

# ***The Enlightened Brain:***

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## ***The Neuroscience Of Awakening***

**Sounds True**

**Wake Up Festival**

**August 20-22, 2012**

**Rick Hanson, Ph.D.**

**The Wellspring Institute for Neuroscience and Contemplative Wisdom**

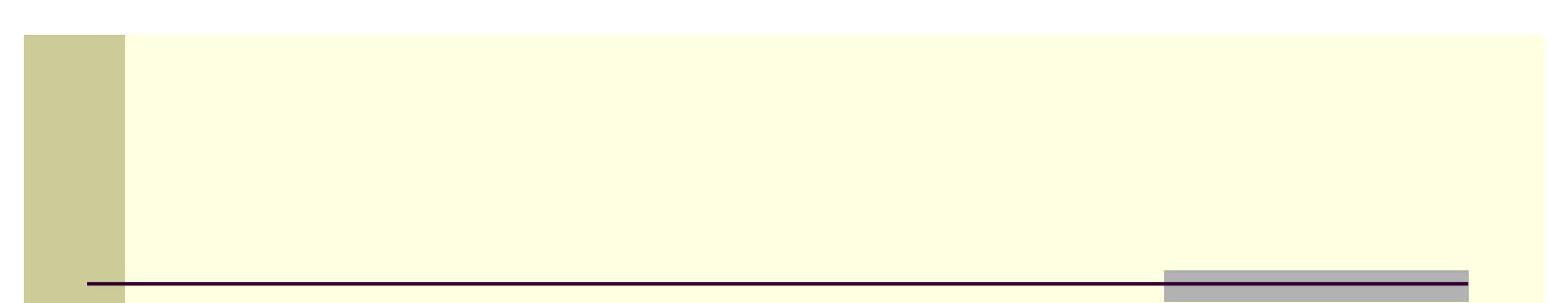
**[WiseBrain.org](http://WiseBrain.org) [RickHanson.net](http://RickHanson.net)**

**[drh@comcast.net](mailto:drh@comcast.net)**

# Topics

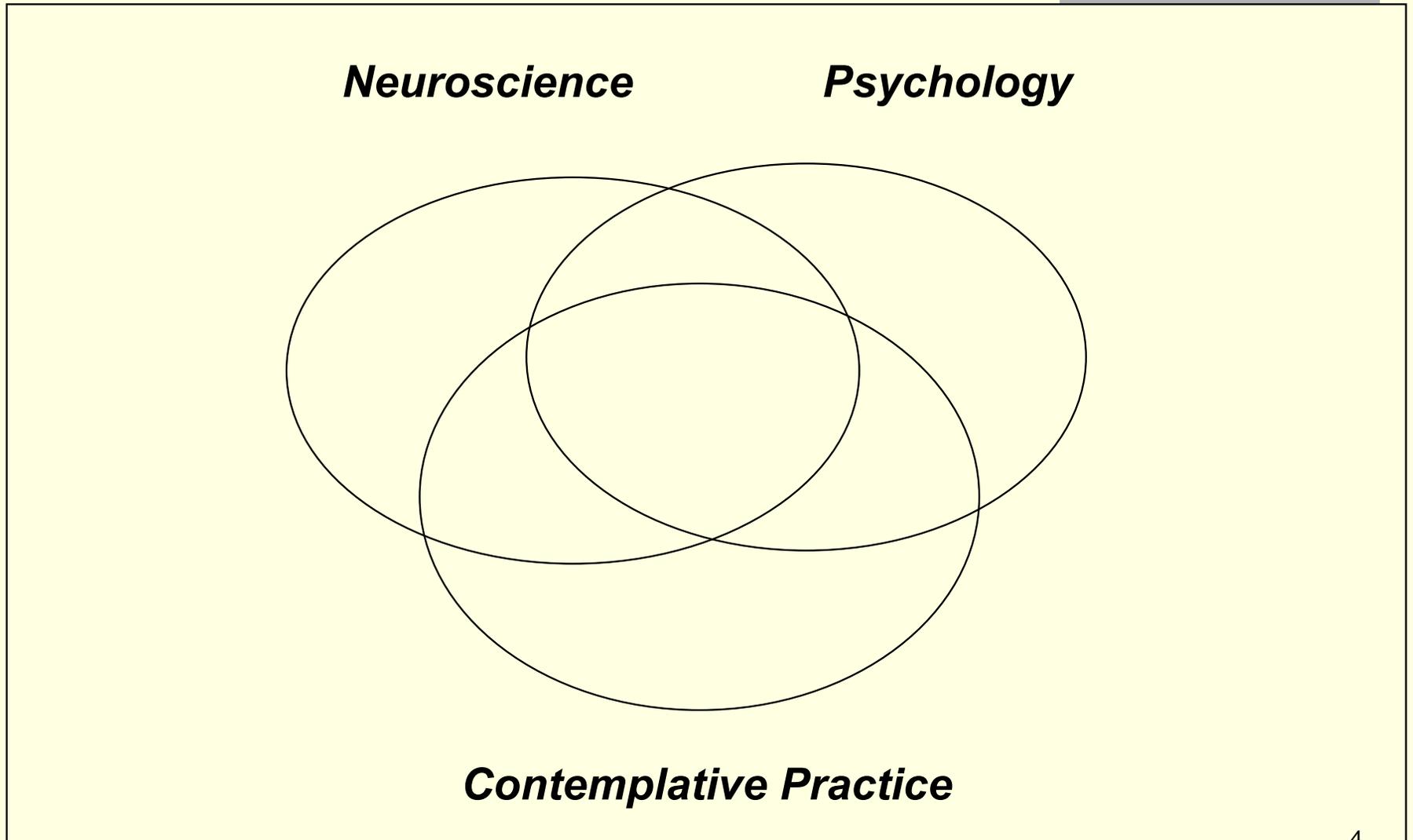
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- **Perspectives**
- **Neural factors of mindfulness**
- **Using your mind to change your brain**
- **Being on your own side**
- **The evolving brain**
- **Cultivation**
- **Steadying the mind**
- **Being and doing**
- **No “self,” no problem**
- **Filling the hole in the heart**
- **Eddies in the stream**



# Perspectives

# Common - and Fertile - Ground



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*Do not go by oral tradition, by lineage of teaching, by hearsay, by a collection of texts, by logic, by inferential reasoning, by reasoned cognition, by the acceptance of a view after pondering it, by the seeming competence of a speaker, or because you think, “this . . . is our teacher.”*

*But when you know for yourselves, “these things are wholesome, these things are blameless; these things are praised by the wise; these things, if undertaken and practiced, lead to welfare and happiness,” then you should engage in them.*

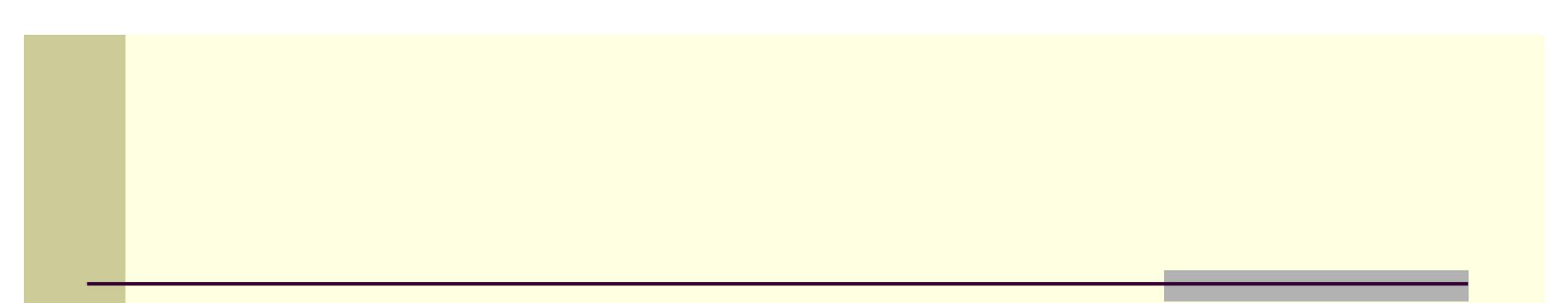
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*We ask, "What is a thought?"*

*We don't know,*

*yet we are thinking continually.*

Venerable Tenzin Palmo



# **Neural Factors of Mindfulness**

# Basics of Meditation

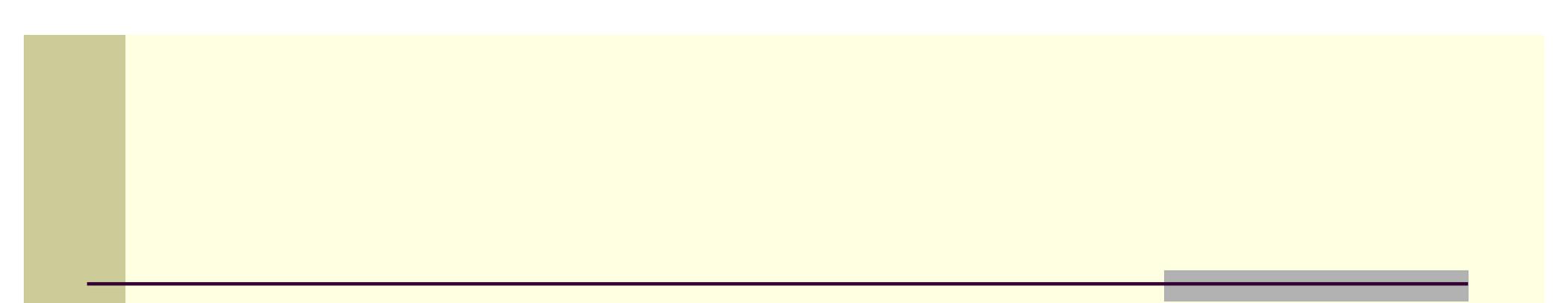
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- Relax; posture that is comfortable and alert
- Simple good will toward yourself
- Awareness of your body
- Focus on something to steady your attention
- Accepting whatever passes through awareness
- Gently settling into peaceful well-being

# 7 Neural Factors of Mindfulness

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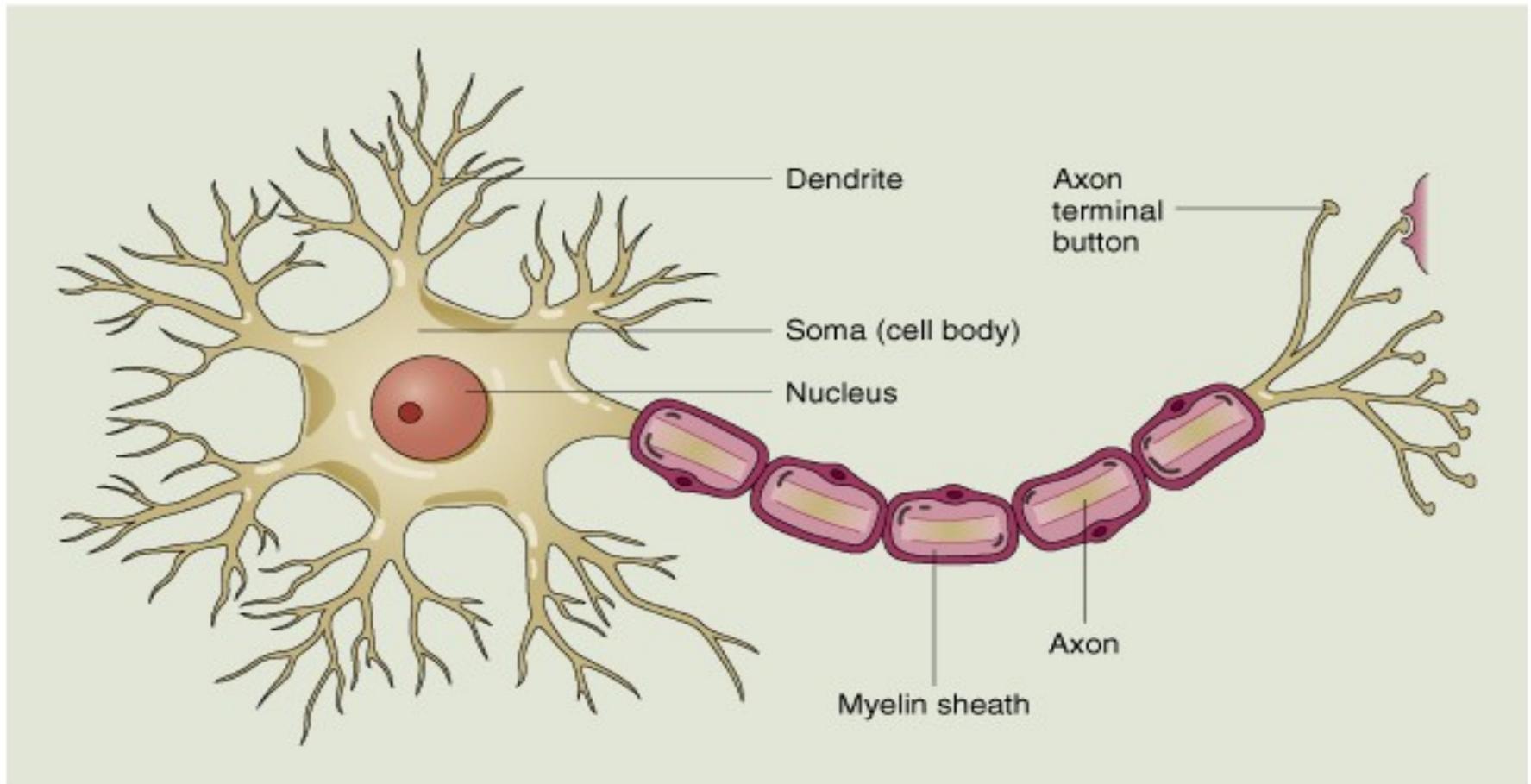
- **Setting an intention** - “top-down” frontal, “bottom-up” limbic
- **Relaxing the body** - parasympathetic nervous system
- **Feeling cared about** - social engagement system
- **Feeling safer** - inhibits amygdala/ hippocampus alarms
- **Encouraging positive emotion** - dopamine, norepinephrine
-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



# **Using Your Mind to Change Your Brain**



# A Neuron



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# Mental States Become Neural Traits

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- The nervous system represents, stores, operates upon, and communicates *information*. This is the “mind,” which is mainly outside awareness.
- How neural activity becomes conscious experience remains a mystery - but there is no doubt that mental and neural activity co-arise.
- As the mind changes, the brain changes - both temporarily and in lasting ways.

# Fact #1

As your brain changes, your mind changes.



# Ways That Brain Can Change Mind

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- 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

# Fact #2

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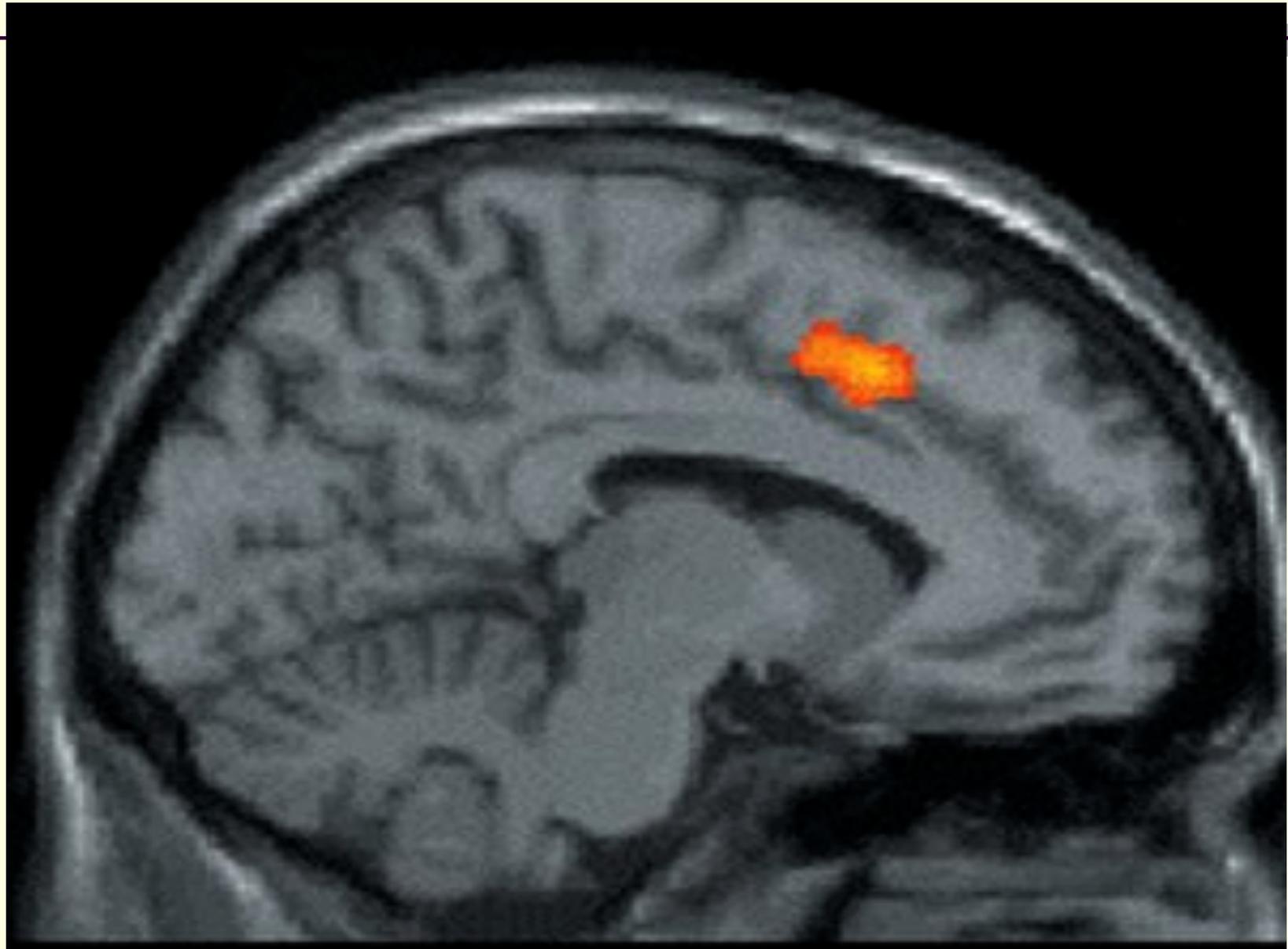
## As your mind changes, your brain changes.

Immaterial mental activity co-occurs with, correlates with material neural activity.

This produces temporary changes in your brain and lasting ones. *Temporary* changes include:

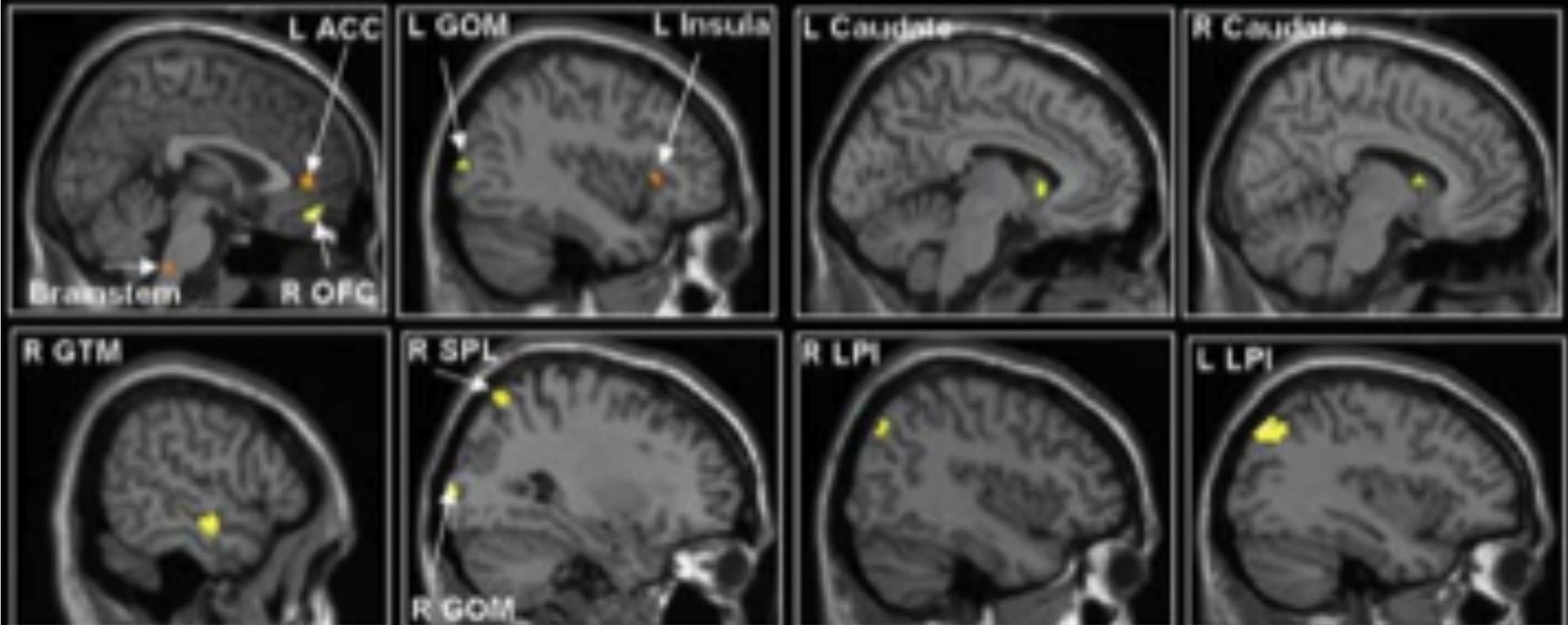
- Alterations in brainwaves (= changes in the firing patterns of synchronized neurons)
- Changing consumption of oxygen and glucose
- Ebbs and flows of neurochemicals

# Tibetan Monk, Boundless Compassion



# Christian Nuns, Recalling a Profound Spiritual Experience

**Mystical > Baseline**

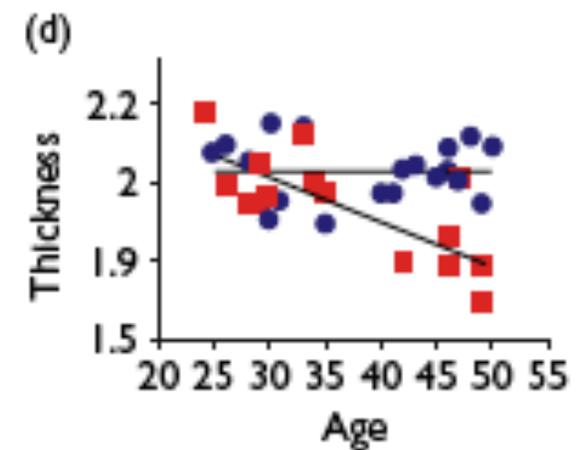
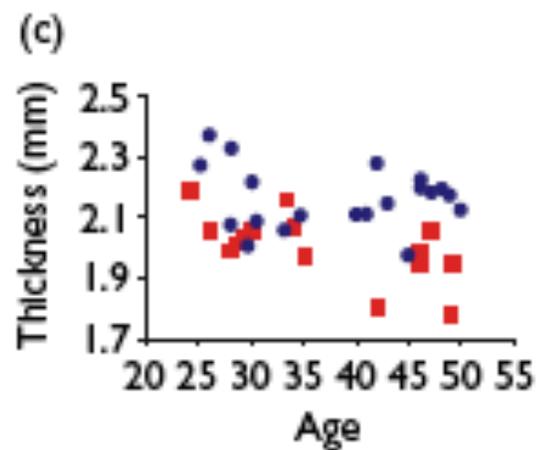
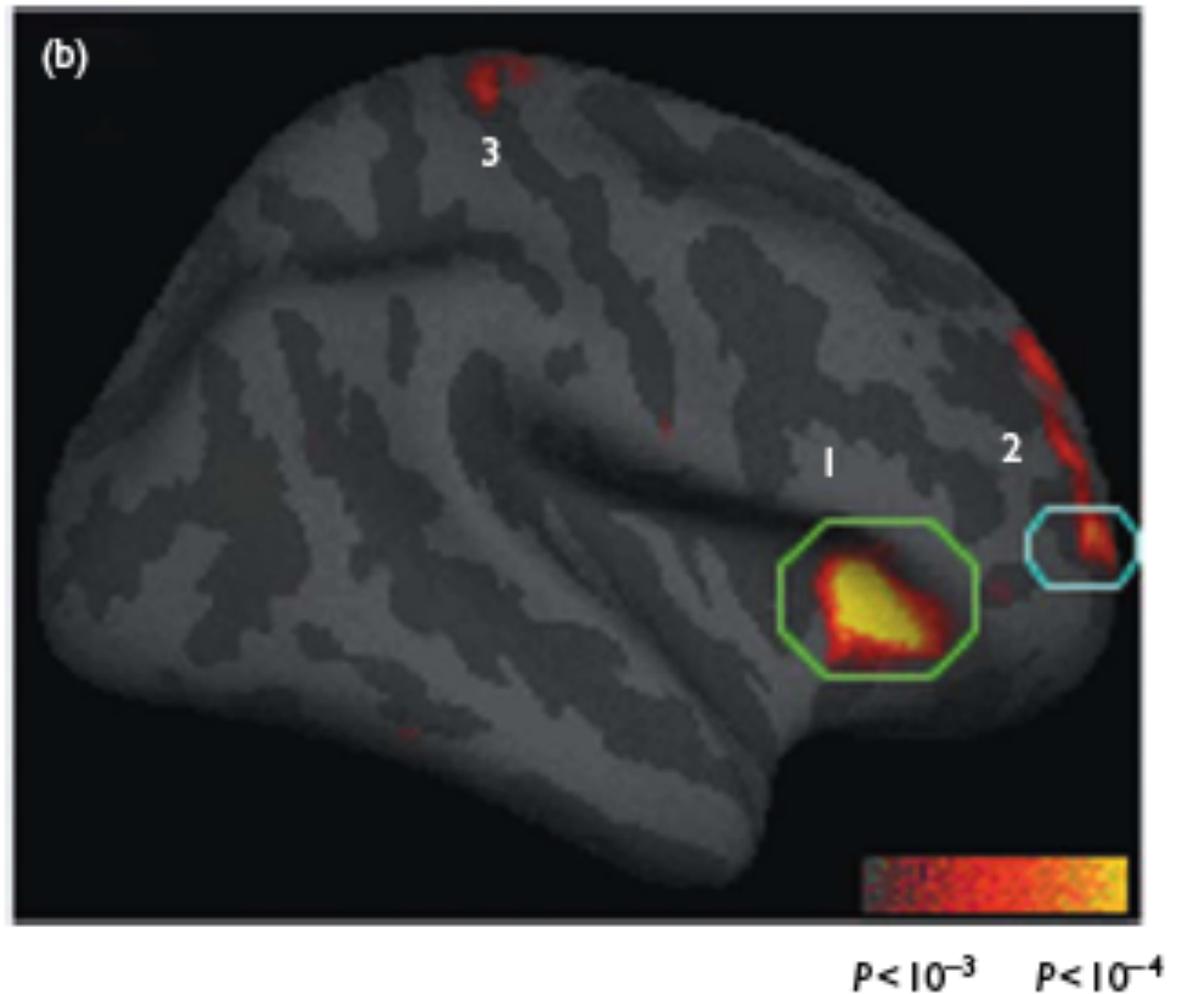


# Mind Changes Brain in Lasting Ways

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- 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”

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



# Meditation - Neural Benefits

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- 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

# Honoring Experience

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**Your experience *matters*.**

**Both for how it feels in the moment  
and for the lasting residues it leaves behind,  
woven into the fabric of your brain and being.**

# Fact #3

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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 Attention

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- Attention is like a spotlight, illuminating its object.
- Because neuroplasticity is heightened for what's in the field of focused awareness, attention is also like a vacuum cleaner, pulling its contents into the brain.
- Directing attention skillfully is therefore a fundamental way to shape the brain - and one's life over time.
- One of the many benefits of mindfulness training is the development of skillful attention.

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

William James

# The Three Great Ways To Engage the Mind

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- The great bird of practice has two wings: *being with* and *working with* the mind.
  - *Working with* reduces negative and increases positive.
  - In sum: Let be, let go, let in.
- *Being with* is fundamental, but not all of practice:
  - As a state, it is not peace, happiness, love, or wisdom.
  - As a factor, it needs virtue, wisdom, compassion, etc.
  - *Being with* and *working with* are synergistic; they can co-arise without interfering with each other.
- And often we need to *work with* the mind to build up inner resources for *being with* it.

# Cultivation Undoes Craving

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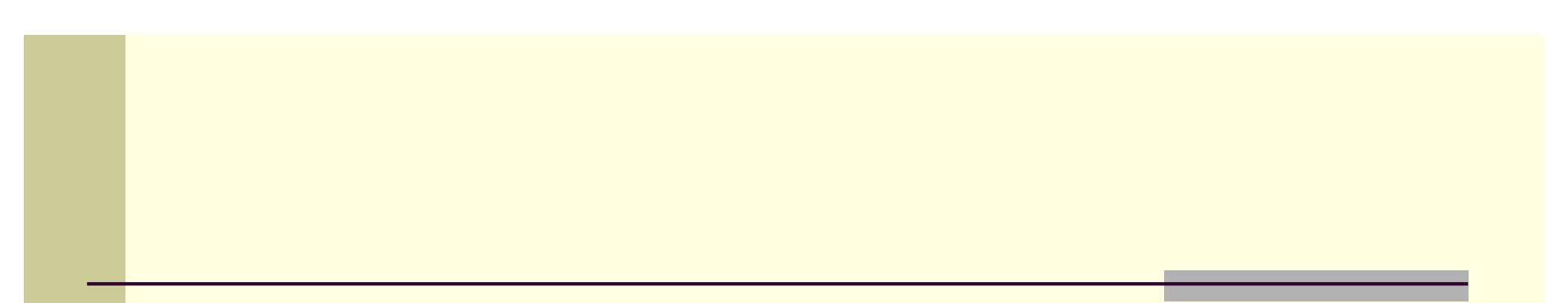
- All life has goals. The brain continually seeks to avoid harms, approach rewards, and attach to others - even that of a Buddha.
- It is wholesome to wish for the happiness, welfare, and awakening of all beings - including the one with your nametag.
- We rest the mind upon positive states so that the brain may gradually take their shape. This disentangles us from craving as we increasingly rest in a peace, happiness, and love that is independent of external conditions.
- With time, even the practice of cultivation falls away - like a raft that is no longer needed once we reach the farther shore.



*Know the mind.*

*Shape the mind.*

*Free the mind.*



# **Being on Your Own Side**

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*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

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*The root of compassion is  
compassion for oneself.*

Pema Chodron

# Self-Compassion

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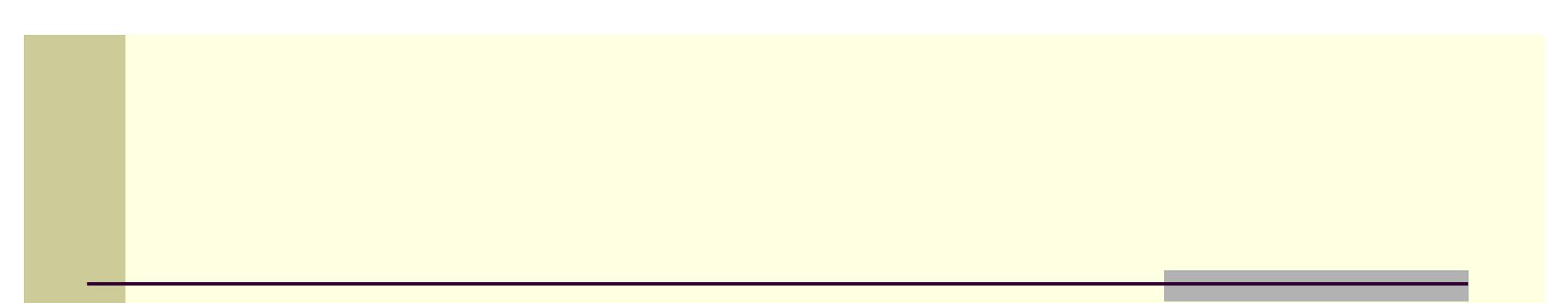
- Compassion is the wish that a being not suffer, combined with sympathetic concern. Self-compassion simply applies that to oneself. It is not self-pity, complaining, or wallowing in pain.
- Studies show that self-compassion buffers stress and increases resilience and self-worth.
- But self-compassion 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
  - 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.”

# “Anthem”

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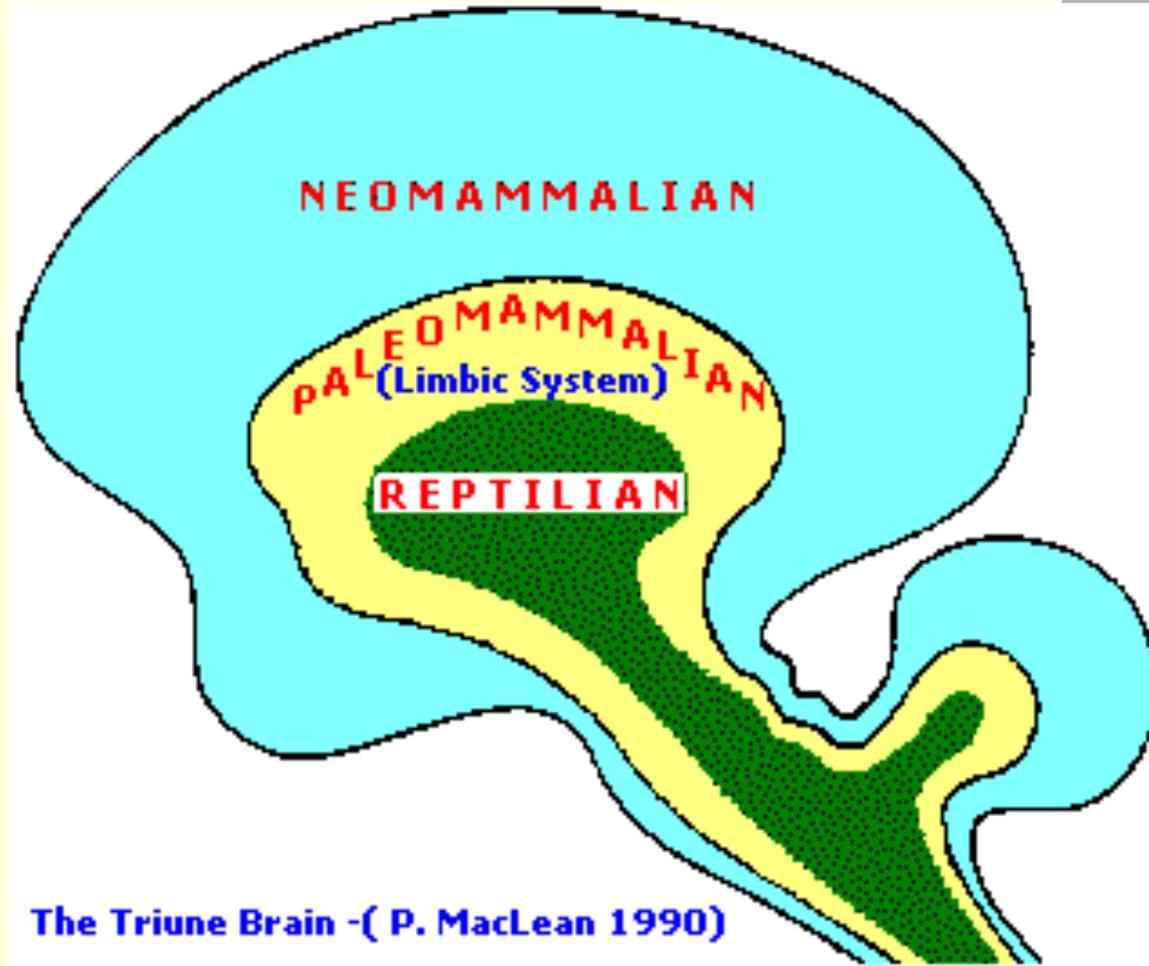
*Ring the bells that still can ring  
Forget your perfect offering  
There is a crack in everything  
That's how the light gets in  
That's how the light gets in*

Leonard Cohen



# **The Evolving Brain**

# Evolutionary History



## The Triune Brain

# Three Stages of Brain Evolution

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## ■ Reptilian:

- Brainstem, cerebellum, hypothalamus
- Reactive and reflexive
- **Avoid** hazards

## ■ Mammalian:

- Limbic system, cingulate, early cortex
- Memory, emotion, social behavior
- **Attain** rewards

## ■ Human:

- Massive cerebral cortex
- Abstract thought, language, cooperative planning, empathy
- **Attach** to “us”

# Three Fundamental Motivational and Self-Regulatory Systems

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## ■ Avoid Harms:

- Primary need, tends to trump all others
- Functional in first animals, in brainstem

## ■ Approach Rewards:

- Functional in first animals, in brainstem
- Elaborated via sub-cortex in mammals for emotional valence, sustained pursuit, etc.

## ■ Attach to Others:

- Functional in mammals and birds, in sub-cortex
- Very elaborated via cortex in humans for pair bonding, language, empathy, cooperative planning, compassion, altruism, etc.



**"With all due respects, I find your disparaging remarks about the 'reptilian brain' unnecessary"**



# The Homeostatic Home Base

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*When not disturbed by threat, loss, or rejection:*

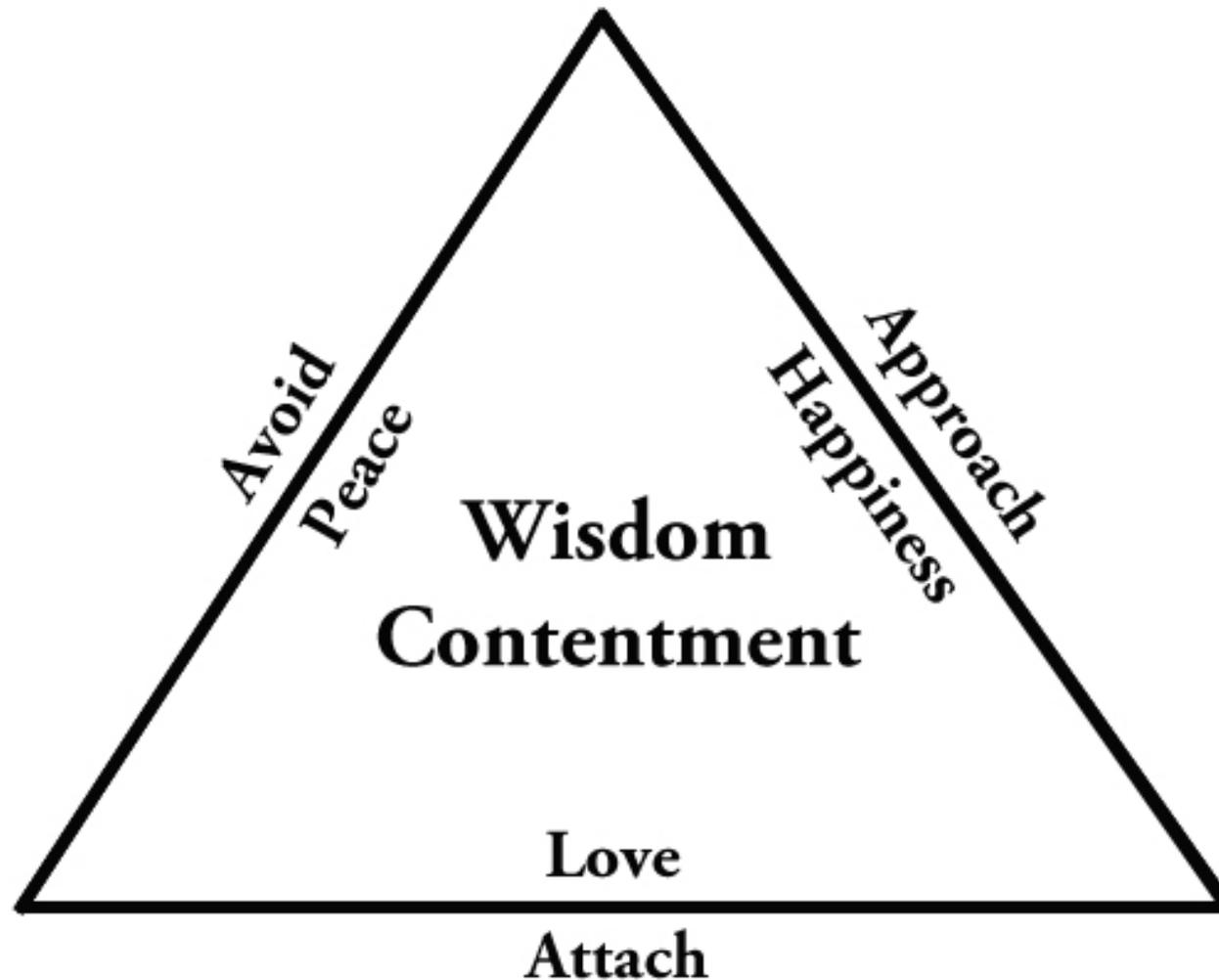
The body defaults to a sustainable equilibrium of refueling, repairing, and pleasant abiding.

The mind defaults to a sustainable equilibrium of:

- **Peace** (the Avoiding system)
- **Happiness** (the Approaching system)
- **Love** (the Attaching system)

This is the brain in its homeostatic ***Responsive*** mode.

# The Responsive Mode





# Behind the Obscurations

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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 forever beyond its reach.”*

Tolkein, *The Lord of the Rings*

# Key Benefits of Responsive Mode

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- Fueling for Reactive mobilizations; recovery after
- Positive emotions, cognitions, and behaviors
- Positive cycles
- Promotes virtue and benevolence

*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

# Coming Home . . .

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**Peace**

**Happiness**

**Love**

# Fired up for Survival

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When disturbed by threat, loss, or rejection:

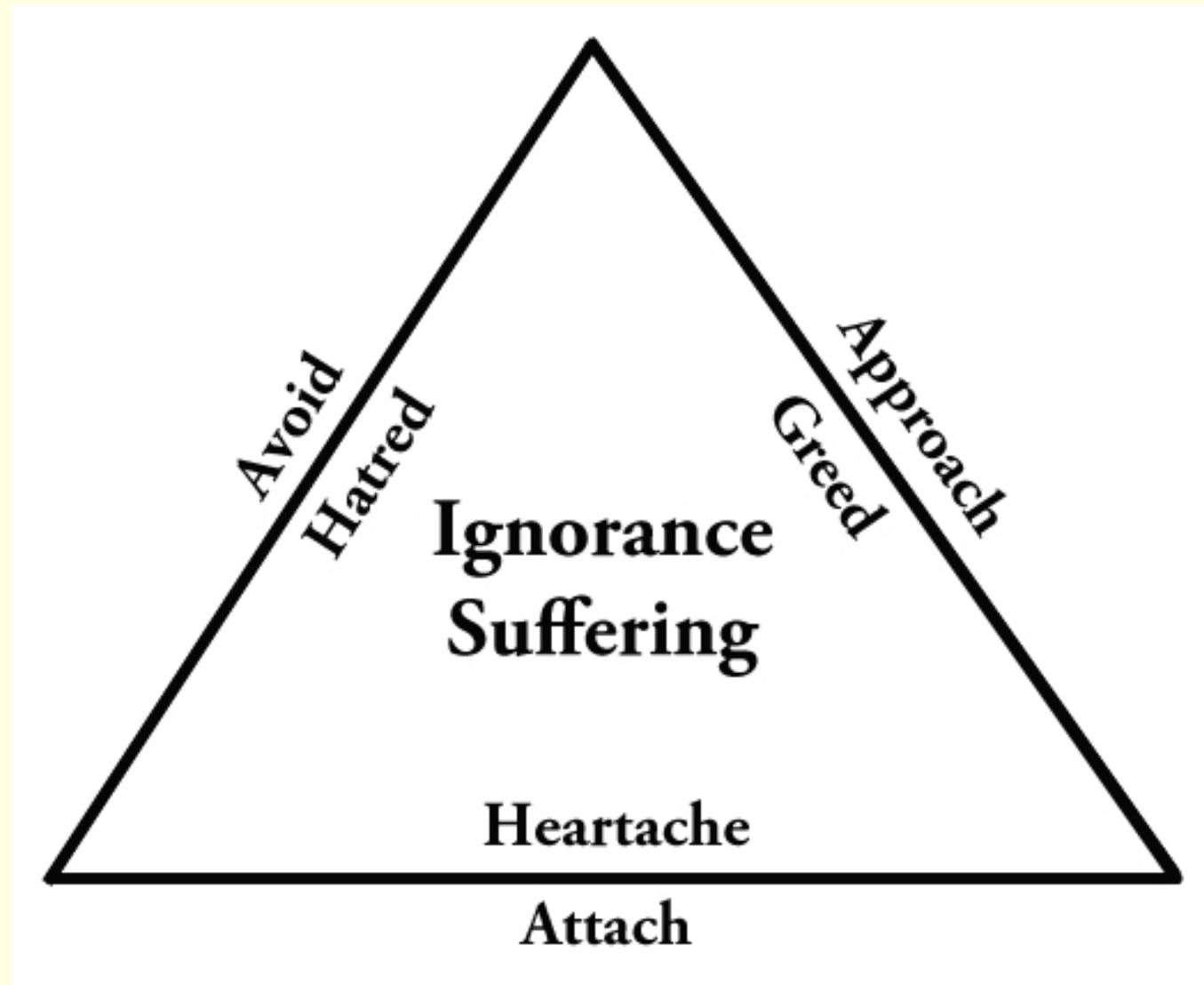
The body fires up into the stress response; resources are burned for immediate needs; long-term building is deferred; outputs exceed inputs; unsustainable.

The mind fires up into:

- **Hatred** (the Avoiding system)
- **Greed** (the Approaching system)
- **Heartache** (the Attaching system)

This is the brain in its allostatic **Reactive** mode.

# The Reactive Mode



# Evolution of the Negativity Bias

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- **Harms** (“sticks”) - Predators, natural hazards, social aggression, pain (physical and psychological)
- **Rewards** (“carrots”) - Food, sex, shelter, social support, pleasure (physical and psychological)
- Avoiding “sticks” usually affects passing on genes more than approaching “carrots.”
  - Urgency - Usually, sticks must be avoided immediately while carrots allow a longer approach.
  - Impact - Often, the presence of a stick ends life while the absence of a carrot does not; if you fail to get a carrot today, you’ll likely have another chance tomorrow, but if you fail to avoid a stick today - whap! - no more carrots forever.

# Negativity Bias: Some Consequences

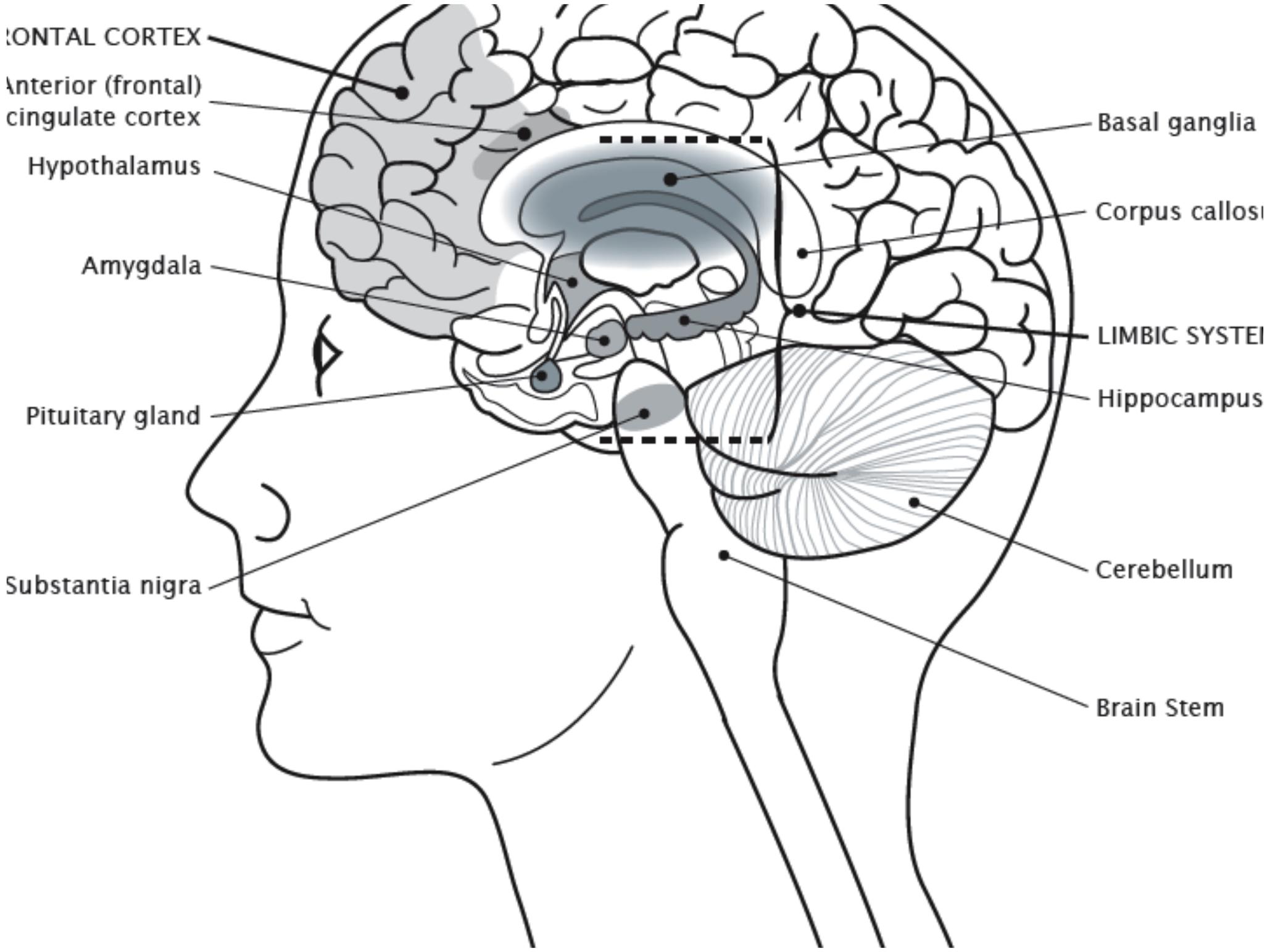
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- Negative stimuli get more attention and processing.
- Easy to create learned helplessness, hard to undo
- Negative interactions: more powerful than positive
- Negative experiences are internalized more efficiently into implicit memory than positive ones.
  - Like Velcro for the negative but Teflon for the positive
  - In life, therapy, meditation, and trainings, activated positive mental states routinely wash through the brain like water through a sieve without getting installed.

# Vicious Cycles in the Brain

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- 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



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# A Major Result of the Negativity Bias: Threat Reactivity

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- Two mistakes:
  - Thinking there is a tiger in the bushes when there isn't one.
  - Thinking there is no tiger in the bushes when there is one.
- We evolved to make the first mistake a hundred times to avoid making the second mistake even once.
- This evolutionary tendency is intensified by temperament, personal history, culture, and politics.
- Threat reactivity affects individuals, couples, families, organizations, nations, and the world as a whole.

# Results of Threat Reactivity (Personal, Organizational, National)

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- Our initial appraisals are mistaken:
  - Overestimating threats
  - Underestimating opportunities
  - Underestimating inner and outer resources
- We update these appraisals with information that confirms them; we ignore, devalue, or alter information that doesn't.
- Thus we end up with views of ourselves, others, and the world that are ignorant, selective, and distorted.

# Costs of Threat Reactivity

## (Personal, Organizational, National)

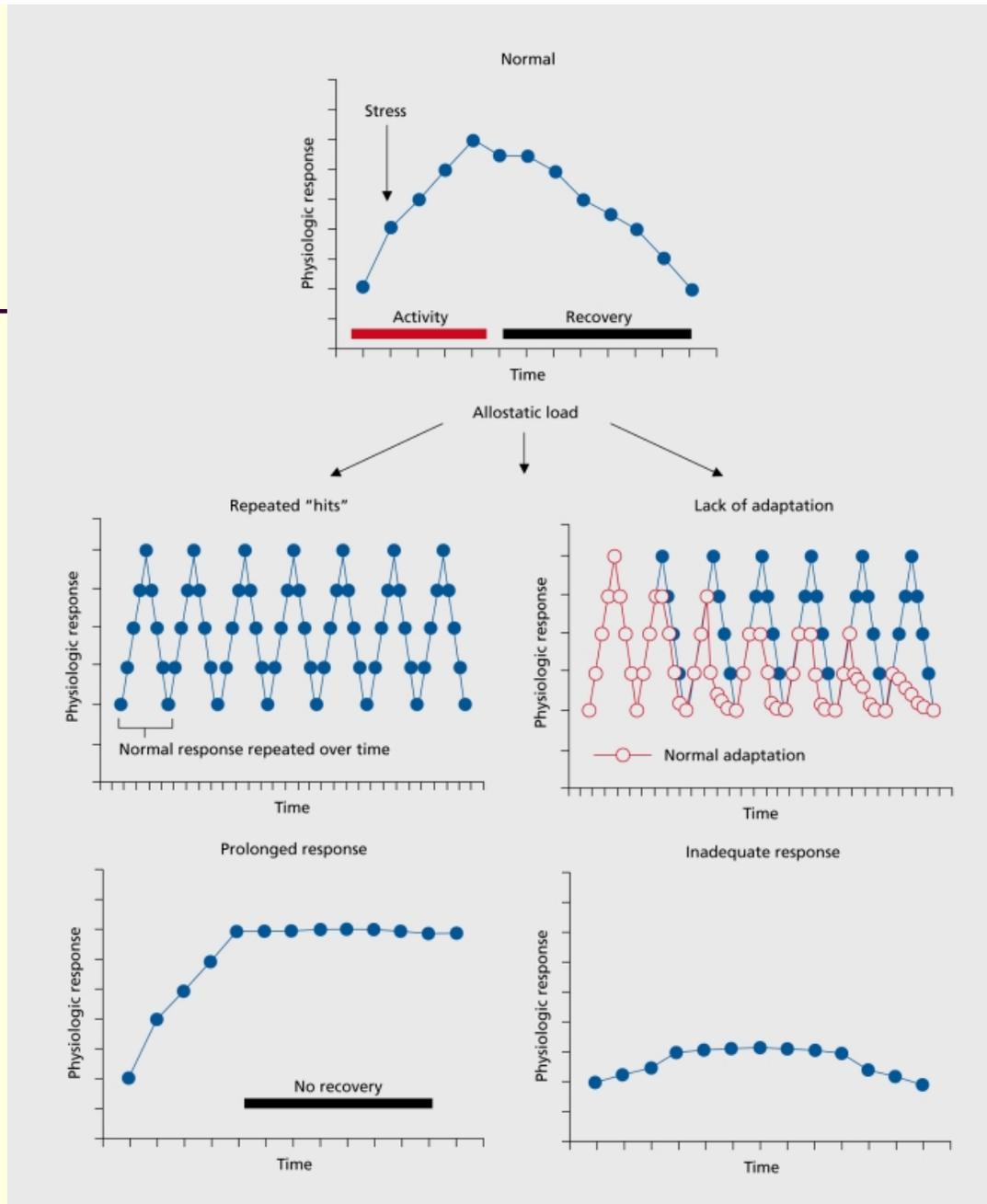
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- Feeling threatened feels bad, and triggers stress consequences.
- We over-invest in threat protection.
- The boy who cried tiger: flooding with paper tigers makes it harder to see the real ones.
- Acting while feeling threatened leads to over-reactions, makes others feel threatened, and creates vicious cycles.
- The Attaining system is inhibited, so we don't pursue opportunities, play small, or give up too soon.
- In the Attaching system, we bond tighter to "us," with more fear<sup>55</sup> and anger toward "them."

# The First and Second Dart

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- The Buddha called unavoidable discomfort the “first dart.”
- Then we add our reactions to it, e.g., anger at hurt.
- Sometimes we react when there’s no first dart at all, simply a condition there’s no need to get upset about.
- And sometimes we react to positive events, such as a compliment or an opportunity.
- The Buddha called these reactions “second darts” - the ones we throw ourselves.



## Adaptive and maladaptive responses to challenges

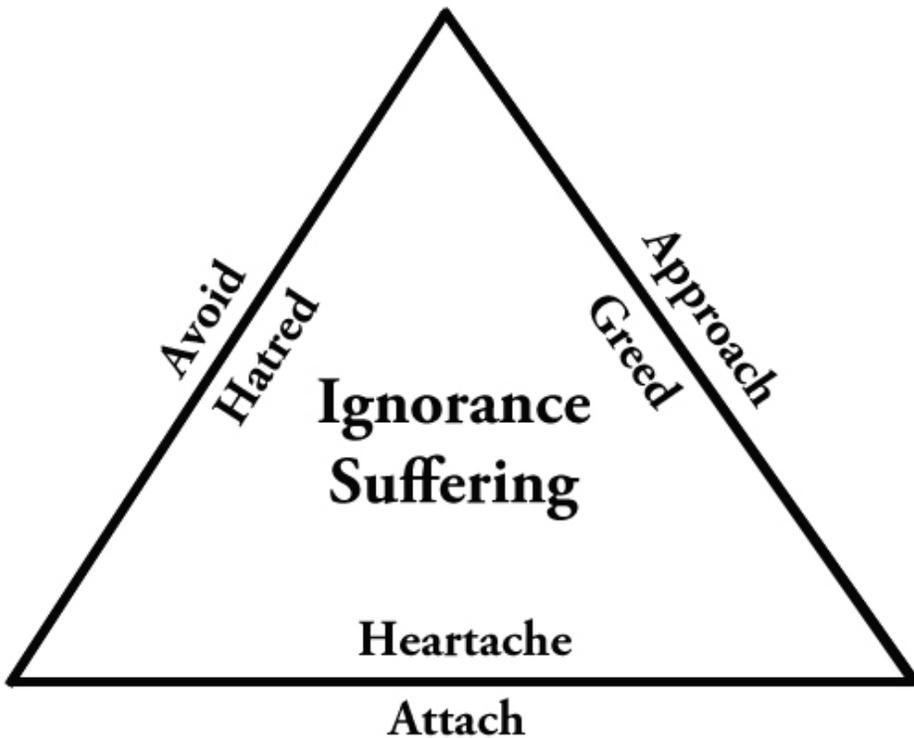
Top panel: adaptive stress response. Lower panels: Top left - repeated stressors, no time for recovery. Top right - adaptation wears out. Bottom left - stuck in stress activation. Bottom right - inadequate stress response.

McEwen, 1998. New England Journal of Medicine, 338:171-179.

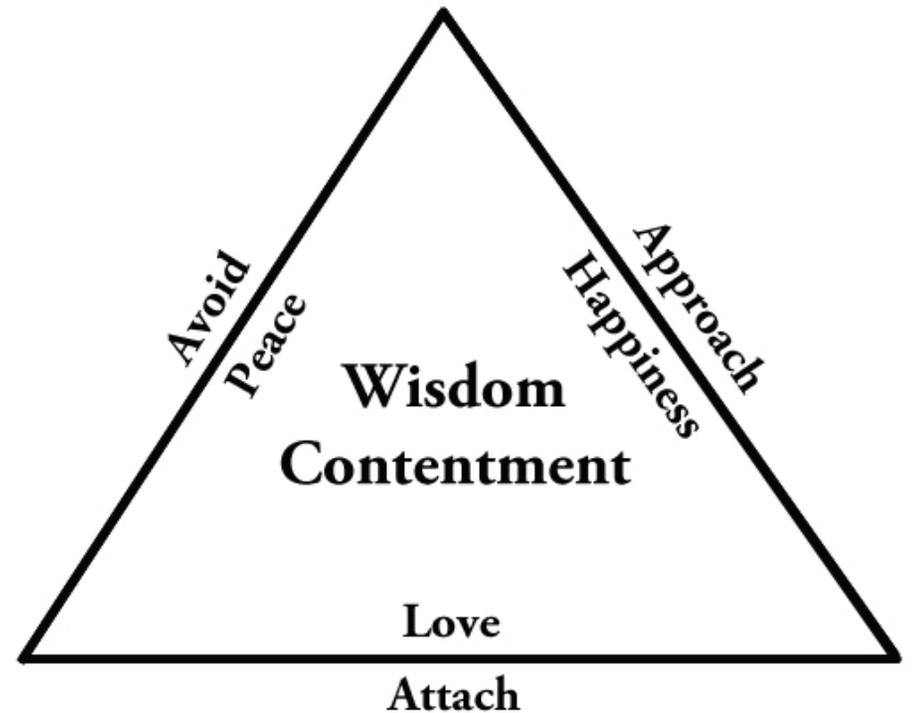
# Choices . . .

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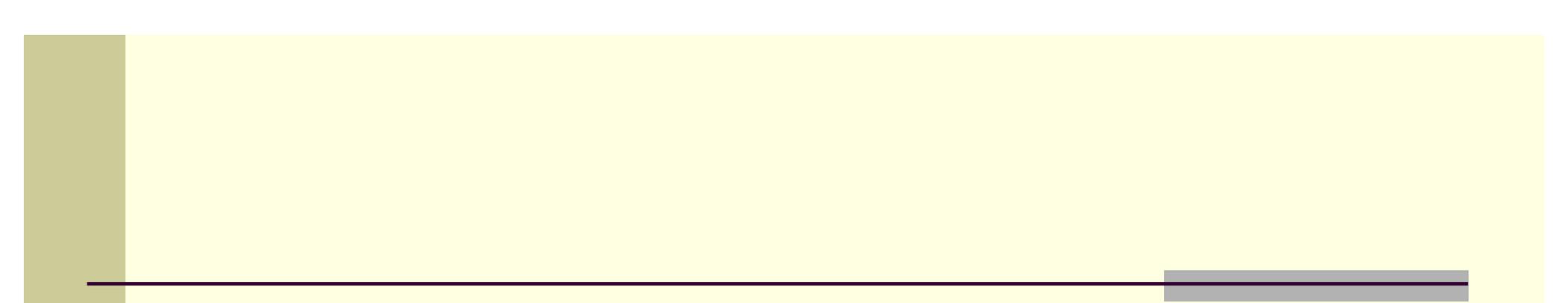
Or?



**Reactive Mode**



**Responsive Mode**



# Cultivation

# How to Take in the Good (TG)

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1. Have a good experience.
  - You are already having one.
  - You deliberately recognize a good fact and let it become a good experience.
2. Extend the good experience in:
  - Time - for 10-20-30+ seconds
  - Space - in your body and feelings
  - Intensity - help it become stronger
3. Absorb the good experience by intending and sensing that is becoming a part of you, woven into the fabric of your brain and being.

# Feeling Alright Right Now

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- Tuning into bodily signals that you're OK
- Recognizing protections
- Not afraid of paper tigers
- Feeling strong

# Feeling Already Full

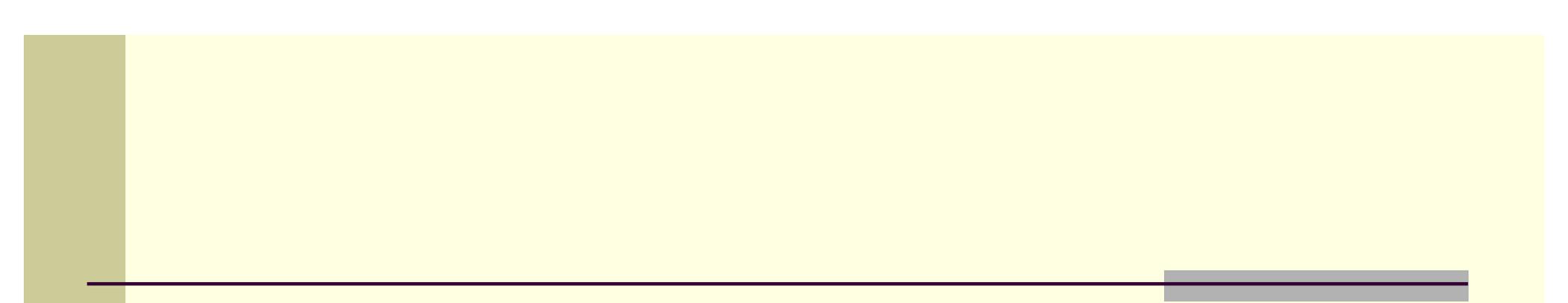
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- Sensing enoughness for the body
- Feeling buoyed and nurtured by the natural world
- Awareness of phenomena filling the mind
- Feeling filled by each moment's arisings even as they pass away.

# Feeling Cared About

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- 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.



# Steadying the Mind

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*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

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*Penetrative insight*

*joined with calm abiding*

*utterly eradicates*

*afflicted states.*

Shantideva

# A Road Map from the Buddha

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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 very stable
- *Quiet* - tranquility; little verbal or emotional activity
- *Singleness* - 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

# Right Concentration

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*“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

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- **Applied attention** - focus on the object
- **Sustained attention** - staying with the object
- **Rapture** - great interest in the object, bliss
- **Joy** - happiness, contentment, and tranquility
- **Singleness** - unification of awareness

# Rapture

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- 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
  - Norepinephrine of SNS arousal (“brightening the mind”)
  - Intense stimulation of “liking” nodes in nucleus accumbens (NA)
  - Intensifies natural opioids of bliss
  - Very high, steady dopamine closes the gate to working memory
  - Norep. and dopamine promote synaptic formation, thus learning.
- 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.

# Joy

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## ■ Experience

- 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

- Moderate stimulation of NA nodes and dopamine; natural opioids of happiness; as tranquility grows, these levels and norep. decline.

## ■ 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.

# Cultivating Singleness

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## ■ Experience

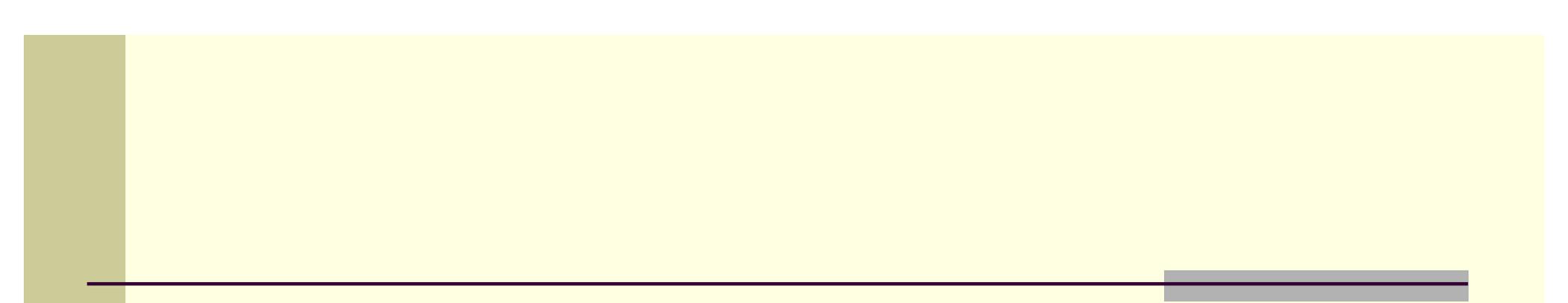
- A sense of all contents of experience appearing as a unified whole, as a single gestalt, moment by moment
- Great collectedness; minimal thought; deep, nearly effortless engagement with the object of attention; non-reactivity; little sense of self

## ■ 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



# Being and Doing

# Dual Modes

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## “Doing”

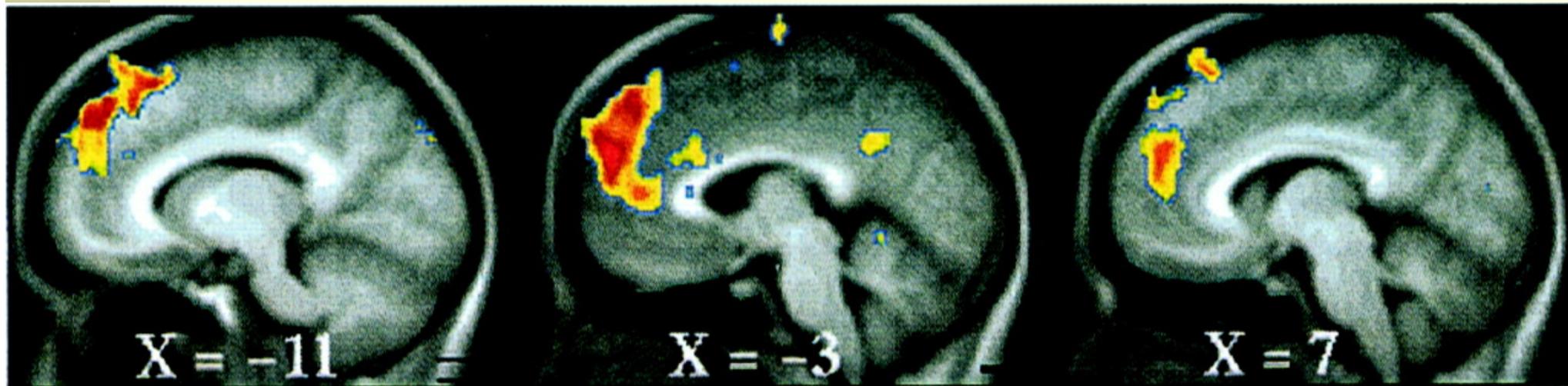
Mainly representational  
Much verbal activity  
Abstract  
Future- or past-focused  
Goal-directed  
Sense of craving  
Personal, self-oriented perspective  
Focal view  
Firm beliefs  
Evaluative  
Lost in thought, mind wandering  
Reverberation and recursion  
Tightly connected experiences  
Prominent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

## “Being”

Mainly sensory  
Little verbal activity  
Concrete  
Now-focused  
Nothing to do, nowhere to go  
Sense of peace  
Impersonal, 3<sup>rd</sup> 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

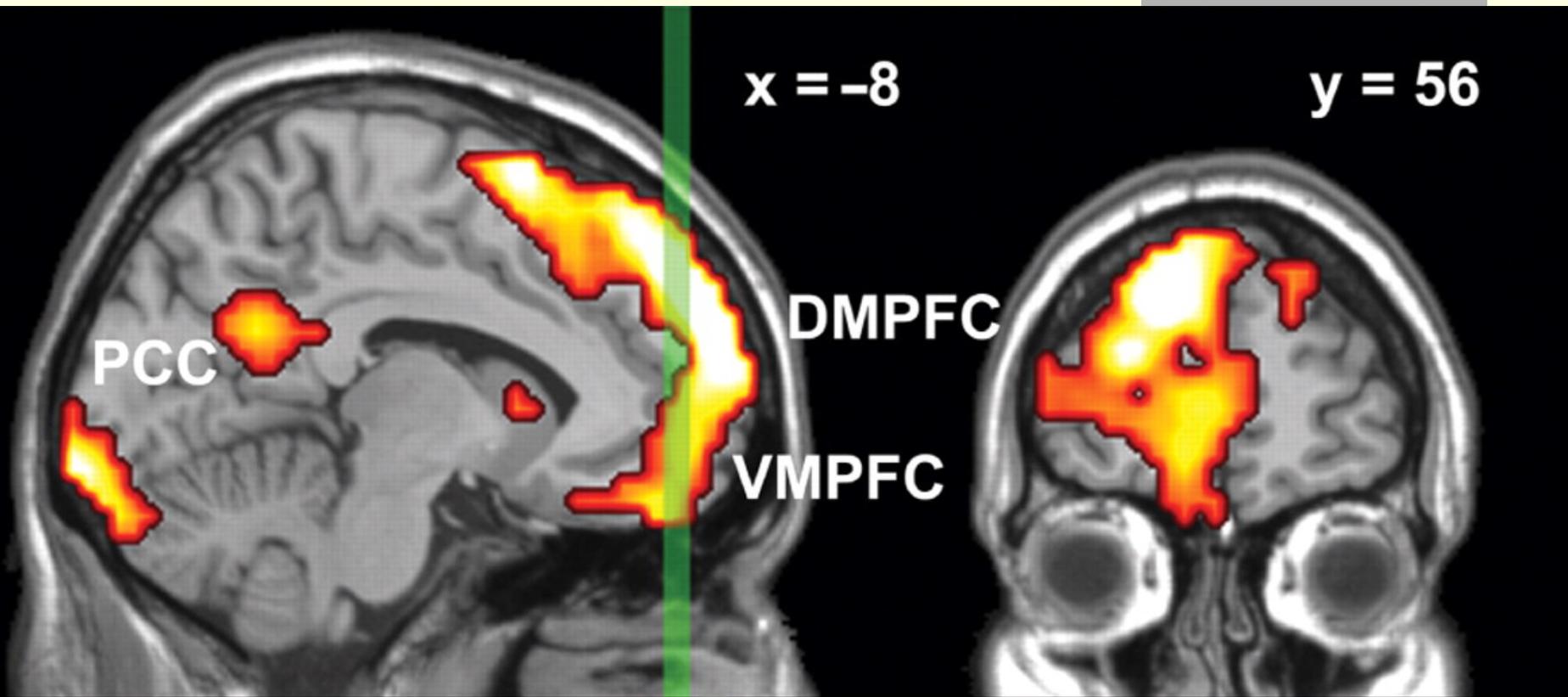
# Increased Medial PFC Activation Related to Self-Referencing Thought

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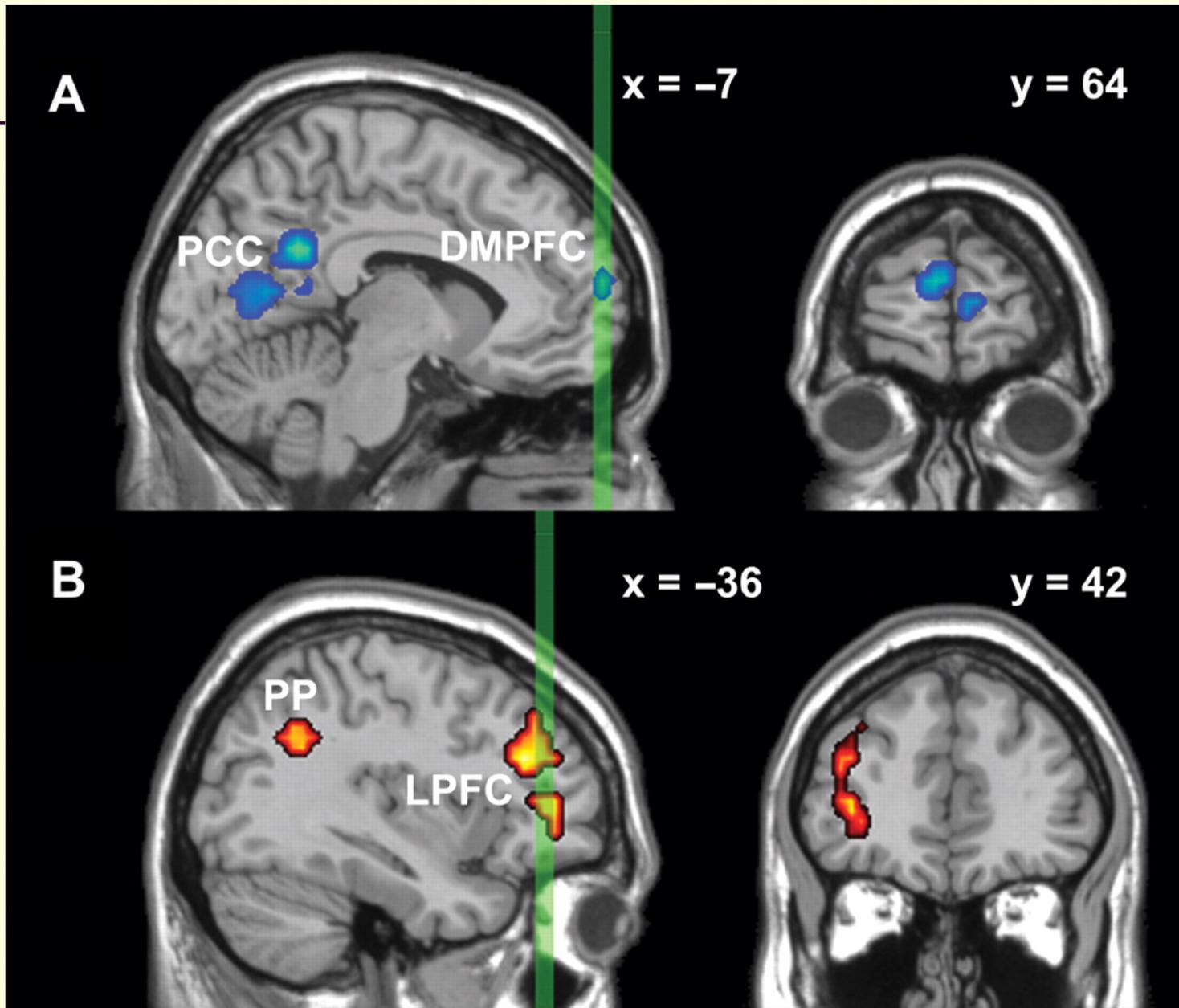
Gusnard D. A., et.al. 2001. *PNAS*, 98:4259-4264

# Cortical Midline Areas for Self-Referencing Thought

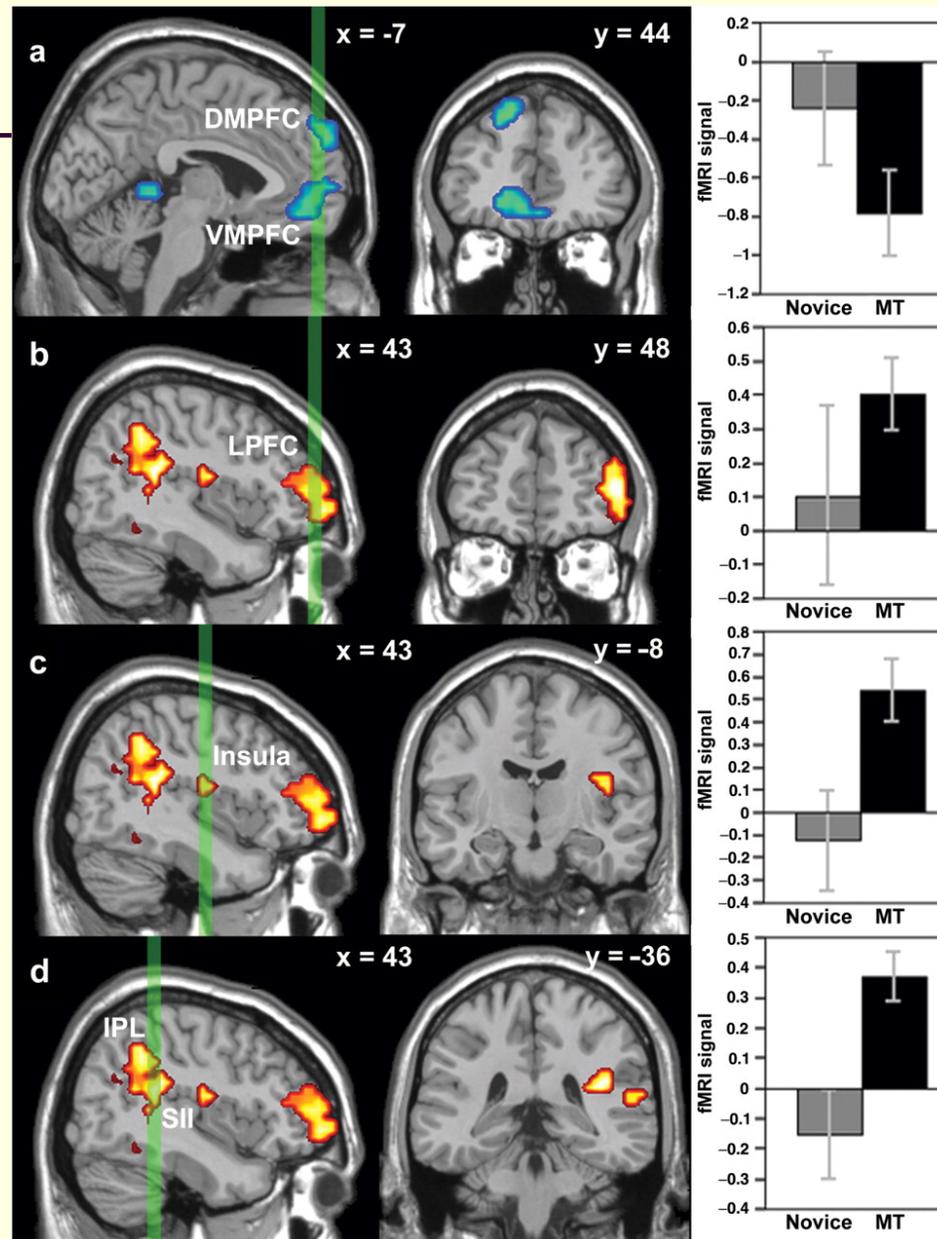


Farb, et al. 2007. *Social Cognitive Affective Neuroscience*, 2:313-322

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



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



# Dual Modes

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## “Doing”

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

## “Being”

Mainly sensory  
Little verbal activity  
Concrete  
Now-focused  
Nothing to do, nowhere to go  
Sense of peace  
Impersonal, 3<sup>rd</sup> 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

# Ways to Activate “Being” Mode

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- Relax
- Focus on bare sensations and perceptions
- Sense the body as a whole
- Take a panoramic, “bird’s-eye” view
- Engage “don’t-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

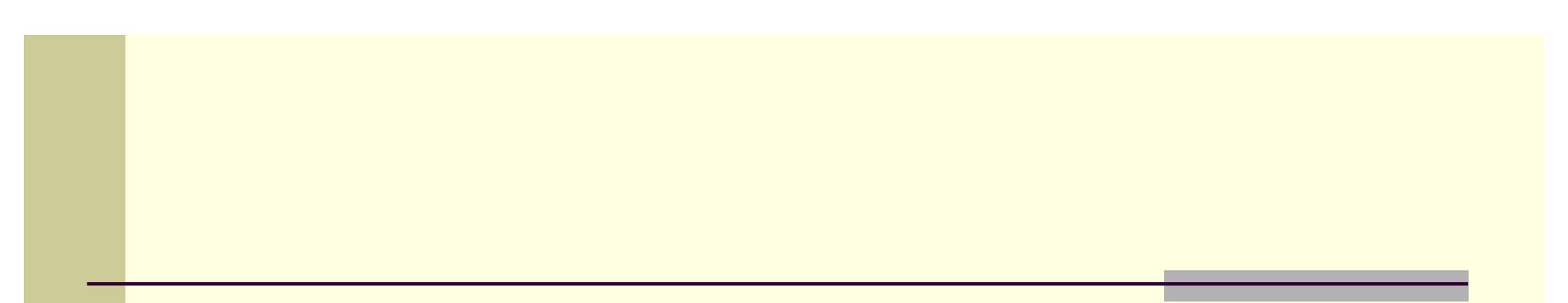
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- Sense the breath in one area (e.g., chest, upper lip)
- Sense the breath as a whole: one gestalt, percept
- Sense the body as a whole, a whole body breathing
- Sense experience as a whole: sensations, sounds, thoughts . . . all arising together as one unified thing
- It's natural for this sense of the whole to be present for a second or two, then crumble; just open up to it again and again.

# Panoramic Awareness

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- Recall a bird's-eye view (e.g., mountain, airplane)
- Be aware of sounds coming and going in an open space of awareness, without any edges: boundless
- Open to other contents of mind, coming and going like clouds moving across the sky.
- Pleasant or unpleasant, no matter: just more clouds
- No cloud ever harms or taints the sky.



**No “Self,” No Problem**

# Definitions

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- **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”
  - 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?”
  - The apparent owner of experiences and agent of actions
- **Awareness** - The field in which the mind (as yet mysteriously) represents aspects of the mind to itself
  - “Global workspace” in which representations of the person, self-related functions, and subjectivity arise and pass away<sup>84</sup>

# Conventional Notions of “Self”

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- **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”

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- **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.

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*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.*

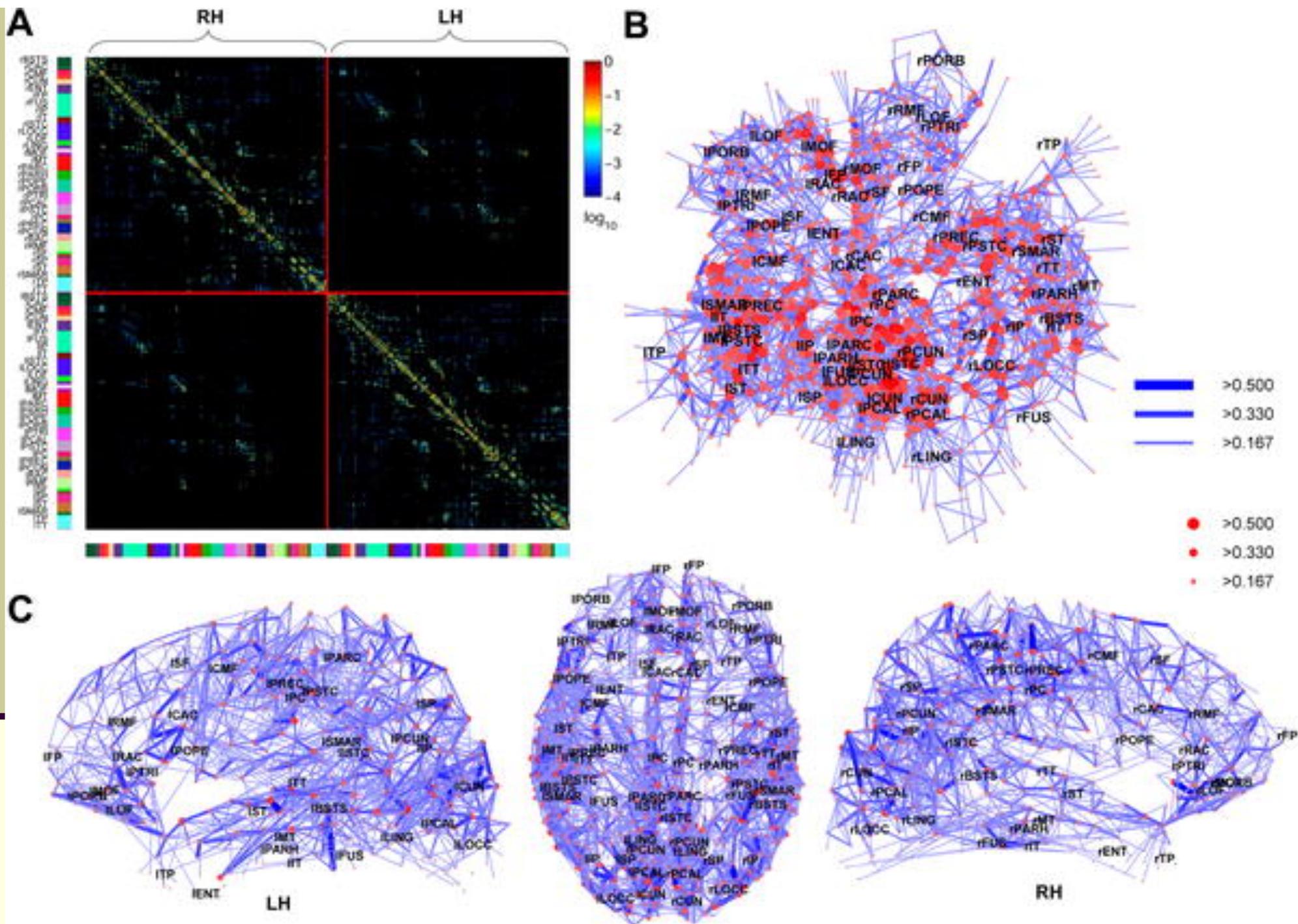
*By maintaining a separate self-sense, it attempts to provide a haven of security.*

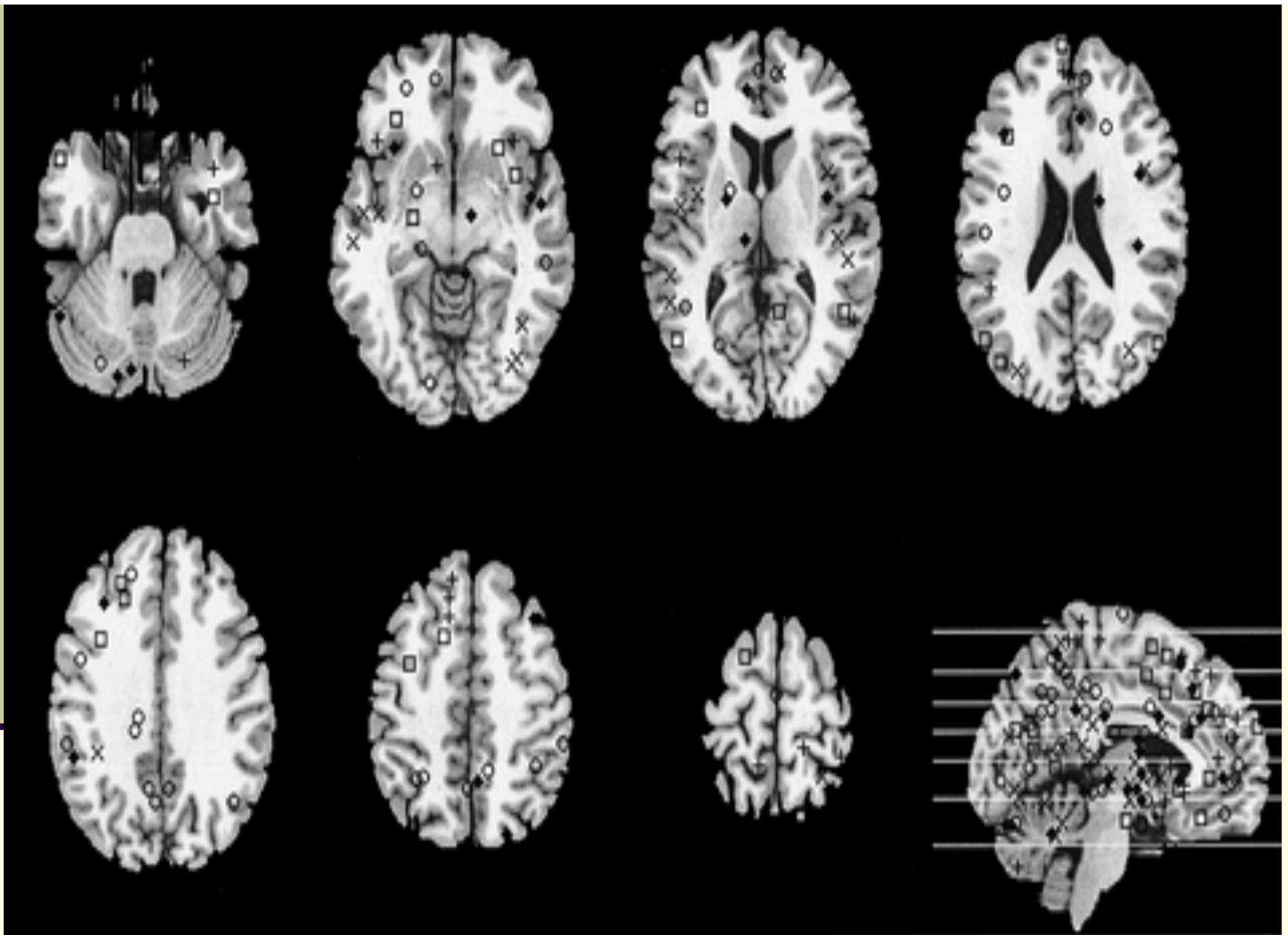
*Yet the very boundaries that create a sense of safety also leave us feeling cut off and disconnected.*

# Actual Experience of “Self”

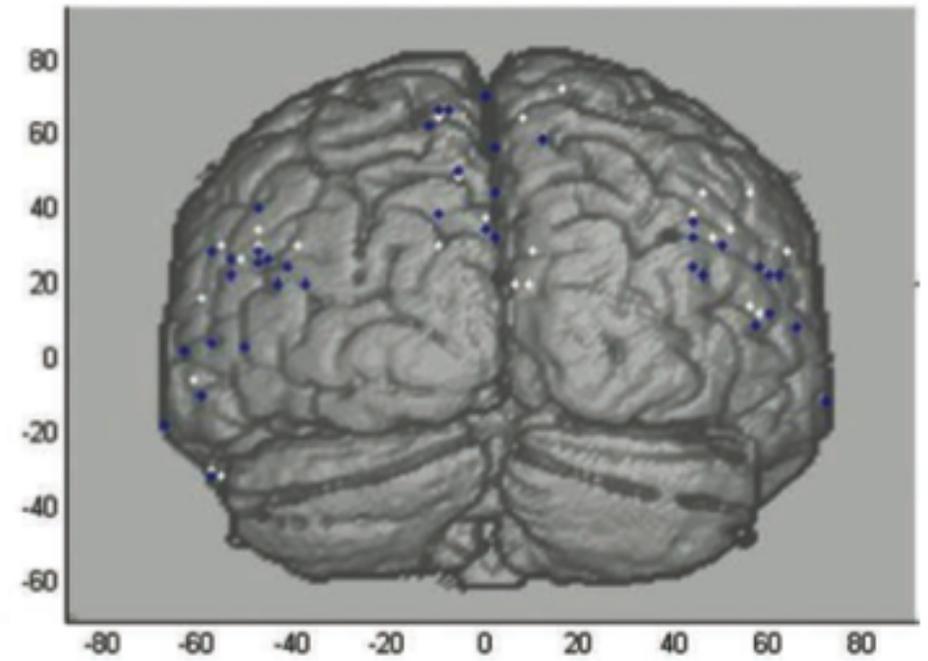
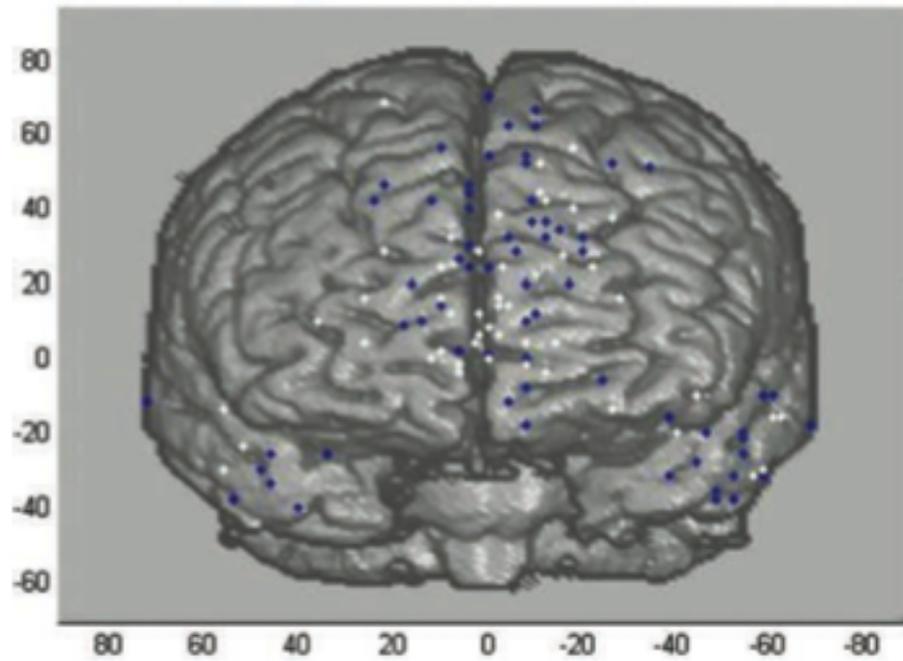
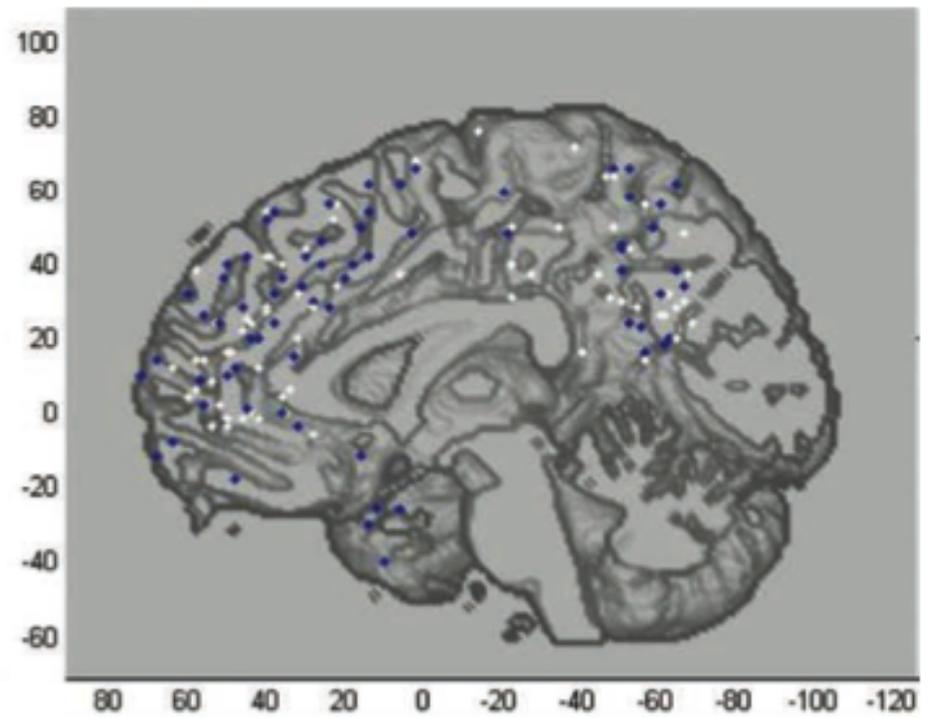
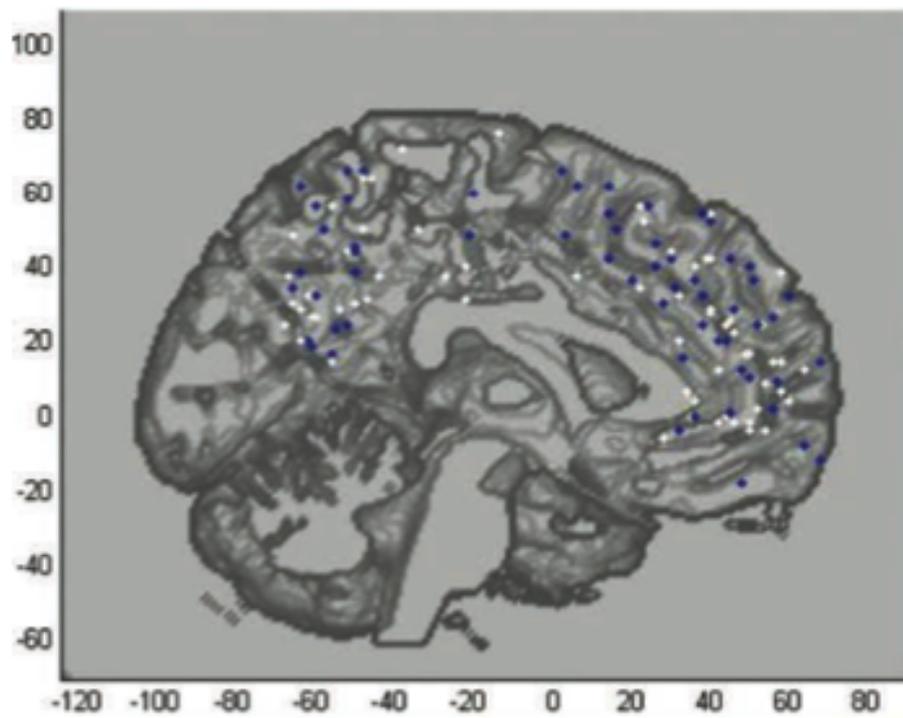
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- **Part of the person** – There is awareness of aspects of self as contents within awareness like any others.





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



Legrand & Ruby, 2009. What is self-specific? [White = self; blue = other]<sup>91</sup>

# Properties of Self in Your Brain

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- **Compounded** – Distributed systems and sub-systems; no homunculus looking through your eyes
- **Impermanent** – Activations are fluid, transient
- **Dependent** – Needs neural structures, processes; based on evolution; affected by stimuli
- **Part of the person** – “Self”-related activations are just a tiny fraction of the total activations in the brain
  - The neural circuitry associated with “self” functions or representations also performs many other activities.
  - In the brain, self is not special.

# Subjectivity Doesn't Equal a Subject

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- 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?

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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

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- 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.<sup>95</sup>

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*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.*

Venerable Bhikkhu Bodhi

# Selfing Leads to Suffering

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- 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.

*No self,  
no problem*

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*Blissful is passionlessness in the world,  
The overcoming of sensual desires;  
But the abolition of the conceit I am --  
That is truly the supreme bliss.*

The Buddha, Udāna 2.11

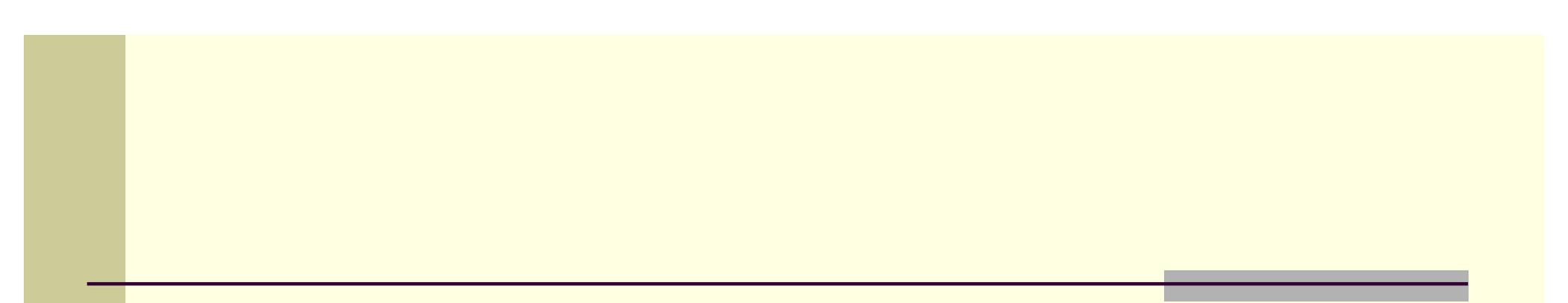
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*To study the Way is to study the self.*

*To study the self is to forget the self.*

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

Dogen



# **Filling the Hole in the Heart**

# Feeding the Hungry Heart

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- Healthy development requires caregivers to give a child extensive mirroring, attunement, and prizing; healthy adult relationships require much the same.
- These are normal “narcissistic supplies.” Deficits lead to:
  - Feelings of inadequacy, worthlessness, and shame
  - Tendencies toward extremes of clinging or distance
- As an adult, you can take in narcissistic supplies, gradually weaving them into your brain and your being.
- This is not clinging to praise, etc. It is filling the hole in your heart so your happiness is increasingly unconditional - not dependent on external events.

# Feeling Prized

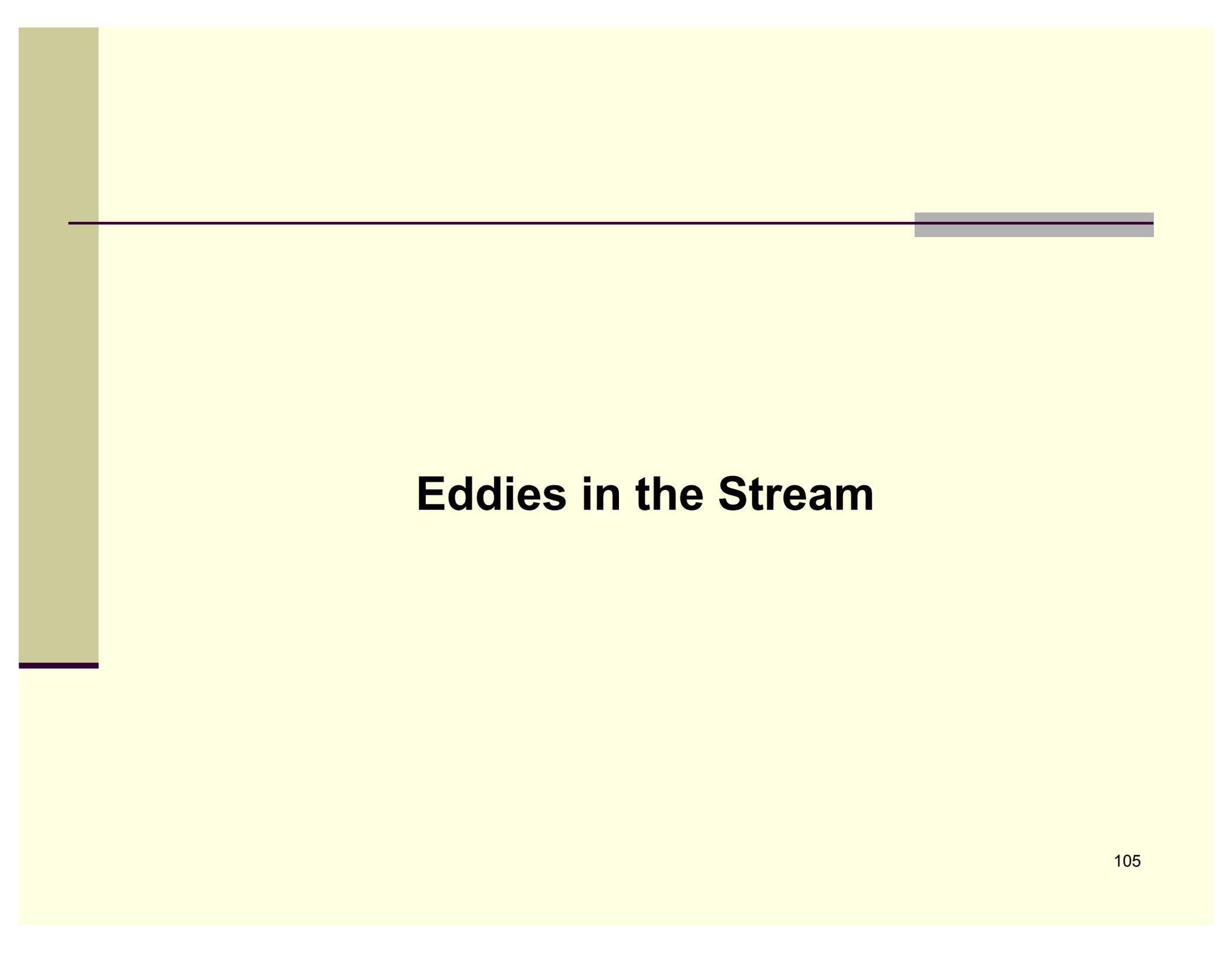
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- It is natural and important to feel that your person is special to others: appreciated, acknowledged, respected, cherished, prized.
  
- Bring to mind experiences of:
  - Being praised, complimented, acknowledged
  - A time you knew you were appreciated, perhaps after some contribution or generosity
  - Being wanted by someone; wanted by a group
  - Feeling cherished by someone
  
- In daily life, look for experiences of being prized, including in small ways, and then savor them so they sink in.

# Feeling Like a Good Person

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- Everyone has good qualities. No halo is required to have patience, determination, fairness, honesty, kindness, etc.
- Recognizing these qualities in yourself is simply seeing reality with clear eyes, just like recognizing good food in your cupboard or good qualities in another person.
- Methods:
  - Pick a good quality that you know you have.
  - Pay attention to any obstructions to recognizing and appreciating this good quality. Let them be . . . then let them go and return attention to the good quality.
  - Gather evidence for this good quality in you (e.g., examples).
  - Be mindful of what the good quality feels like in your body and mind; let it sink in.
  - Consider how this good quality contributes to yourself and others.
  - Open to a simple gladness for this good quality; let it sink in.



# **Eddies in the Stream**

# “Bahiya, you should train yourself thus.”

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*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.*

# Common Nature of Matter and Mind

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- Patterns - eddies - form from matter (including energy, quantum weirdness, etc.): whirlpools, butterflies, and galaxies. Patterns of information (mind) form via assemblies of material synapses.
- These patterns exist only within Now - which is infinitely “thin” yet holds all the causes of the past conditioning the future.
- All patterns are transient, interdependent, and emergent.
- At the leading edge of Now, they are effectively unconditioned.

# The Nature of Awakened Being?

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- Awakened beings (and those far along the path) seem to:
  - abide as the nature of things at the leading edge of Now,
  - embedded in and embodying the ongoing knowing of transience that continually undoes craving and clinging,
  - with a freedom that comes from both that undoing and some sense of the unconditioned.
- This abiding, knowing, undoing, and freedom could be the natural fruit of Nibbana manifesting in the brain - at least in terms of the progression into Nibbana and the return from it.

# Nibbana and the Brain

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- In a recurring description in the dharma, one moves through the eight absorptions (Jhanas) to the point of “cessation.”
- Then - mysteriously - Nibbana “occurs.” After a while, more ordinary consciousness returns, through which the effects of Nibbana continue to ripple, for a lifetime.
- In the brain, these eight steps seem to correspond to a profound quieting of mind and brain: all eddies of information (and their underlying neural assemblies) disperse in awareness so that there is only fertile noise.
- At that point, the person is utterly present with the bare nature of matter and mind - the realization of which is transforming.

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*For one who clings motion exists, but for one who does not  
cling there is no motion.*

*Where no motion is, there is stillness.*

*Where stillness is, there is no craving.*

*Where no craving is, there is neither coming nor going.*

*Where no coming or going is there is neither arising nor  
passing away.*

*Where neither arising nor passing away is, there is neither  
this world, nor a world beyond nor a state between.*

*This verily, is the end of suffering.*

# Flashes of Nibbana

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*Actually, when we meditate we do experience little breakthroughs, like tiny flashes of the unconditioned mind. But that's just the beginning of the processes. It's certainly not the end!*

*Wisdom is a huge subject. It 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.*

# Seeing Conditioned and Unconditioned

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- In great quiet and singleness, the constructed, empty nature of experience and the self are readily seen.
- "Behind" it, the ineffable, unnameable true reality can be perceived.

*Like living in a valley surrounded by high mountains.  
Then one day you're standing atop the tallest peak,  
seeing everything from an utterly fresh perspective.  
It's so clear and extraordinary there, yet your life is in the valley.  
And so you come back.  
But that seeing changes you forever.*

# Coming Home . . .

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**Peace**

**Happiness**

**Love**

# Thank you

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*Be still*

*Listen to the stones of the wall*

*Be silent, they try*

*To speak your*

*Name.*

*Listen to the living walls.*

*Who are you?*

*Who*

*Are you? Whose*

*Silence are you?*

Thomas Merton

# Great Books

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See [www.RickHanson.net](http://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.
- Johnson, S. 2005. *Mind Wide Open*. Scribner.
- Keltner, D. 2009. *Born to Be Good*. Norton.
- Kornfield, J. 2009. *The Wise Heart*. Bantam.
- LeDoux, J. 2003. *Synaptic Self*. Penguin.
- Linden, D. 2008. *The Accidental Mind*. Belknap.
- Sapolsky, R. 2004. *Why Zebras Don't Get Ulcers*. Holt.
- Siegel, D. 2007. *The Mindful Brain*. Norton.
- Thompson, E. 2007. *Mind in Life*. Belknap.

# Key Papers - 1

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See [www.RickHanson.net](http://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

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- 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. 117

# Key Papers - 3

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- 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

---

- Rozin, P. & Royzman, E.B. 2001. Negativity bias, negativity dominance, and contagion. *Personality and Social Psychology Review*, 5:296-320.
- 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.

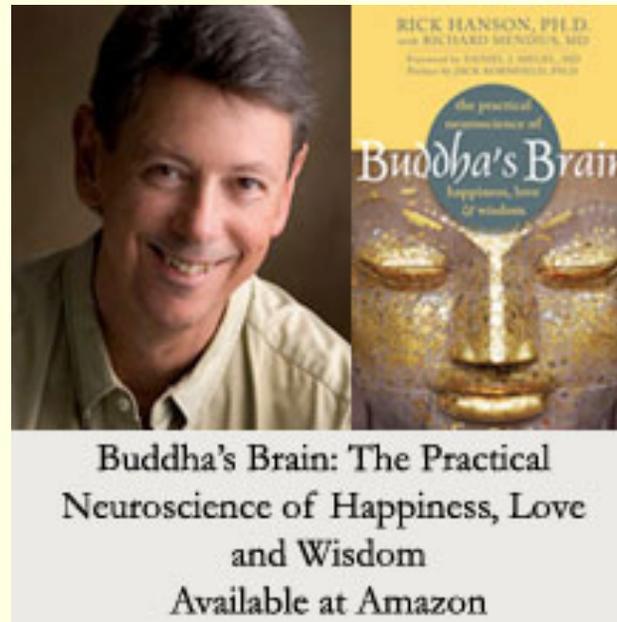
## *Where to Find Rick Hanson Online*

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<http://www.youtube.com/BuddhasBrain>

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