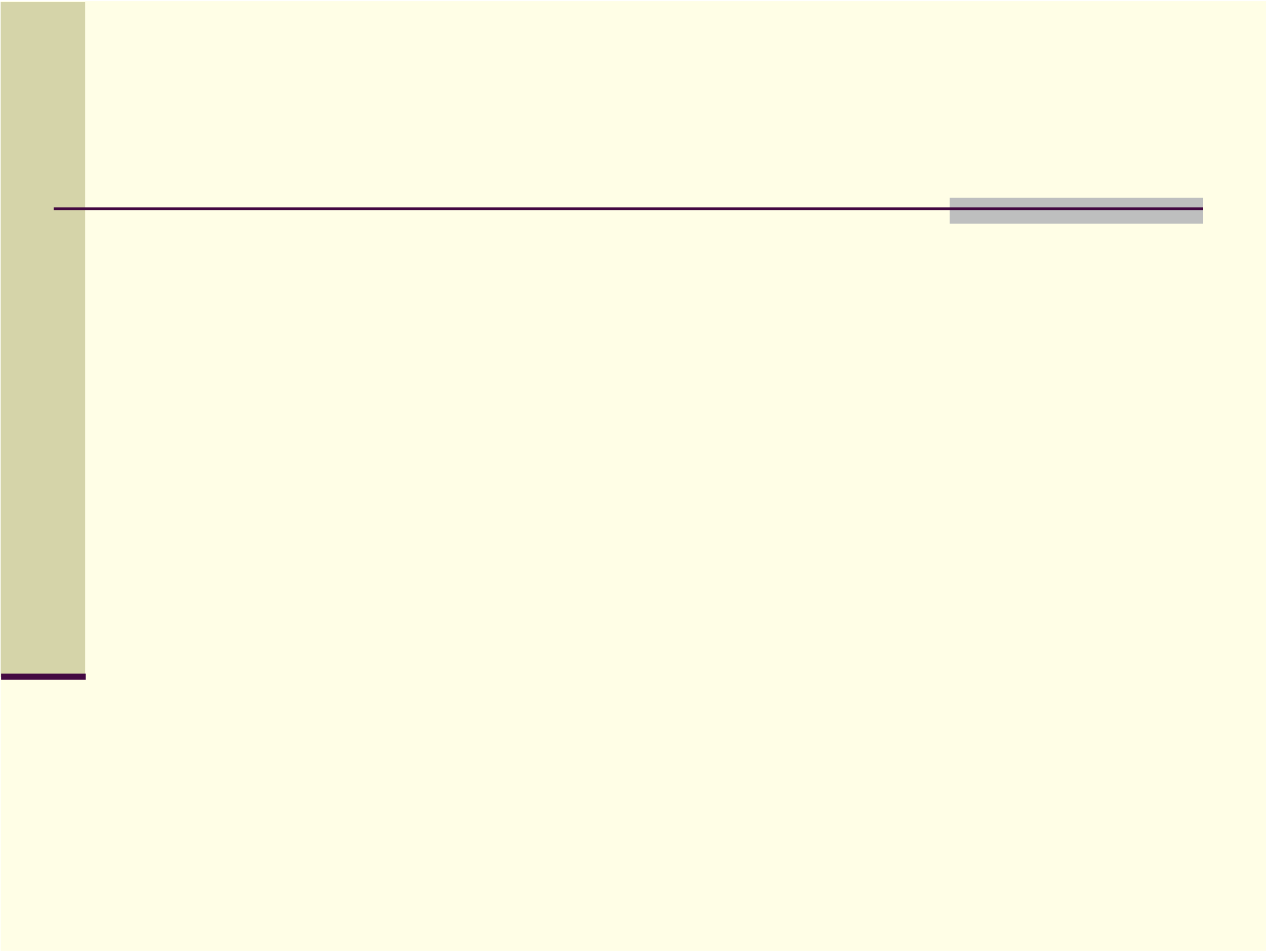
Reflections . . .

Wisdom is . . . all about understanding the underlying spacious and empty quality of the person and of all experienced phenomena.

To attain this quality of deep insight, we must have a mind that is quiet and malleable.

Achieving such a state of mind requires that we first develop the ability to regulate our body and speech so as to cause no conflict.

Venerable Ani Tenzin Palmo



Great Books

See www.RickHanson.net for other great books.

- Austin, J. 2009. *Selfless Insight: Zen and the Meditative Transformations of Consciousness*. MIT Press.
- Begley, S. 2007. *Train Your Mind, Change Your Brain: How a New Science Reveals Our Extraordinary Potential to Transform Ourselves*. Ballantine.
- Hanson, R. 2009. *Buddha's Brain: The Practical Neuroscience of Happiness, Love, and Wisdom*. New Harbinger.
- Johnson, S. 2005. *Mind Wide Open: Your Brain and the Neuroscience of Everyday Life*. Scribner.
- Kornfield, J. 2009. *The Wise Heart: A Guide to the Universal Teachings of Buddhist Psychology*. Bantam.
- LeDoux, J. 2003. *Synaptic Self: How Our Brains Become Who We Are*. Penguin
- Sapolsky, R. 2004. *Why Zebras Don't Get Ulcers*. Holt.
- Siegel, D. 2007. *The Mindful Brain: Reflection and Attunement in the Cultivation of Well-Being*. W. W. Norton & Co.
- Thompson, E. 2007. *Mind in Life: Biology, Phenomenology, and the Sciences of Mind*. Belknap Press.

Key Papers - 1

See www.RickHanson.net for other scientific papers.

- Atmanspacher, H. & Graben, P. 2007. Contextual emergence of mental states from neurodynamics. *Chaos & Complexity Letters*, 2:151-168.
- Baumeister, R., Bratlavsky, E., Finkenauer, C. & Vohs, K. 2001. Bad is stronger than good. *Review of General Psychology*, 5:323-370.
- Braver, T. & Cohen, J. 2000. On the control of control: The role of dopamine in regulating prefrontal function and working memory; in *Control of Cognitive Processes: Attention and Performance XVIII*. Monsel, S. & Driver, J. (eds.). MIT Press.
- Carter, O.L., Callistemon, C., Ungerer, Y., Liu, G.B., & Pettigrew, J.D. 2005. Meditation skills of Buddhist monks yield clues to brain's regulation of attention. *Current Biology*. 15:412-413.

Key Papers - 2

- Davidson, R.J. 2004. Well-being and affective style: neural substrates and biobehavioural correlates. *Philosophical Transactions of the Royal Society*. 359:1395-1411.
- Farb, N.A.S., Segal, Z.V., Mayberg, H., Bean, J., McKeon, D., Fatima, Z., and Anderson, A.K. 2007. Attending to the present: Mindfulness meditation reveals distinct neural modes of self-reflection. *SCAN*, 2, 313-322.
- Gillihan, S.J. & Farah, M.J. 2005. Is self special? A critical review of evidence from experimental psychology and cognitive neuroscience. *Psychological Bulletin*, 131:76-97.
- Hagmann, P., Cammoun, L., Gigandet, X., Meuli, R., Honey, C.J., Wedeen, V.J., & Sporns, O. 2008. Mapping the structural core of human cerebral cortex. *PLoS Biology*. 6:1479-1493.
- Hanson, R. 2008. Seven facts about the brain that incline the mind to joy. In *Measuring the immeasurable: The scientific case for spirituality*. Sounds True.

Key Papers - 3

- Lazar, S., Kerr, C., Wasserman, R., Gray, J., Greve, D., Treadway, M., McGarvey, M., Quinn, B., Dusek, J., Benson, H., Rauch, S., Moore, C., & Fischl, B. 2005. Meditation experience is associated with increased cortical thickness. *Neuroreport*. 16:1893-1897.
- Lewis, M.D. & Todd, R.M. 2007. The self-regulating brain: Cortical-subcortical feedback and the development of intelligent action. *Cognitive Development*, 22:406-430.
- Lieberman, M.D. & Eisenberger, N.I. 2009. Pains and pleasures of social life. *Science*. 323:890-891.
- Lutz, A., Greischar, L., Rawlings, N., Ricard, M. and Davidson, R. 2004. Long-term meditators self-induce high-amplitude gamma synchrony during mental practice. *PNAS*. 101:16369-16373.
- Lutz, A., Slager, H.A., Dunne, J.D., & Davidson, R. J. 2008. Attention regulation and monitoring in meditation. *Trends in Cognitive Sciences*. 12:163-169.

Key Papers - 4

- Takahashi, H., Kato, M., Matsuura, M., Mobbs, D., Suhara, T., & Okubo, Y. 2009. When your gain is my pain and your pain is my gain: Neural correlates of envy and schadenfreude. *Science*. 323:937-939.
- Tang, Y.-Y., Ma, Y., Wang, J., Fan, Y., Feng, S., Lu, Q., Yu, Q., Sui, D., Rothbart, M.K., Fan, M., & Posner, M. 2007. Short-term meditation training improves attention and self-regulation. *PNAS*. 104:17152-17156.
- Thompson, E. & Varela F.J. 2001. Radical embodiment: Neural dynamics and consciousness. *Trends in Cognitive Sciences*, 5:418-425.
- Walsh, R. & Shapiro, S. L. 2006. The meeting of meditative disciplines and Western psychology: A mutually enriching dialogue. *American Psychologist*, 61:227-239.

So that all cubs are our own . . .
So that all beings are our clan . . .
All life, our relatives . . .
The whole earth, our home . . .

*May you know happiness, love, and wisdom,
in this life, just as it is.*

Thank you!