
Taking in the Good

Salesmanship Club Youth and Family Centers
January 28, 2011

Rick Hanson, Ph.D.

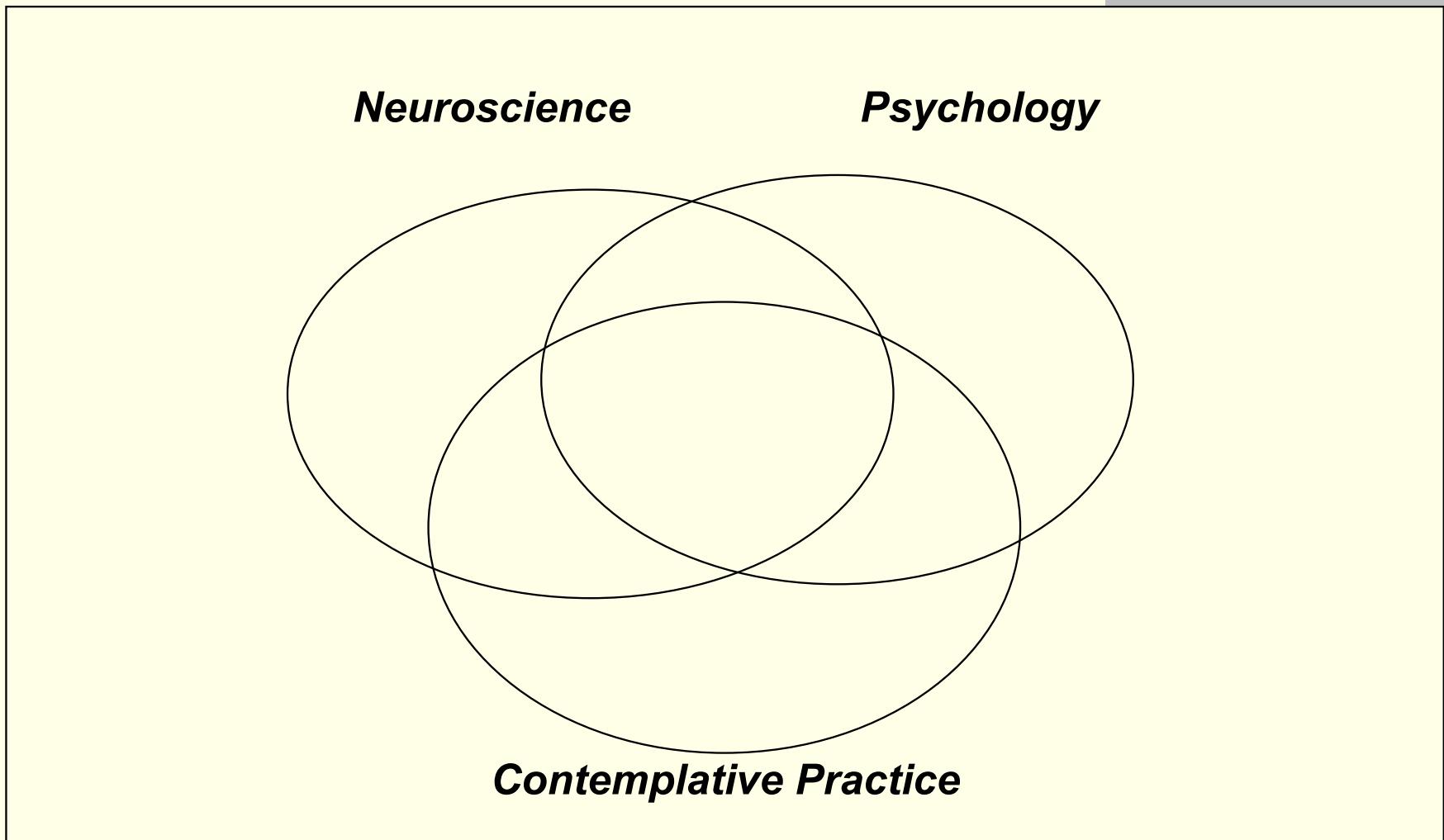
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Topics

- **The promise of self-directed neuroplasticity**
- **The evolving brain - and its challenges today**
- **Implicit memory and inner resources**
- **“Taking in the good” (TIG)**
- **Using TIG to heal emotional pain**

Common - and Fertile - Ground



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

J. Robert Oppenheimer



*When the facts change,
I change my mind, sir.*

What do you do?

John Maynard Keynes

"We ask, 'What is a thought?'

We don't know,

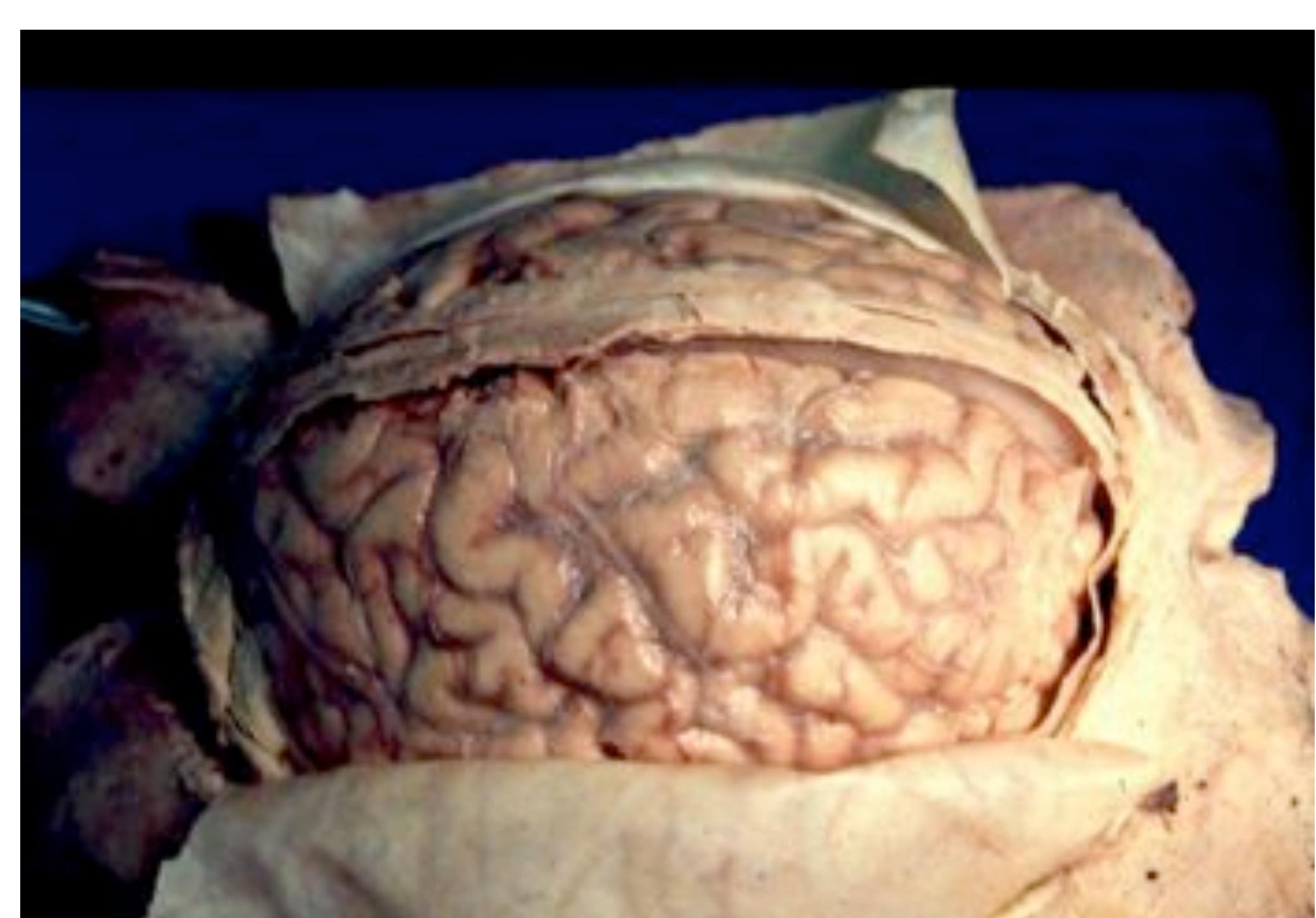
yet we are thinking continually."

Venerable Ani Tenzin Palmo

Domains of Intervention

- We can intervene in three domains:
 - World (including relationships)
 - Body
 - Mind
- All three are important. And they work together.
- We have limited influence over world and body.
- In the mind:
 - Much more influence
 - Changes are with us wherever we go

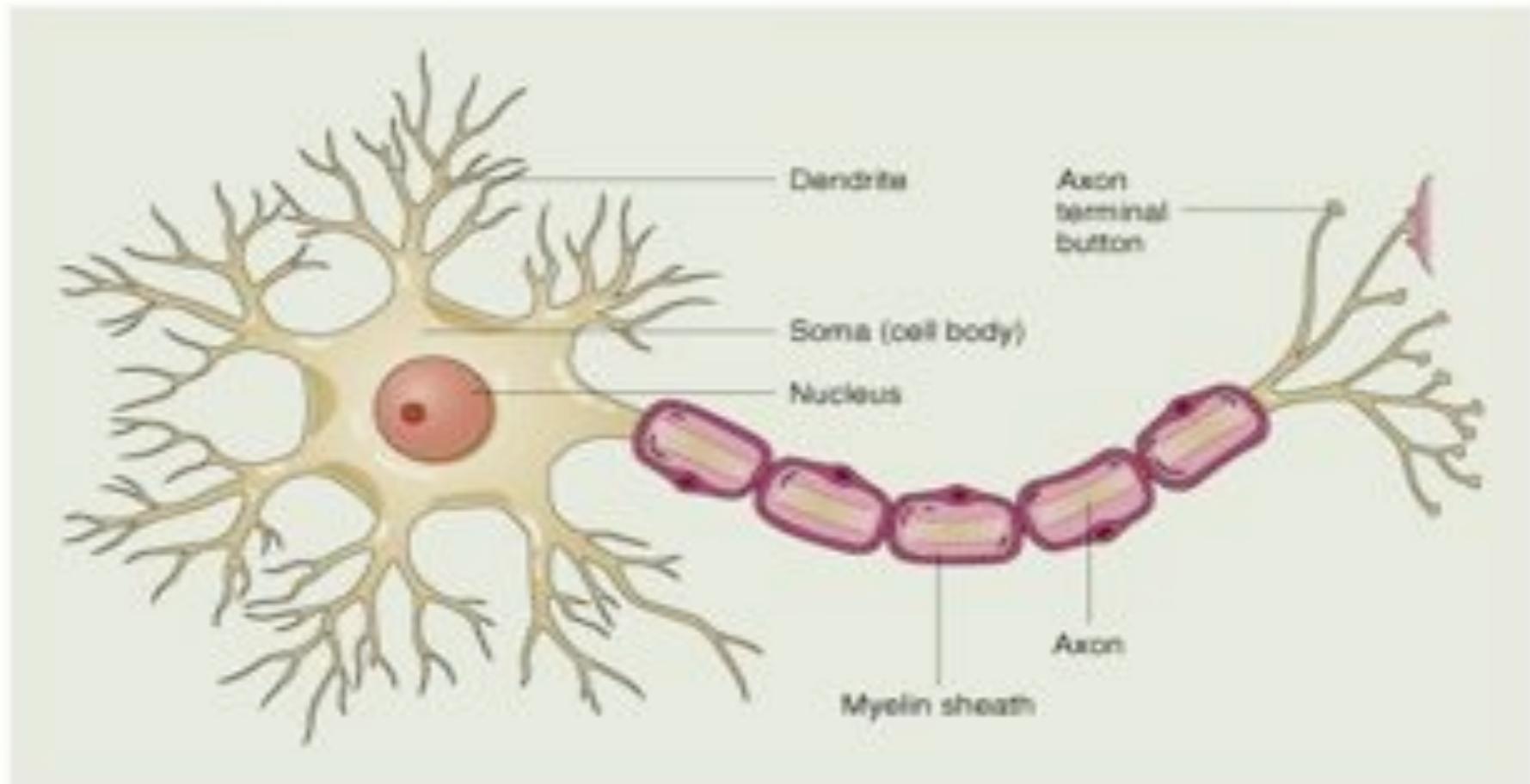
Self-Directed Neuroplasticity

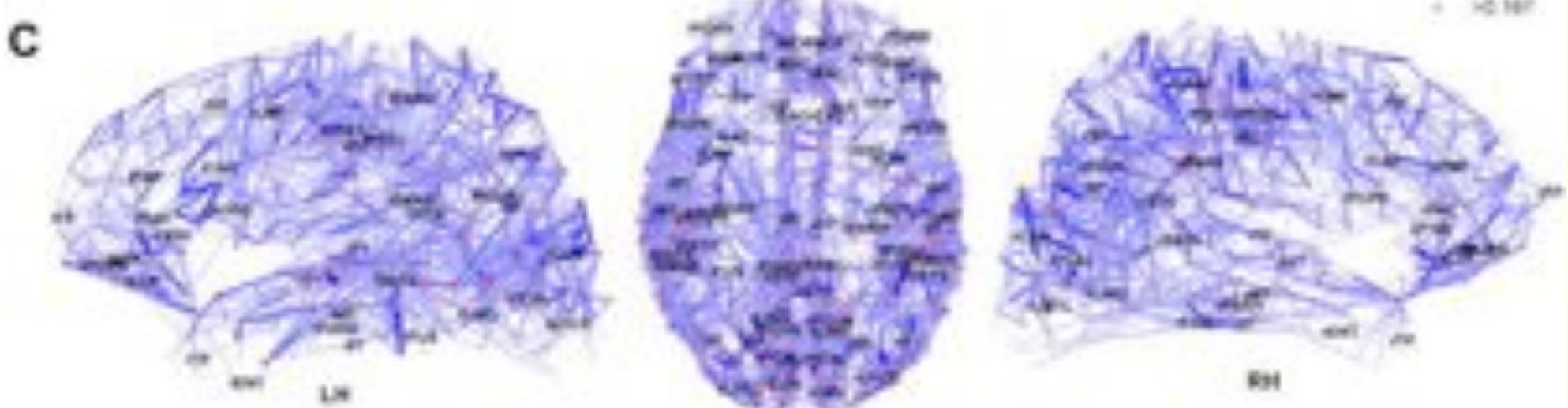
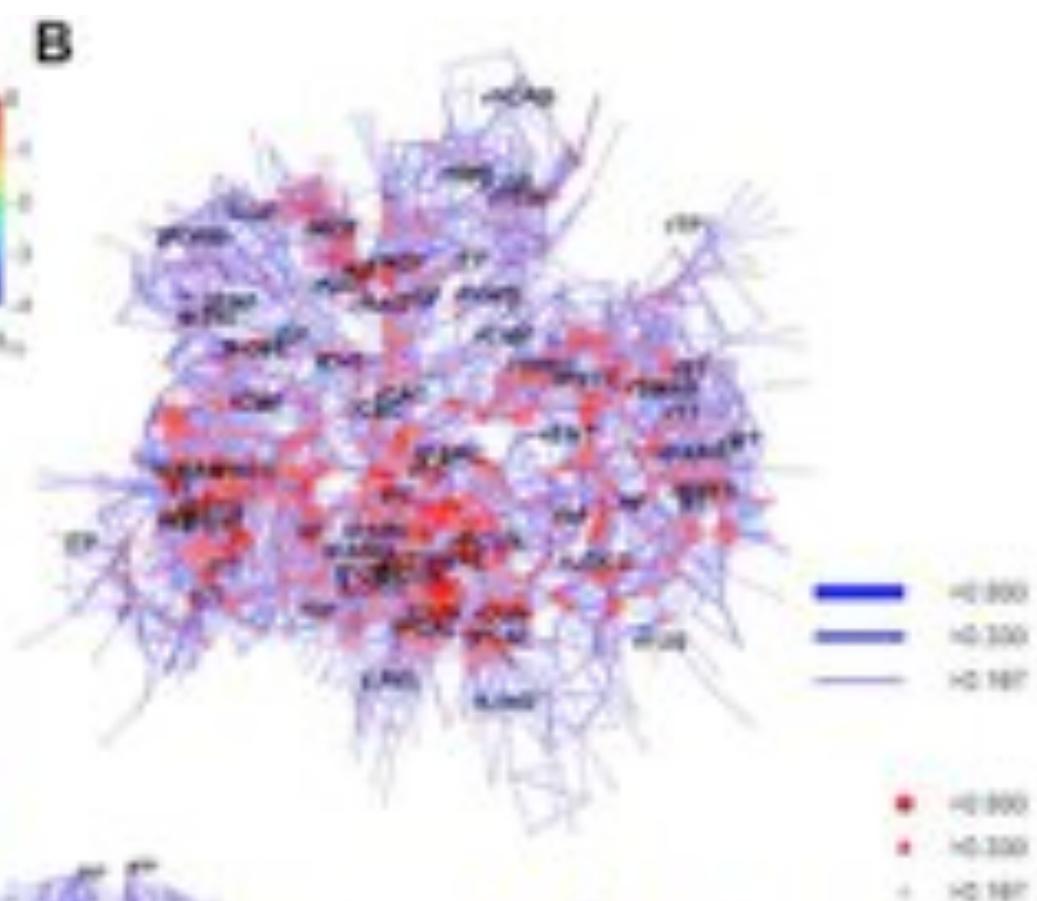
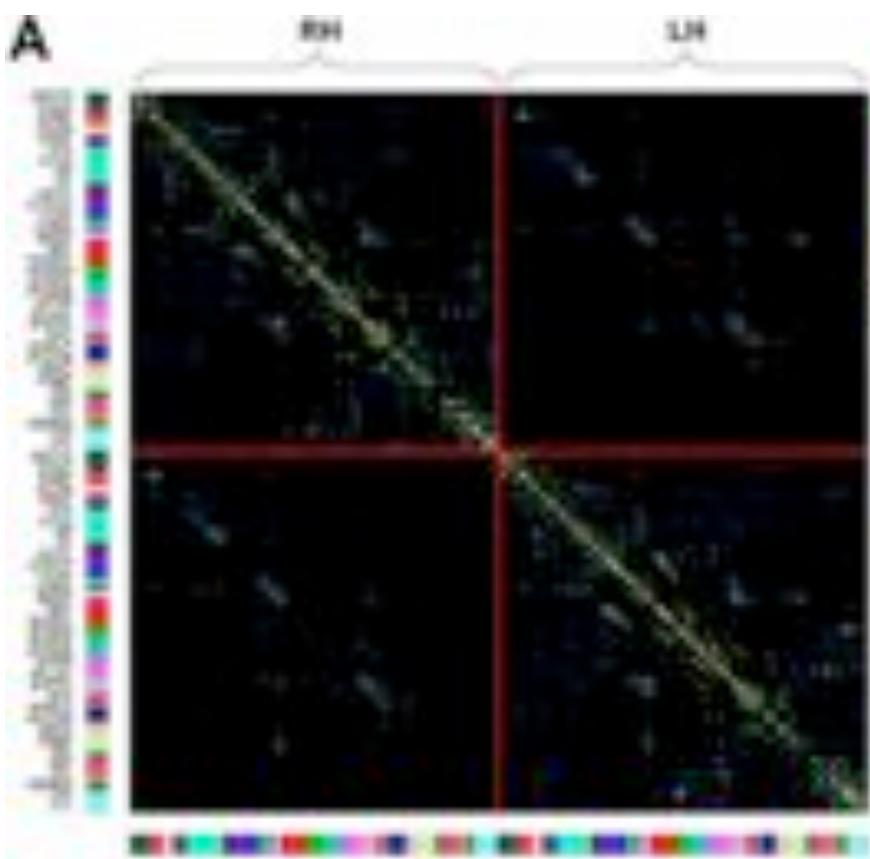


Brain Basics

- **Size:**
 - 3 pounds of tofu-like tissue
 - 1.1 trillion brain cells
 - 100 billion "gray matter" neurons
- **Activity:**
 - Always on 24/7/365 - Instant access to information on demand
 - 20-25% of blood flow, oxygen, and glucose
- **Speed:**
 - Neurons firing around 5 to 50 times a second (or faster)
 - Signals crossing your brain in a tenth of a second
- **Connectivity:**
 - Typical neuron makes ~ 5000 connections with other neurons:
~ 500 trillion synapses
- **Complexity:**
 - Potentially 10 to the millionth power brain states

A Neuron





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The Mind/Brain System

- “Mind” = flow of information within the nervous system:
 - Information is represented by the nervous system.
 - Most mind is unconscious; awareness is an aspect of mind.
 - The headquarters of the nervous system is the brain.
- In essence then, apart from hypothetical transcendental factors, the mind *is* what the brain *does*.
- Brain = necessary, *proximally* sufficient condition for mind:
 - The brain depends on the nervous system, 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.

Fact #1

As your brain changes, your mind changes.



Ways That Brain Can Change Mind

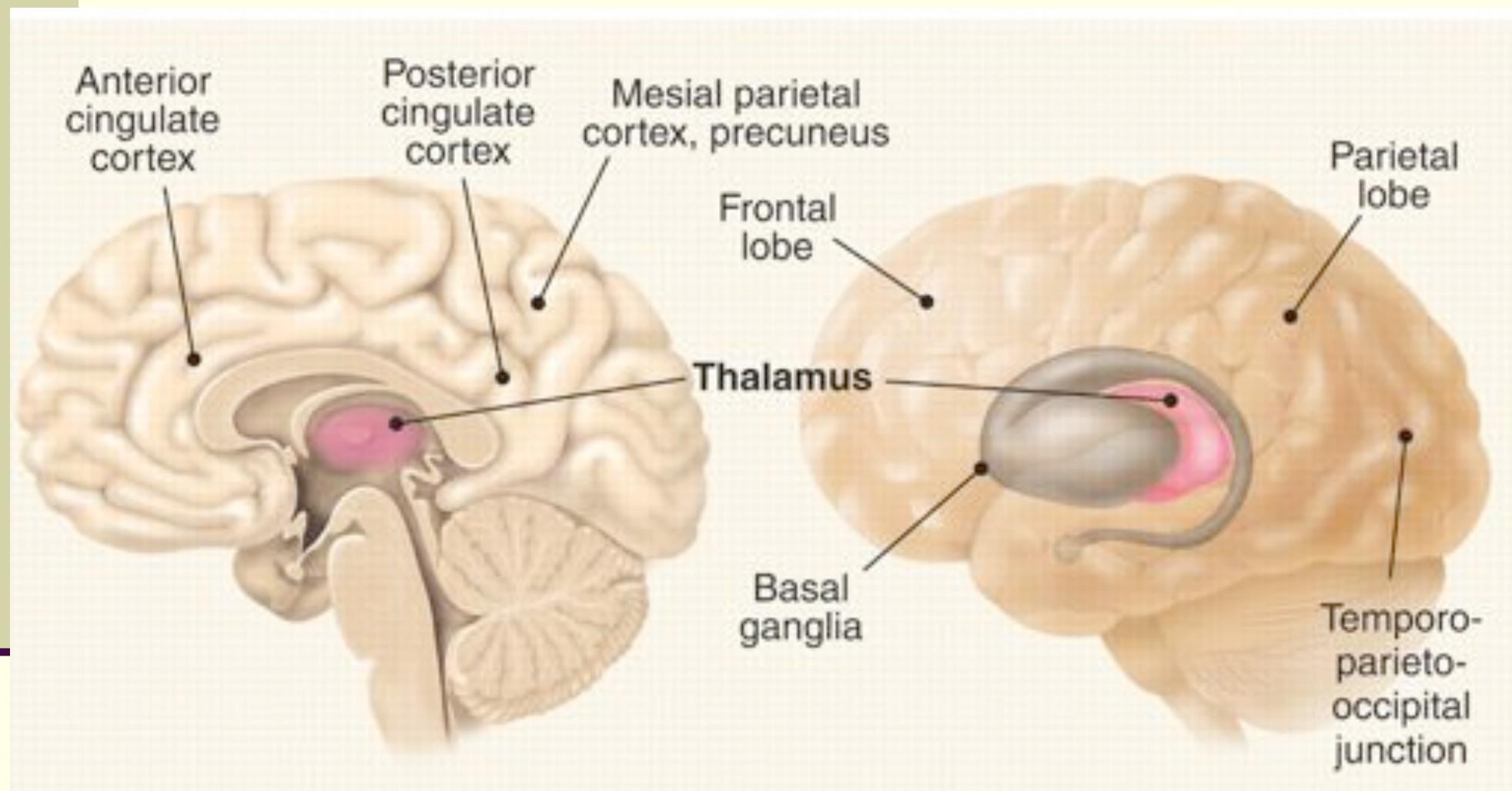
- For better:

- 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)

Fact #2

As your mind changes, your brain changes.

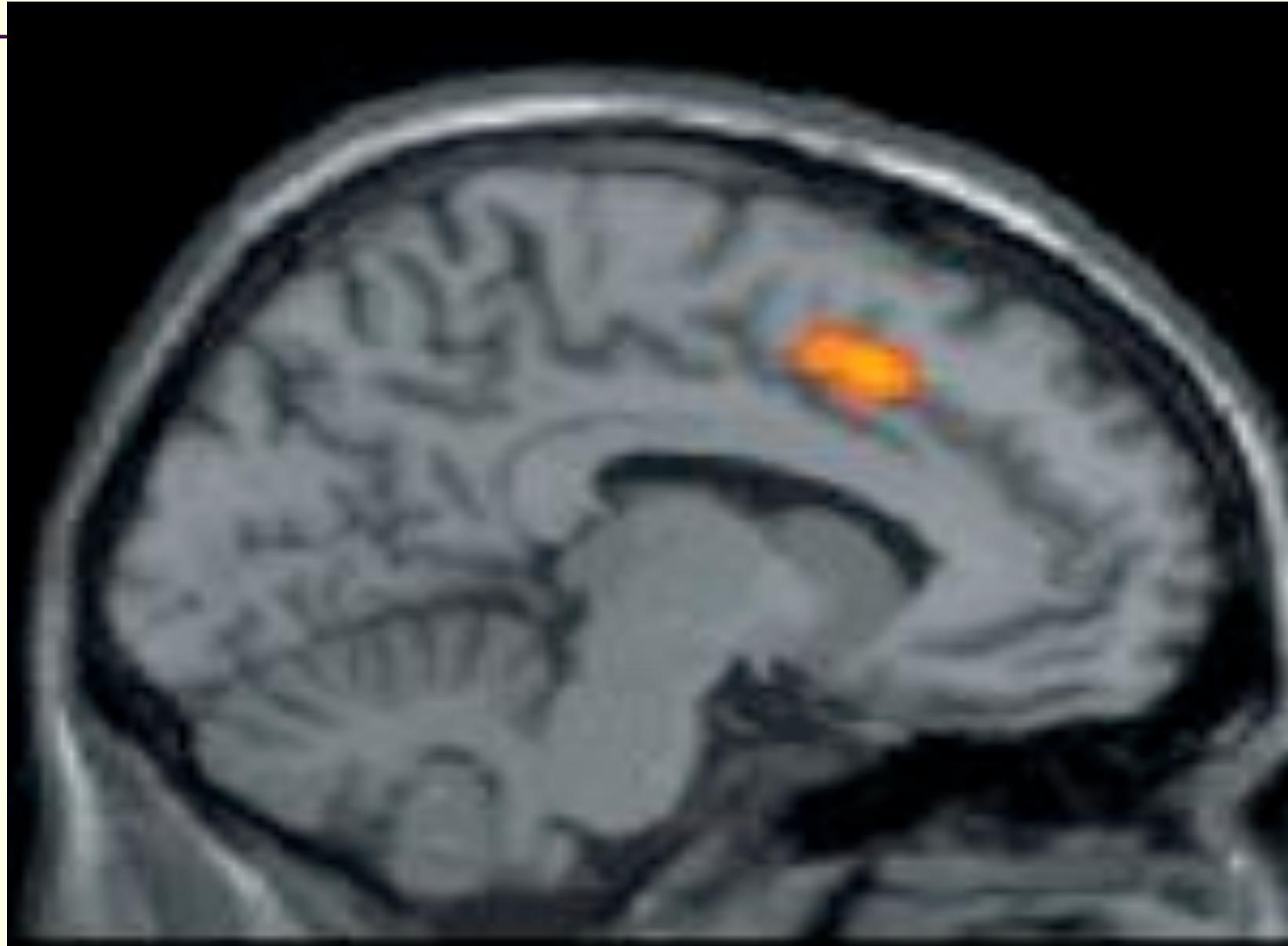
Immaterial mental activity maps to material neural activity.

This produces temporary changes in your brain and lasting ones.

Temporary changes include:

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

Tibetan Monk, Boundless Compassion



Christian Nuns, Recalling Profound Spiritual Experiences

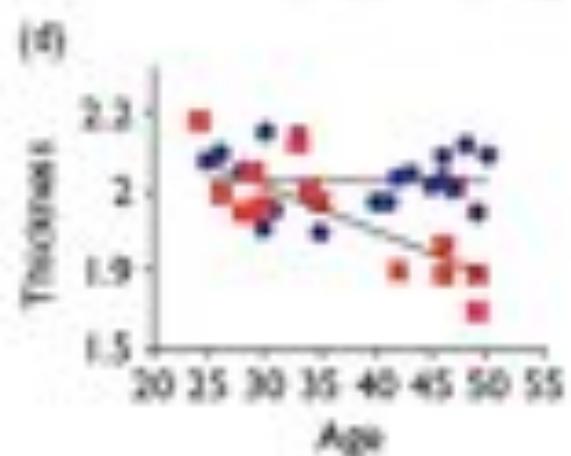
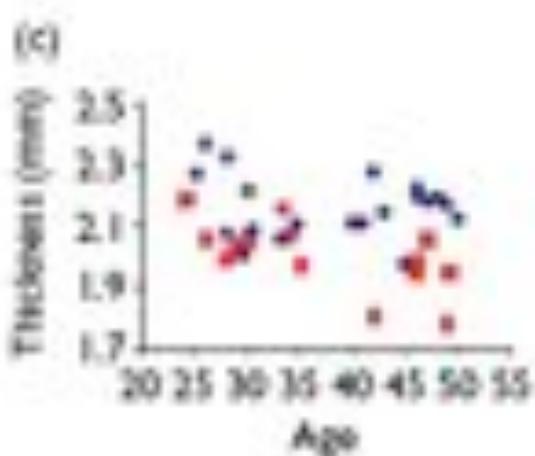
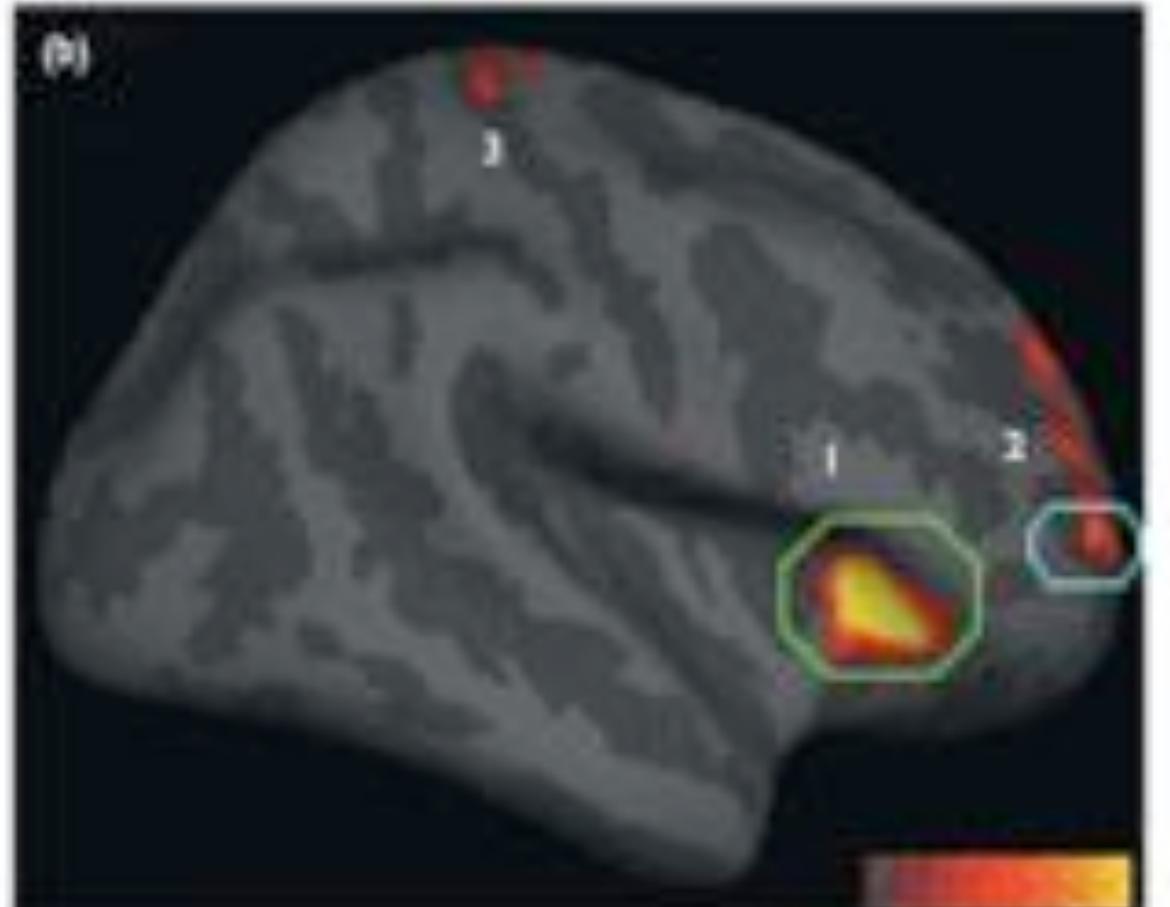


Beauregard, et al., *Neuroscience Letters*, 9/25/06

Mind Changes Brain in Lasting Ways

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

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



Honoring Experience

One's experience *matters*.

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

Fact #3

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

This is self-directed neuroplasticity.

How to do this, in skillful ways?

The Power of Mindfulness

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

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

William James

Neuroplasticity in Context

- Neuroplasticity is not breaking news. It's been long presumed that mental activity changed neural structure: what else is learning?
- The news is in how the mind changes the brain.
- Most neuroplasticity is incremental, not dramatic.
- Neuroplasticity is ethically neutral.

How to use it for good?

Grounding in the Brain - Benefits

- Organizing framework
 - Evolutionary neuropsychology
 - Common ground across theories and methods
- Motivating to clients, clinicians, policy-makers
 - Concrete, in the body, *physical*
 - Status of medicine, hard science
- Highlighting key principles and practices
 - Implicit memory
 - Nonverbal processes
- Innovating with truly new methods
 - Neurofeedback
 - Fear extinction

Grounding in the Brain - Pitfalls

- Adding little new meaning
 - Replacing psych terms with neuro (“amygdala made me do it”)
- Over-simplifying
 - Over-localizing function (e.g., empathy = mirror neurons)
 - Exaggerated terms (“God-gene,” “female brain”)
 - Materialistic reductionism, though brain and mind co-arise
- Claiming authority
 - Using neuro data to argue a political or cultural case
 - Using the secular religion of science to elevate status
- Underestimating the mind
 - Most big changes in psyche involve tiny changes in soma; mental plasticity holds more promise than neural plasticity.
 - Overlooking the insights and effectiveness of psychology
 - Ducking existential choices in values

Self-Compassion

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

*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*

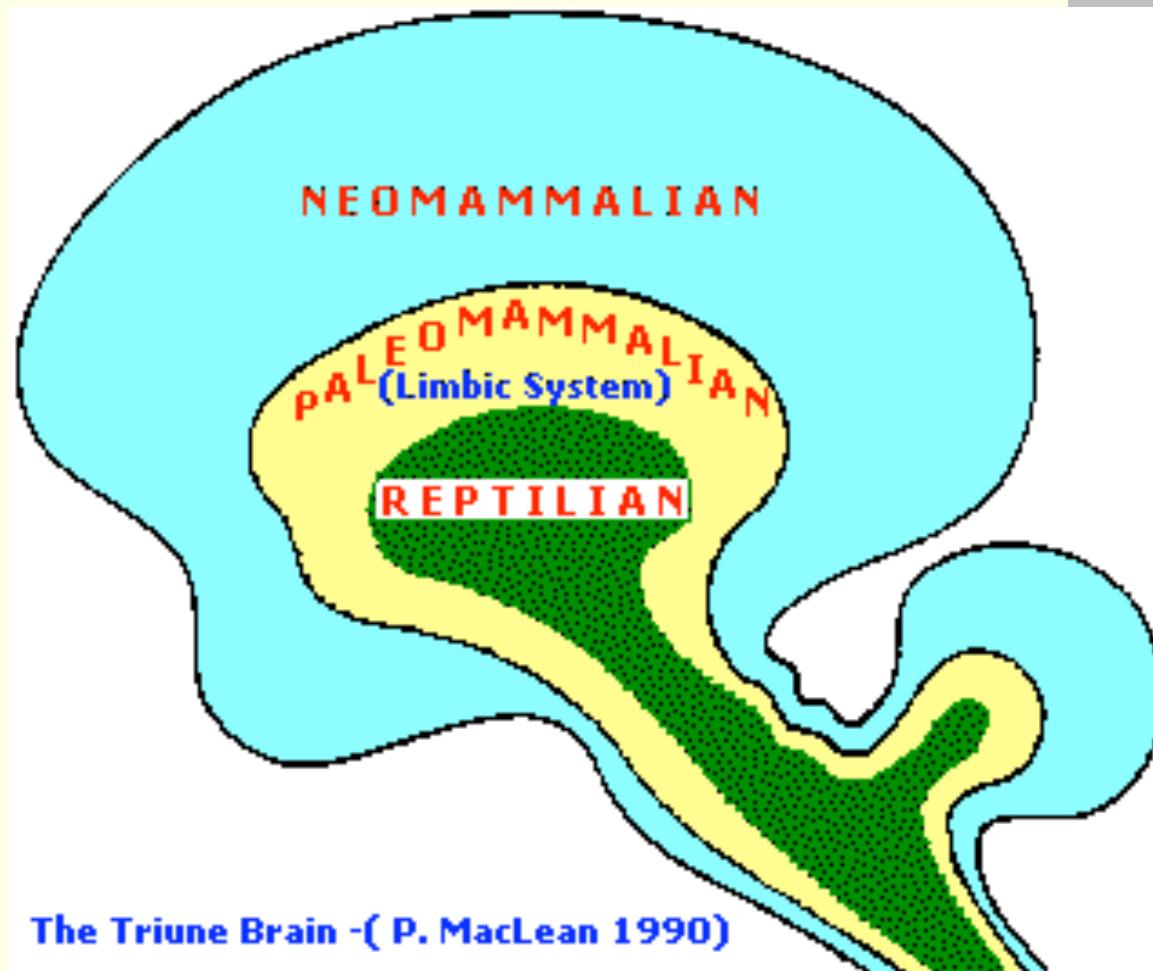
Leonard Cohen

The Evolving Brain - and Its Challenges

Evolution

- ~ 4+ billion years of earth
- 3.5 billion years of life
- 650 million years of multi-celled organisms
- 600 million years of nervous system
- ~ 200 million years of mammals
- ~ 60 million years of primates
- ~ 6 million years ago: last common ancestor with chimpanzees, our closest relative among the “great apes” (gorillas, orangutans, chimpanzees, bonobos, humans)
- 2.5 million years of tool-making (starting with brains 1/3 our size)
- ~ 150,000 years of *homo sapiens*
- ~ 50,000 years of modern humans
- ~ 5000 years of blue, green, hazel eyes

Evolutionary History



The Triune Brain

Three Stages of Brain Evolution

■ Reptilian:

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

■ Mammalian:

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

■ Human:

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

Negativity Bias: Causes in Evolution

- “Sticks” - Predators, natural hazards, social aggression, pain (physical and psychological)
- “Carrots” - Food, sex, shelter, social support, pleasure (physical and psychological)
- During evolution, avoiding “sticks” usually had more effects on survival than approaching “carrots.”
 - Urgency - Usually, sticks must be dealt with immediately, while carrots allow a longer approach.
 - Impact - Sticks usually determine mortality, carrots not; if you fail to get a carrot today, you’ll likely have a chance at a carrot tomorrow; but if you fail to avoid a stick today - whap!³⁵ - no more carrots forever.

Negativity Bias: Physiology and Neuropsychology

■ Physiology:

- Greater bodily arousal to negative stimuli
- Pain is produced anywhere; pleasure is circumscribed.

■ Neuropsychology:

- Separate, low-level systems for negative and positive stimuli
- Right hemisphere specialized for negative stimuli
- Greater brainwave responses to negative stimuli
- ~ 65% of amygdala sifts for negative stimuli
- The amygdala-hippocampus system flags negative experiences prominently in memory: *like Velcro for negative experiences but Teflon for positive ones.*
- More negative “basic” emotions than positive ones

Negativity Bias: Attention and Learning

- Negative stimuli command more attention.
 - They're less common and thus more informative.
 - They're perceived more easily and quickly.
 - Reaction times are faster for angry faces than happy ones.
 - Empathy is elicited more for negative experiences.
- In nature: multiple chances to learn how to approach rewards, but no chance for trial-and-error learning about dangers.
 - Learning based on punishments is generally faster.
 - Strong dislikes are acquired more quickly than strong likes.

Negativity Bias: Consequences (1)

- Negative beats positive head to head:
 - “Endowment effect,” “prospect function,” “loss aversion”: People will do more to avoid a loss than to acquire a gain.
 - Immorality contaminates more than morality elevates.
 - “Pariahs” contaminate more than “saints” elevate.

- Negative beats positive in combination:
 - Negative information about a person shapes opinions most.
 - It’s easy to create learned helplessness, but hard to undo.
 - In health, parenting, and relationships, absence of negative generally matters more than presence of positive.

Negativity Bias: Consequences (2)

- Negative is more differentiated:
 - There are more words for negative experiences.
- Negative is more alarming than positive is reassuring:
 - Negativity of negative stimuli grows faster with approach in time or space than positivity of positive stimuli.
- Negative vicious cycles:
 - Minimal inhibitory feedback on cortisol
 - Negative social behaviors produce confirming feedback.
- Individual differences in negativity bias: vulnerabilities for reactivity, stress, anxiety, anger, and depression ³⁹

Negativity Bias: Complications

- Positive events are more common, but negative events are more urgent; our ancestors evolved to handle both.
- When mildly negative and positive stimuli come together, we tend to regard their gestalt as mildly positive. Negative stimuli dominate positive stimuli when both are intense.
- Compensatory processes tilt personal memories in a positive direction over time (so the more time that's passed, the more positive the memory).
- There's a positivity bias for positive stimuli that are rare (e.g., heroic acts, exceptional ability).

Negative Experiences Can Have Benefits

- There's 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

But is there really any shortage of negative experiences?

Health Consequences of Chronic Stress

■ Physical:

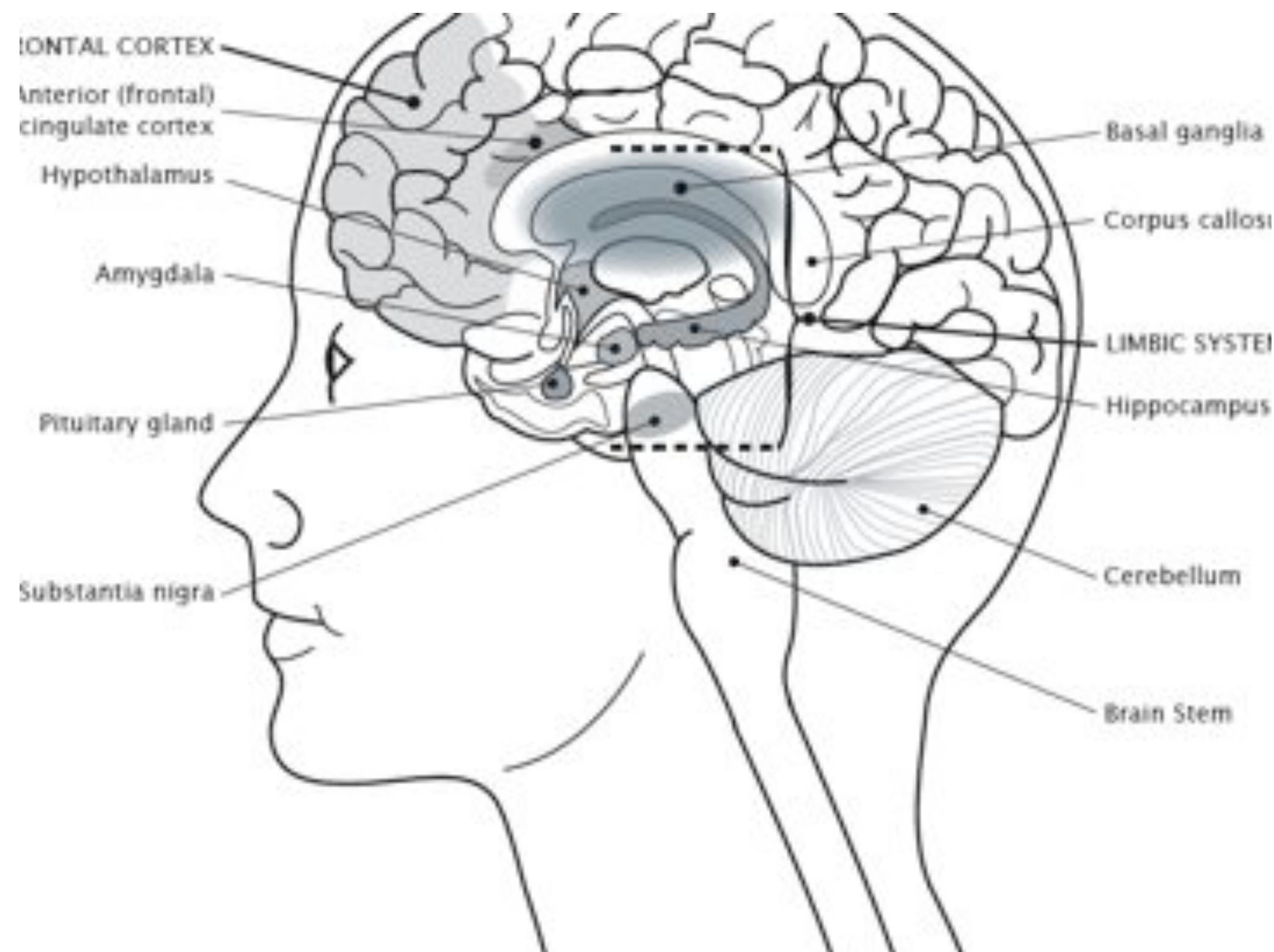
- Weakened immune system
- Inhibits GI system; reduced nutrient absorption
- Reduced, dysregulated reproductive hormones
- Increased vulnerabilities in cardiovascular system
- Disturbed nervous system

■ Mental:

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

One Neural Consequence of Negative Experiences

- Amygdala (“alarm bell”) initiates stress response
- 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

- 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)

- 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. ⁴⁷

Costs of Threat Reactivity (Personal, Organizational, National)

- 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 Approach system is inhibited, so we don't pursue opportunities, play small, or give up too soon.
- In the Attach system, we bond tighter to “us,” with more fear and anger toward “them.”

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.*

Implicit Memory and Inner Resources

Learning and Memory

- The sculpting of the brain by experience is memory:
 - Explicit - Personal recollections; semantic memory
 - Implicit - Bodily states; emotional residues; “views” (expectations, object relations, perspectives); behavioral repertoire and inclinations; what it feels like to be “me”
- Implicit memory is much larger than explicit memory. Resources are embedded mainly in implicit memory.
- Therefore, the key target is implicit memory. So what matters most is not the explicit recollection of positive *events* but the implicit emotional residue of positive *experiences*.

The Importance of Inner Resources

■ Examples:

- Freud's "positive introjects"
- Internalization of "corrective emotional experiences" during psychotherapy
- "Learned optimism"

■ Benefits

- Increase positive emotions: many physical and mental health benefits
- Improve self-soothing
- Improve outlook on world, self, and future
- Increase resilience, determination

Factors of Neuroplasticity

■ Physiological:

- Norepinephrine (moderate)
- Dopamine
- Acetylcholine
- Brain-derived neurotrophic factor (BDNF)
- Natural opioids (?) (e.g., endorphins)
- Neurogenesis (promoted by exercise)

■ Mental:

- Priming memory through intention
- Target material:
 - Is within awareness
 - Receives focused attention
 - Is sustained, multimodal, and intense
 - Is (alas) negative

In essence, how can we actively internalize resources in implicit memory - making the brain like Velcro for positive experiences, but Teflon for negative ones?

Taking in the Good

Being with, Releasing, Replacing

- There are three phases of psychological healing and personal growth (and spiritual practice):
 - Be mindful of, release, replace.
 - Let be, let go, let in.
- Mindfulness is key to the second and third phase, sometimes curative on its own, and always beneficial in strengthening its neural substrates. But often it is not enough by itself.
- And sometimes you need to skip to the third phase to build resources for mindfulness.

Just having positive experiences is not enough.

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

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

How to Take in the Good

1. Look for positive **facts**, and let them become positive experiences.

2. Savor the positive experience:
 - Sustain it for 10-20-30 seconds.
 - Feel it in your body and emotions.
 - Intensify it.

3. Sense and intend that the positive experience is soaking into your brain and body - registering deeply in emotional memory.

Targets of TIG

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

Kinds of “Good” to Take in

- The small pleasures of ordinary life
 - The satisfaction of attaining goals or recognizing accomplishments - especially small, everyday ones
 - Feeling grateful, contented, and fulfilled
-
- Things are alright; nothing is wrong; there is no threat
 - Feeling safe and strong
 - The peace and relief of forgiveness
-
- Being included, valued, liked, respected, loved by others
 - The good feelings that come from being kind, fair, generous
 - Feeling loving
-
- Recognizing your positive character traits
 - Spiritual or existential realizations

Resources for Taking in the Good

- Intention; willing to feel good
- Identified target experience
- Openness to the experience; embodiment
- Mindfulness of the steps of TIG to sustain them
- Working through obstructions (e.g., distractibility, counter experiences, painful associations when accessing an embodied experience)

Why It's Good to Take in the Good - 1

- In general, adds positive contents to implicit memory
- Internalizes psychological growth (e.g., it usually feels good and goes well to speak from my heart)
- Associates rewards to good steps; boosts motivation
- Brings in missing “supplies” (e.g., love, worth) to help remedy deficits and heal painful experiences
- Encourages prosocial experiences and actions

*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

Why It's Good to Take in the Good - 2

- Reduces threat reactivity (by taking in resources, opportunities fulfilled, and reasonable safety)
- Counteracts “learned helplessness” (by taking in assertiveness, efficacy, internal locus of control)
- Reduces suffering due to alarm signals from endlessly disturbed equilibria by taking in their also endless re-balancing
- Implicitly: Rights the internal injustice of the negativity bias; embodies self-attunement, -nurturance, and - advocacy (vital if a person hasn't received these)

Benefits of Positive Emotions

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

TIG and the Stress Response

- Activates and thereby strengthens general, top-down PFC-hippocampal (PFC-H) capabilities, which become enhanced resources for coping
- Generally desensitizes amygdaloid-sympathetic nervous system (A-SNS) networks
- Internalizes specific regulatory resources, which strengthens PFC-H and inhibits A-SNS (e.g., feeling soothed or encouraged)

TIG and Children

- All kids benefit from TIG.
- Particular benefits for mistreated, anxious, spirited/ADHD, or LD children.
- Adaptations:
 - Brief
 - Concrete
 - Natural occasions (e.g., bedtimes)

Potential Synergies of TIG and MBSR

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

Healing Old Pain

Using Memory Mechanisms to Help Heal Painful Experiences

- The machinery of memory:
 - When explicit or implicit memory is re-activated, it is re-built from schematic elements, not retrieved *in toto*.
 - When attention moves on, elements of the memory get re-consolidated.
- The open processes of memory activation and consolidation create a window of opportunity for shaping your internal world.
- Activated memory tends to associate with other things in awareness (e.g., thoughts, sensations), esp. if they are prominent and lasting.
- When memory goes back into storage, it takes associations with it.
- You can imbue implicit and explicit memory with positive associations.

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 positive resources in your mind.

Neuropsychology of TIG4

- Extinction, through pairing a negative experience with a powerful positive one.
- Reinforces maintaining PFC-H activation and control during A-SNS arousal, so PFC-H is not swamped or hijacked
- Reinforcement of self-directed regulation of negative experiences; enhances sense of efficacy
- Dampens secondary associations to negative material; that reduces negative experiences and behavior, which also reduces vicious cycles
- Reduces defenses around negative material; thus more amenable to therapeutic help, and to insight

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

■ Skills:

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

Psychological Antidotes

Approaching Opportunities

- Satisfaction, fulfillment --> Frustration, disappointment
- Gladness, gratitude --> Sadness, discontentment, “blues”

Affiliating with “Us”

- Attunement, inclusion --> Not seen, rejected, left out
- Recognition, acknowledgement --> Inadequacy, shame
- Friendship, love --> Abandonment, feeling unloved or unlovable

Avoiding Threats

- Strength, efficacy --> Weakness, helplessness, pessimism
- Safety, security --> Alarm, anxiety
- Compassion for oneself and others --> Resentment, anger

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

Enhancements to TIG4

- During TIG4:
 - Use language to intensify the positive experience.
 - Emphasize the affiliating system:
 - Increases endorphins (analgesic; physical and social pain share overlapping networks) and oxytocin (buffers stress)
 - Affiliation inhibits the avoiding system
- Prior to TIG4, identify a trigger (e.g., event, setting, mental state) that has become a conditioned stimulus for the negative material; after TIG4, associate that trigger to positive material several times over the next hour.
- After TIG4, reflect on the negative material, especially re contextualizing it (e.g., recognizing the innocence and vulnerability of a child, seeing “ten thousand causes upstream”);⁷⁷ this stimulates and strengthens the PFC-A “locale” system

TIG and Trauma

- General considerations:
 - People vary in their resources and their traumas.
 - Often the major action is with “failed protectors.”
 - Cautions for awareness of internal states, including positive
 - Respect “yellow lights” and the client’s pace.
- The first three steps of TIG are generally safe. Use them to build resources for tackling the trauma directly.
- As indicated, use the fourth step of TIG to address the peripheral features and themes of the trauma.
- Then, with care, use the fourth step to get at the heart of the trauma.

First of all, do no harm.

Promoting Client Motivation

- During therapy, but mainly between sessions, notice:
 - When learning from therapy works well
 - New insights
 - When things happen consistent with therapist's realistic view of you, the world, the future
 - Good qualities in yourself emphasized by therapist
- Then practice three, sometimes four, steps of TIG.
- Can be formalized in daily reflections, journaling
- In general: take appropriate risks of “dreaded experiences,” notice the (usually) good results, and then take those in.

Penetrative insight

joined with calm abiding

utterly eradicates

afflicted states.

Shantideva

Great Books

See www.RickHanson.net for other great books.

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- Carter, C. 2010. *Raising Happiness*. Ballantine.
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- Kornfield, J. 2009. *The Wise Heart*. Bantam.
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- Sapolsky, R. 2004. *Why Zebras Don't Get Ulcers*. Holt.
- Siegel, D. 2007. *The Mindful Brain*. Norton.
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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.
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- 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. 83

Key Papers - 3

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- Lieberman, M.D. & Eisenberger, N.I. 2009. Pains and pleasures of social life. *Science*. 323:890-891.
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Key Papers - 4

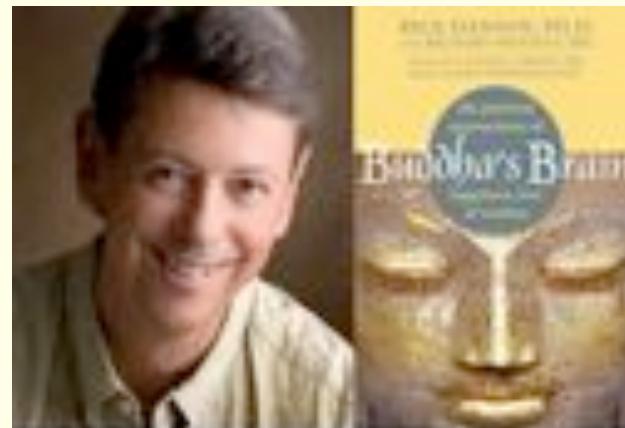
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- Walsh, R. & Shapiro, S. L. 2006. The meeting of meditative disciplines and Western psychology: A mutually enriching dialogue. *American Psychologist*, 61:227-239.

Where to Find Rick Hanson Online



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

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



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