

# ***Buddha's Brain:***

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## ***The Practical Neuroscience of Happiness, Love, and Wisdom***

PESI Seminars, 2011

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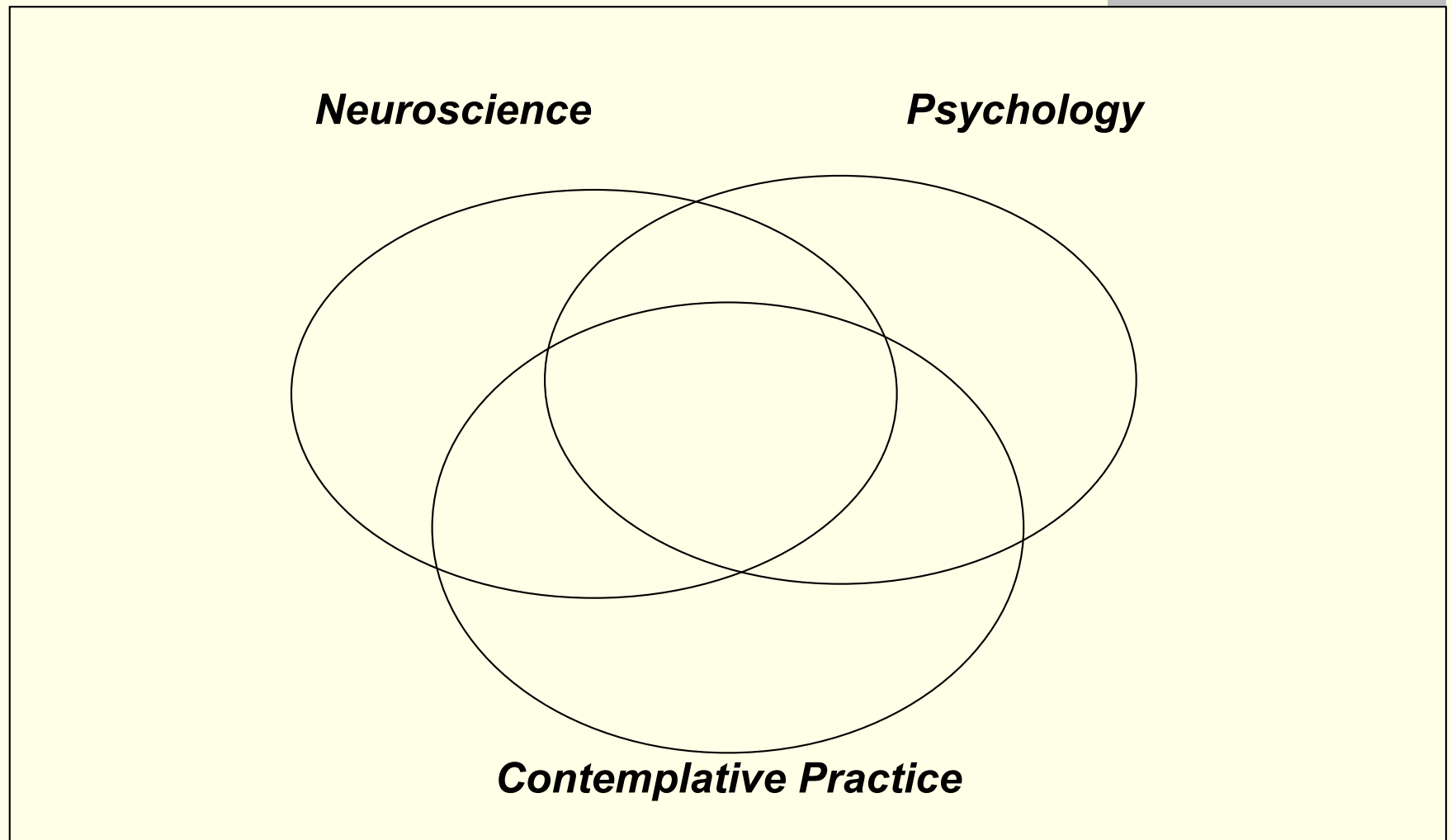
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# Topics

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- **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**
- **Natural happiness**

# Common - and Fertile - Ground



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*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

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

***We don't know,***

***yet we are thinking continually."***

Venerable Ani Tenzin Palmo

# Domains of Intervention

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- 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

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## ■ **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:**

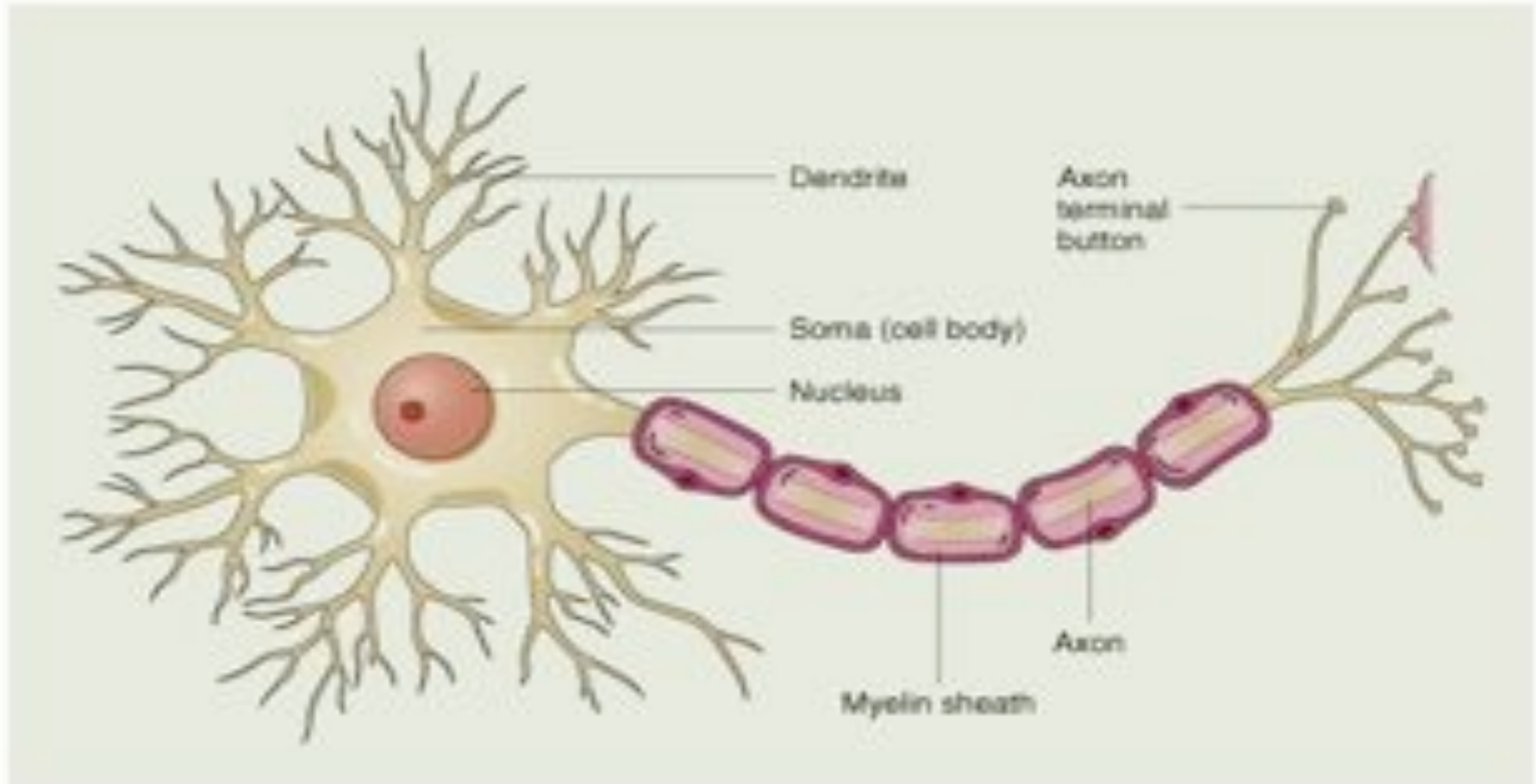
- Typical neuron makes ~ 5000 connections with other neurons:  
~ 500 trillion synapses

## ■ **Complexity:**

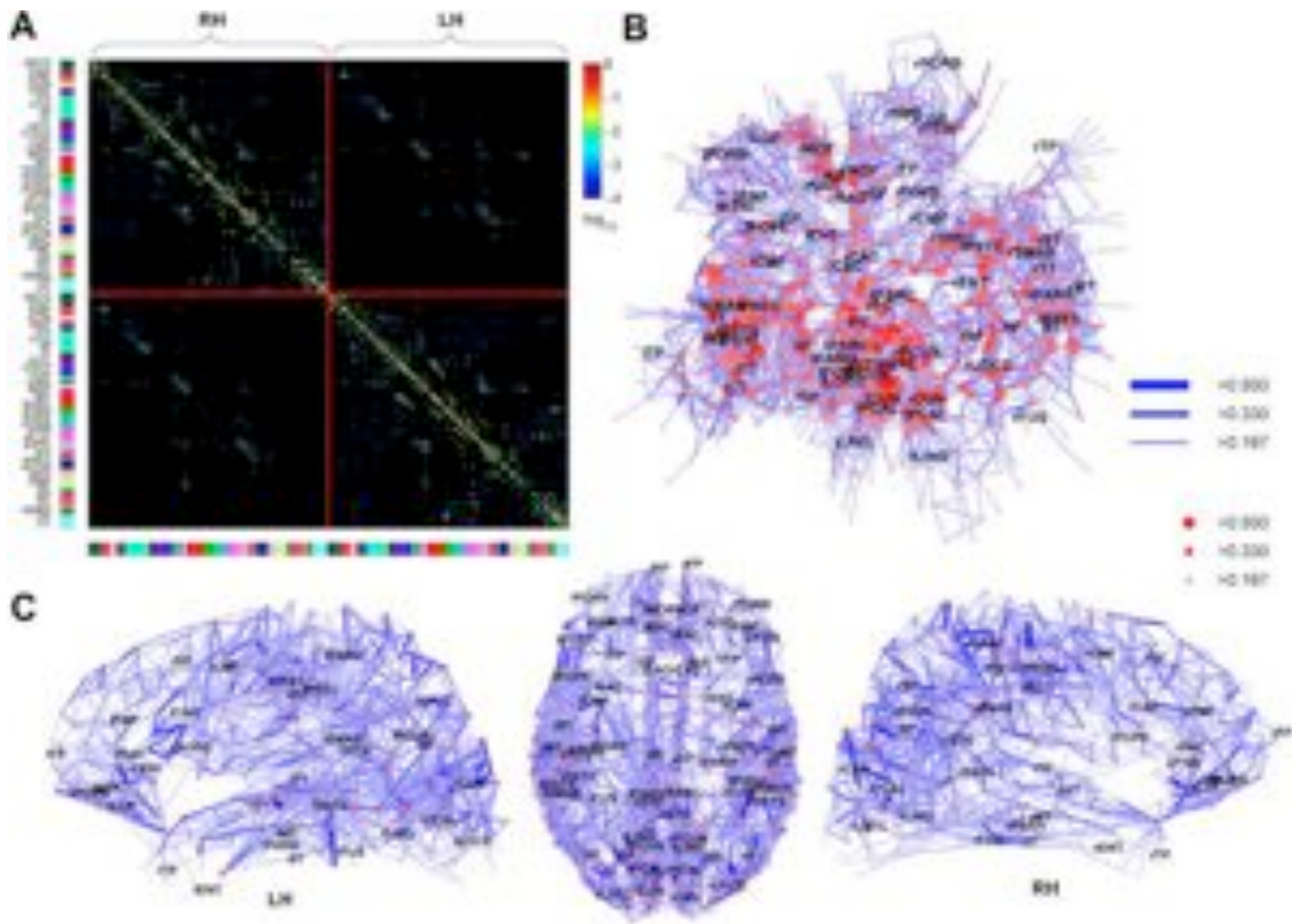
- Potentially 10 to the millionth power brain states



# A Neuron



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# The Mind/Brain System

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- “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

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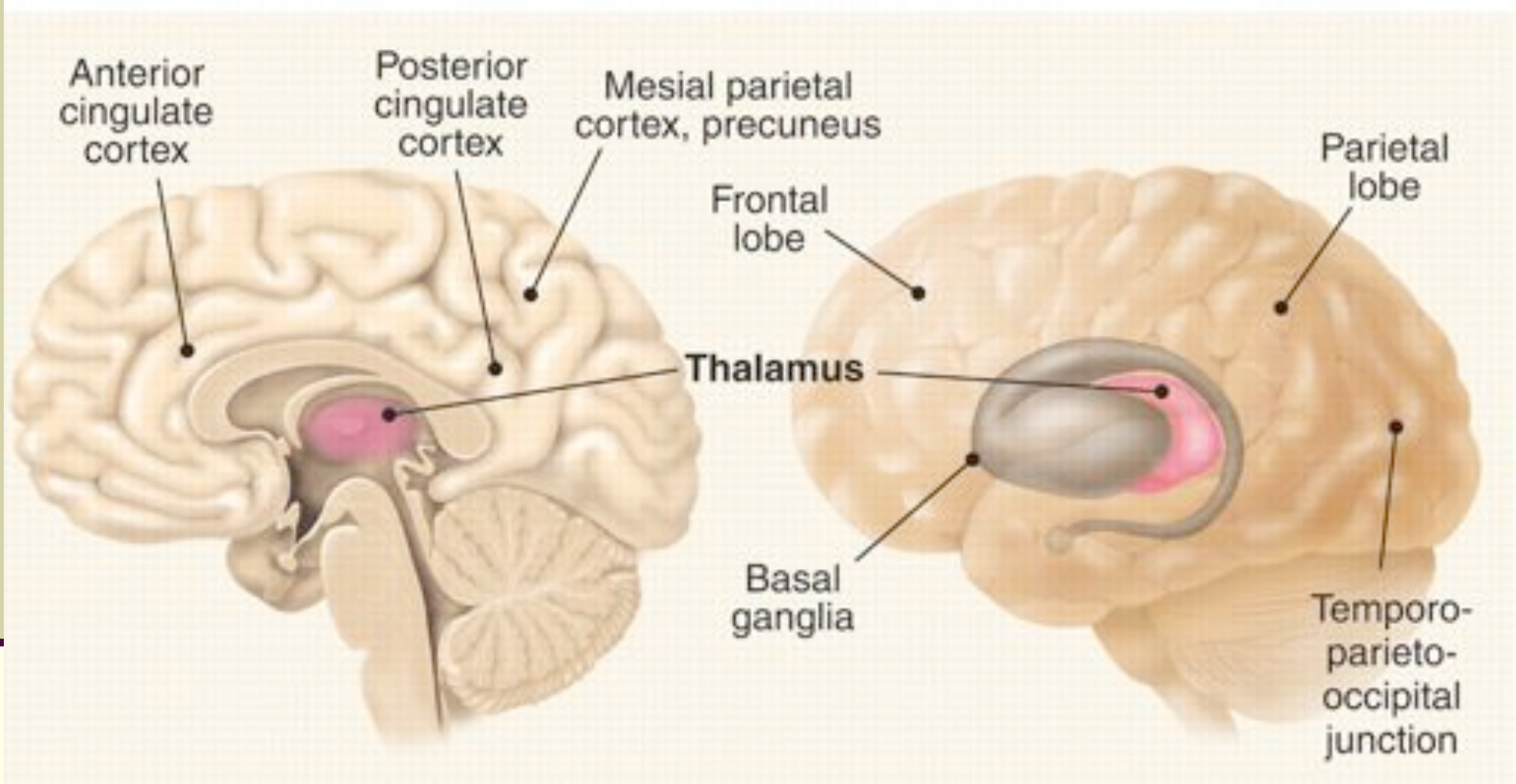
## ■ For better:

- 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

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## As your mind changes, your brain changes.

Immaterial mental activity maps to material neural activity.

This produces temporary changes in your brain and lasting ones.

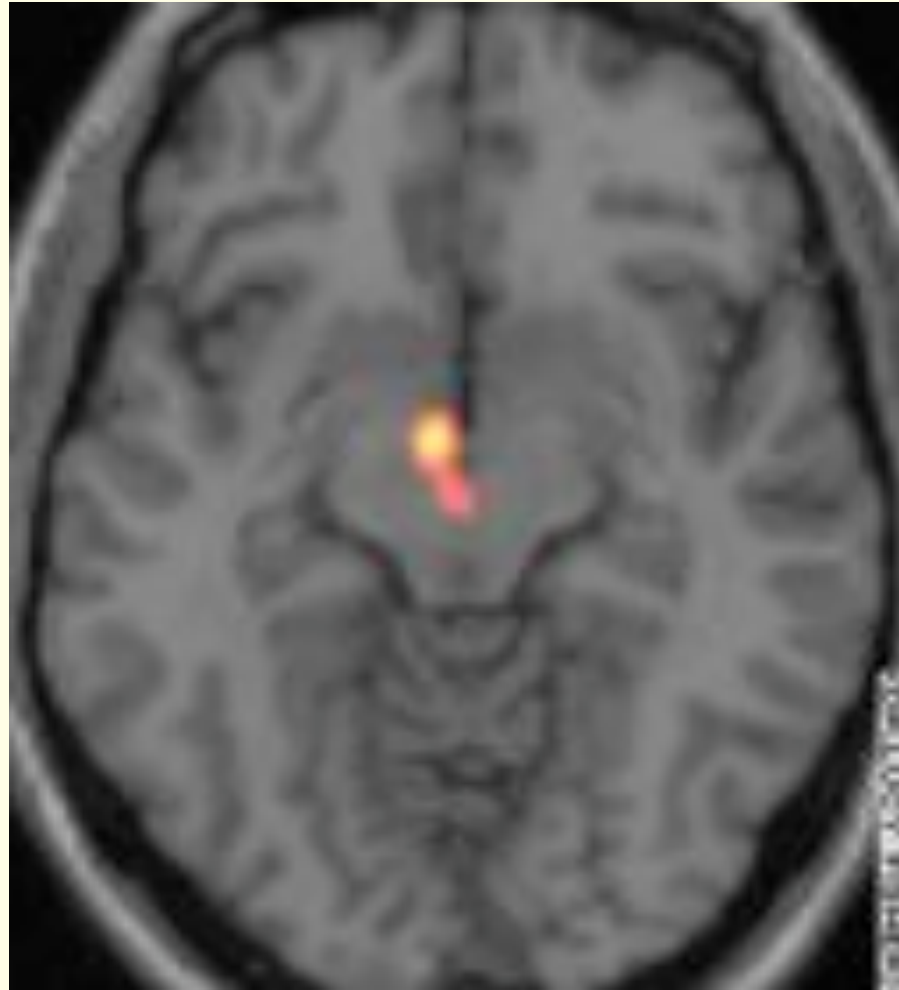
*Temporary* changes include:

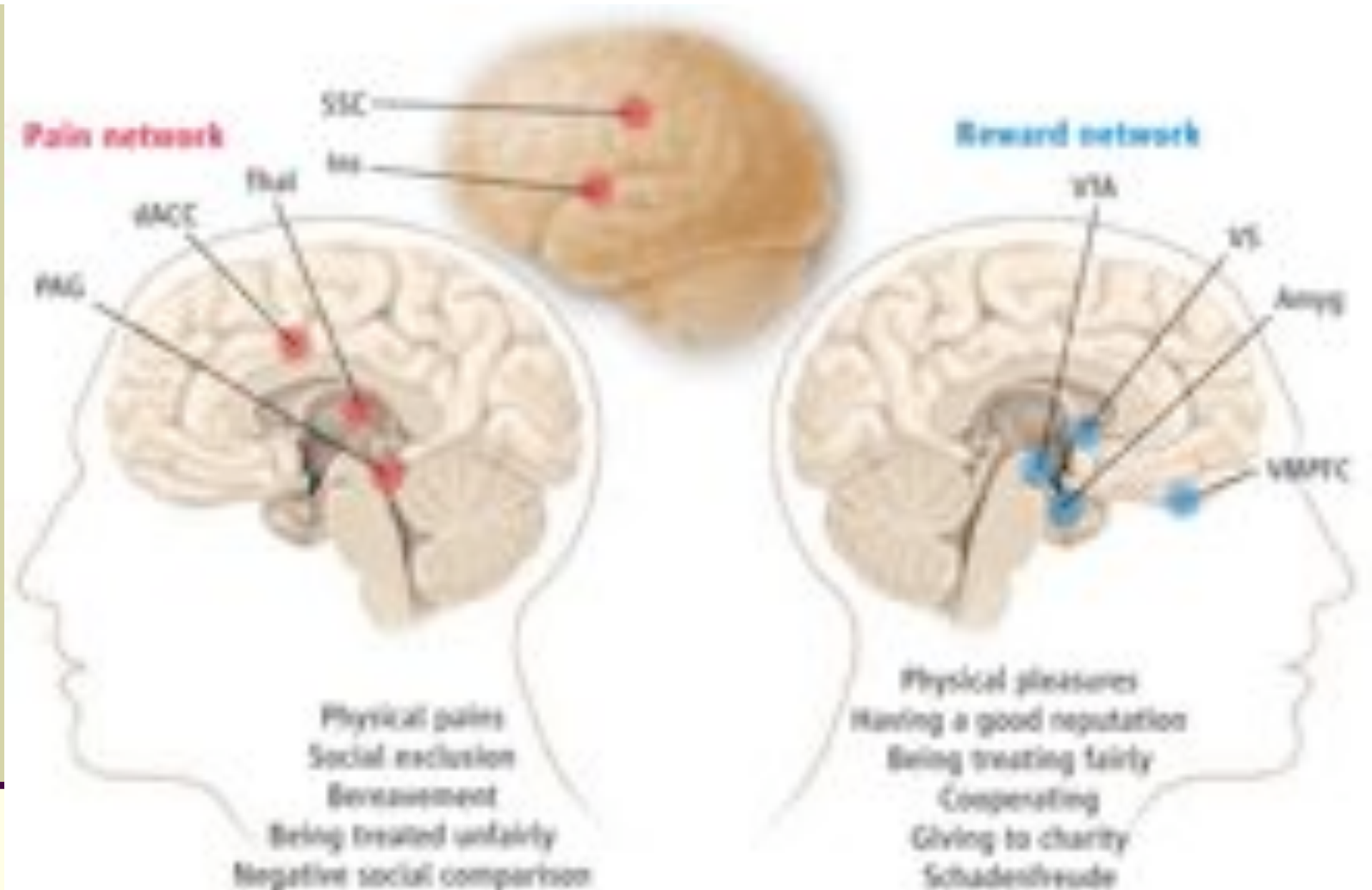
- Alterations in brainwaves (= changes in the firing patterns of synchronized neurons)
- Increased or decreased use of oxygen and glucose
- Ebbs and flows of neurochemicals



# The Rewards of Love

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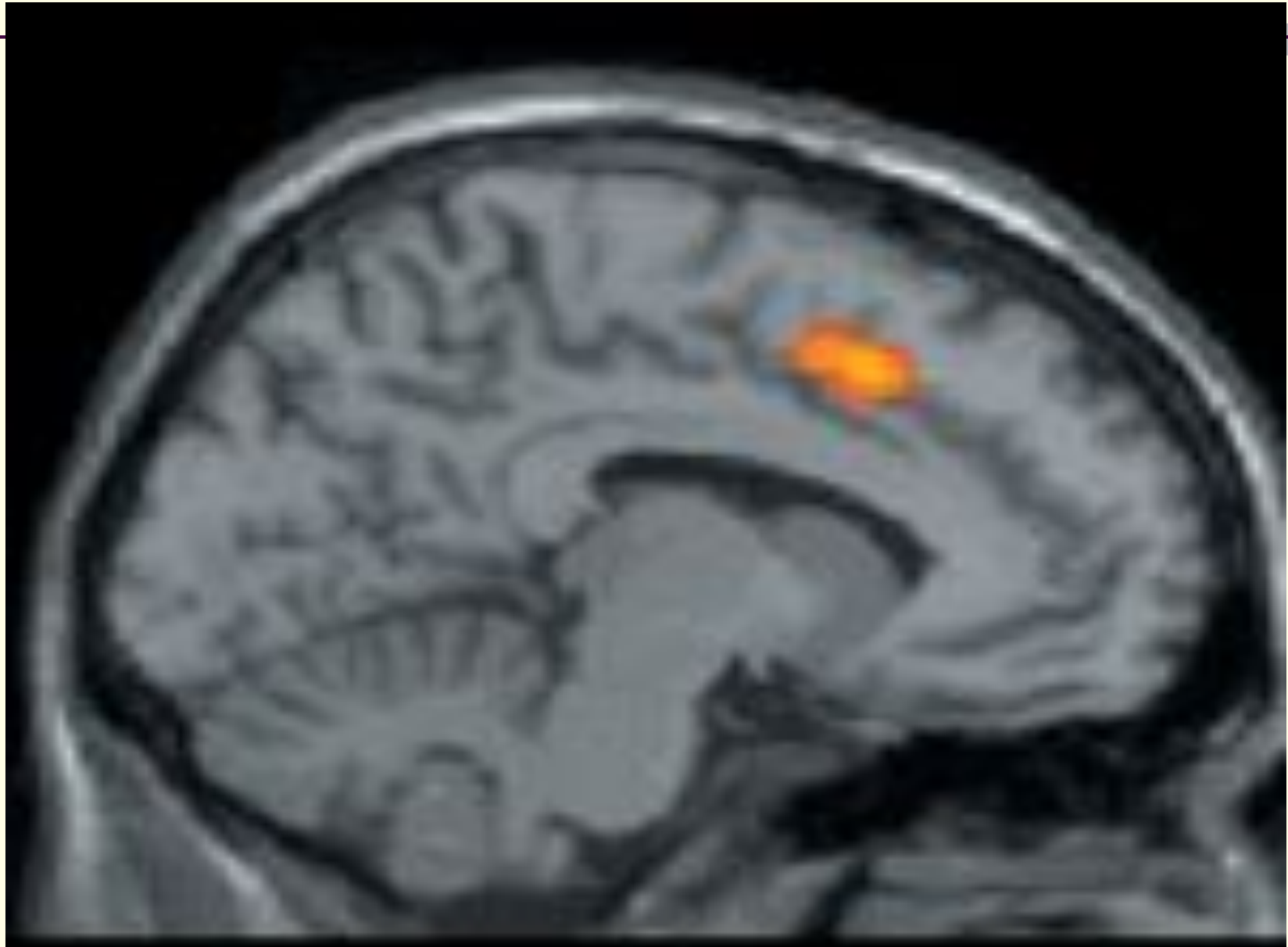




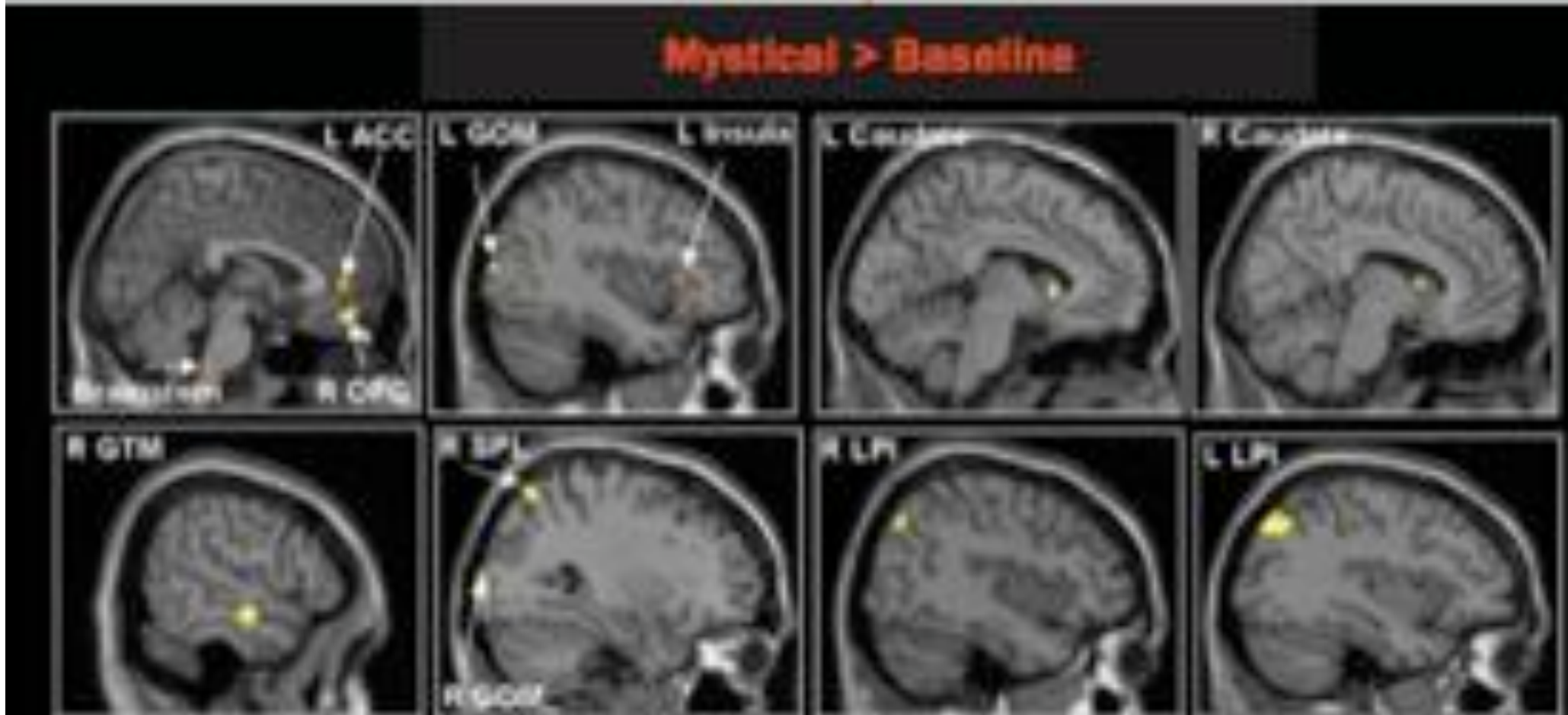
Pain network: Dorsal anterior cingulate cortex (dACC), insula (Ins), somatosensory cortex (SSC), thalamus (Thal), and periaqueductal gray (PAG).

Reward network: Ventral tegmental area (VTA), ventral striatum (VS), ventromedial prefrontal cortex (VMPFC), and amygdala (Amyg).

# Tibetan Monk, Boundless Compassion



# Christian Nuns, Recalling Profound Spiritual Experiences

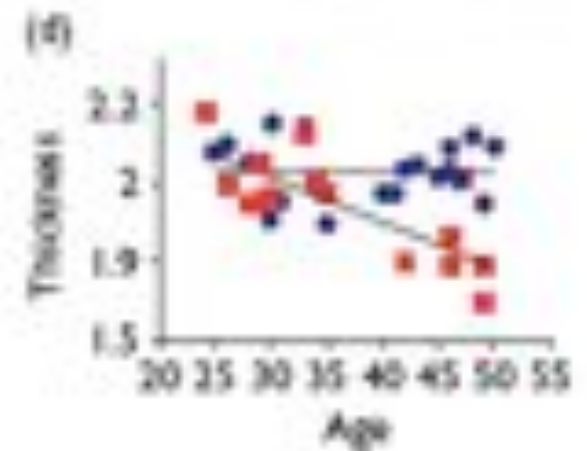
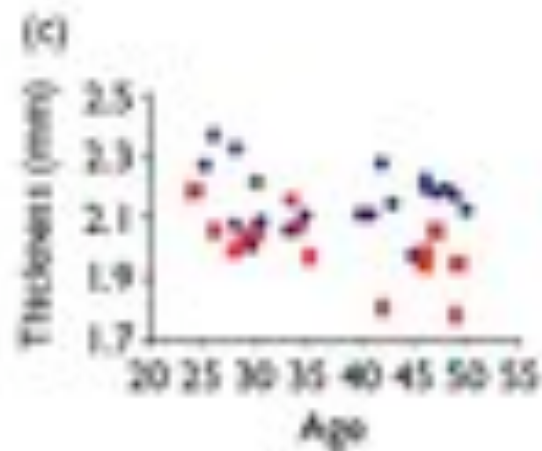
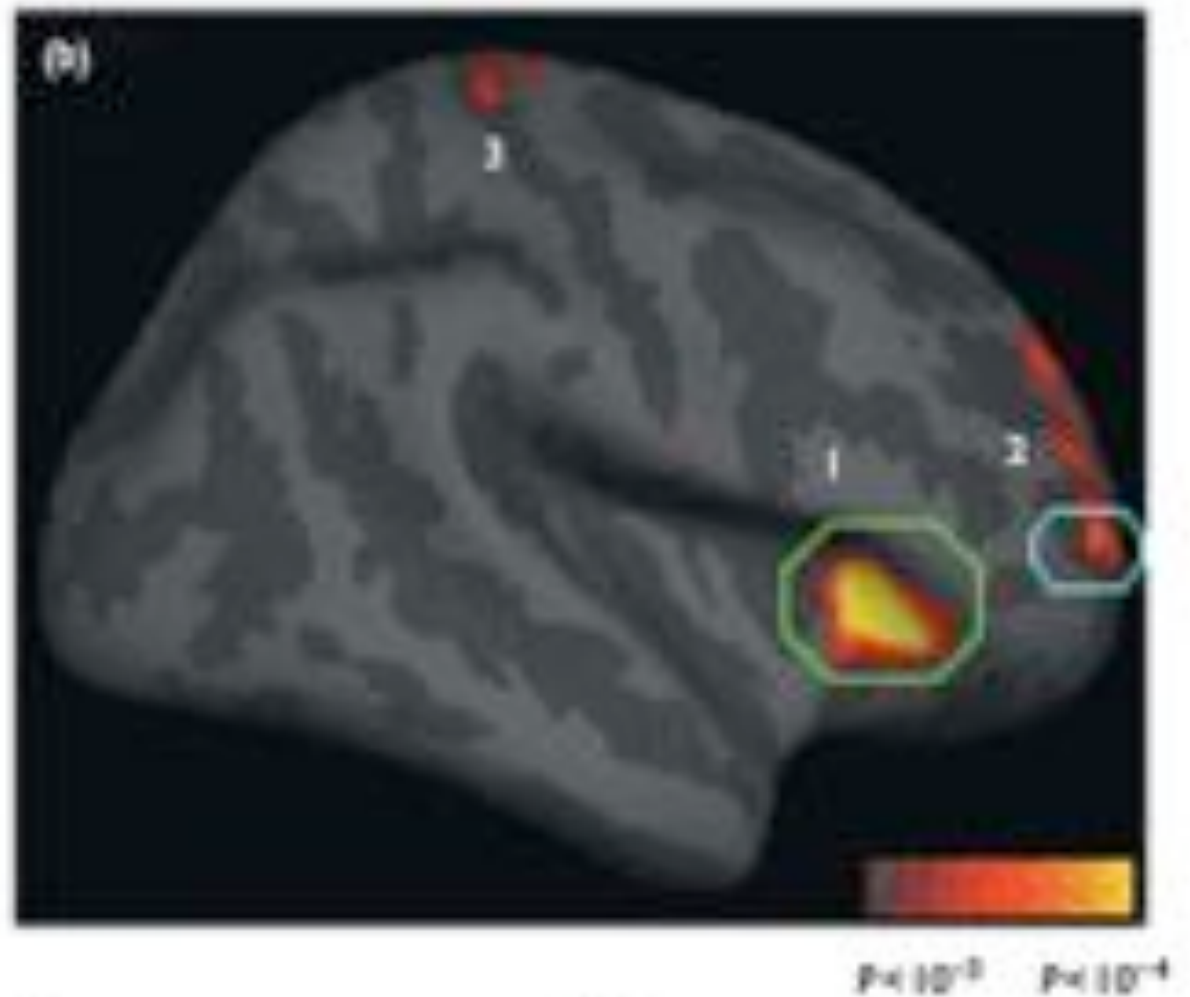


# Mind Changes Brain in Lasting Ways

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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.



# Honoring Experience

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**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

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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 Mindfulness

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- 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

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- 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

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- 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

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- 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

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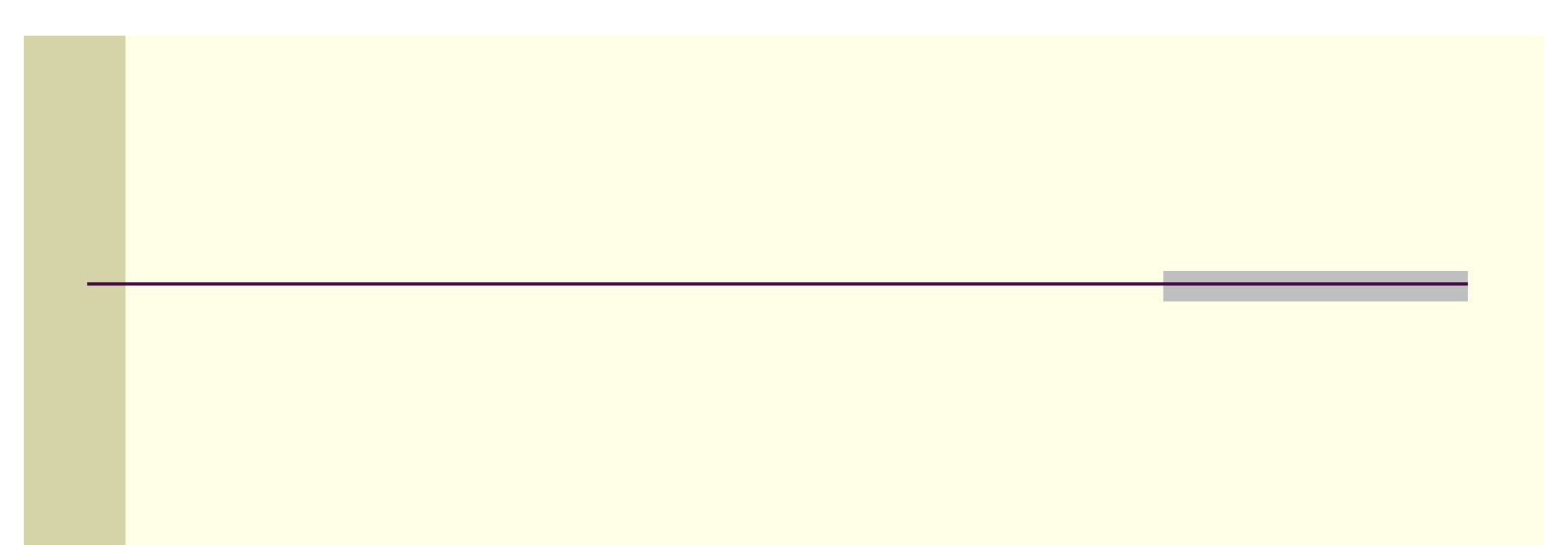
- Compassion is the wish that a being not suffer, combined with sympathetic concern. Self-compassion simply applies that to oneself. It is not self-pity, complaining, or wallowing in pain.
- Studies show that self-compassion buffers stress and increases resilience and self-worth.
- But self-compassion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

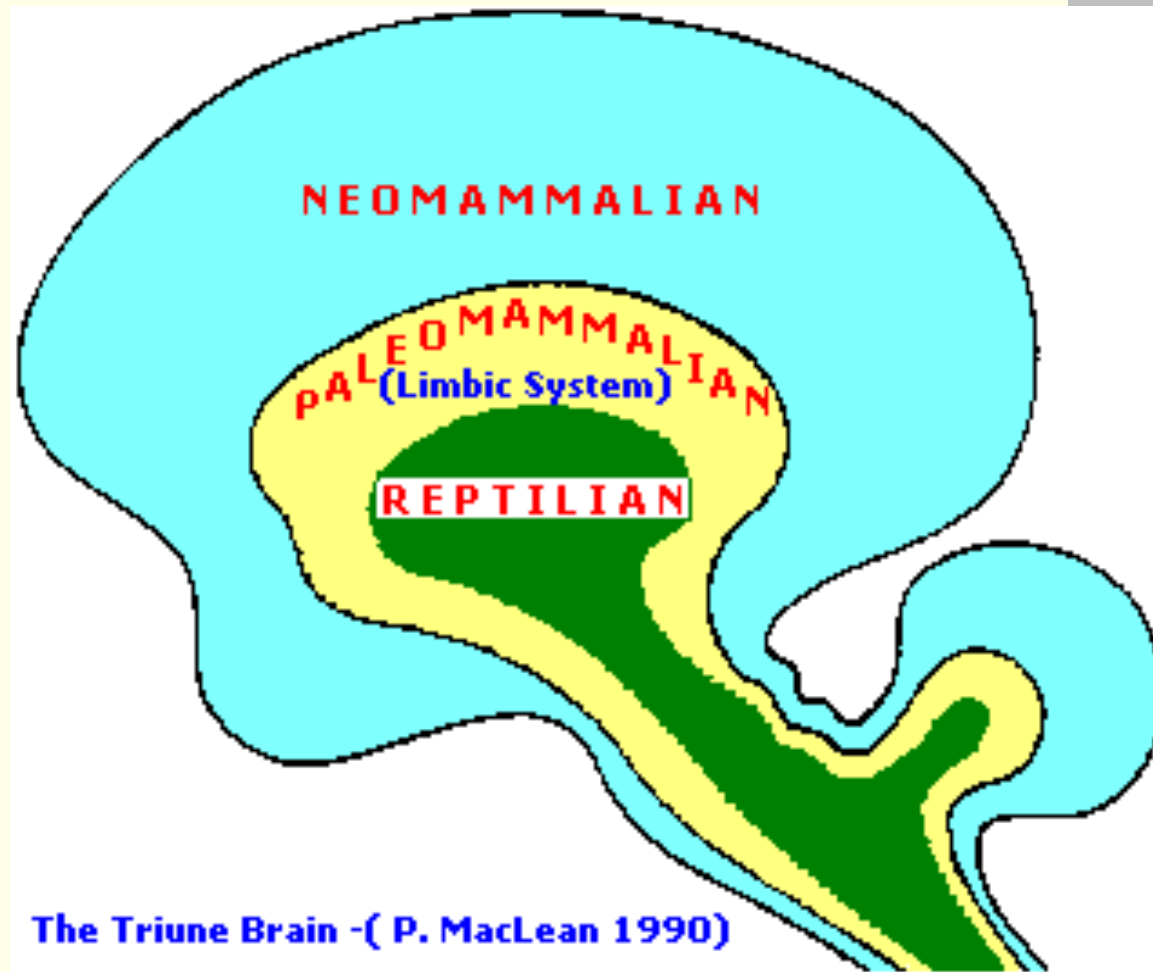
# Evolution

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- ~ 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

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## ■ 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”

# Three Goal-Directed Systems Evolved in the Brain

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- **Avoid** “sticks,” threats, penalties, pain
- **Approach** “carrots,” opportunities, rewards, pleasure
- **Attach** to “us,” proximity, bonds, feeling close
- Although the three branches of the vagus nerve loosely map to the three systems, the essence of each is its aim, not its neuropsychology.
- Each system can draw on the other two for its ends.

# Love and the Brain

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- Social capabilities have been a primary driver of brain evolution.
- Reptiles and fish avoid and approach. Mammals and birds *attach* as well - especially primates and humans.
- Mammals and birds have bigger brains than reptiles and fish.
- The more social the primate species, the bigger the cortex.
- Since the first hominids began making tools ~ 2.5 million years ago, the brain has roughly tripled in size, much of its build-out devoted to social functions (e.g., cooperative planning, empathy, language). The growing brain needed a longer childhood, which required greater pair bonding and band cohesion.

**A key component of the Reactive mode is a focus on scanning for, reacting to, storing, and retrieving negative stimuli: *the negativity bias.***

# Negativity Bias: Causes in Evolution

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- “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!<sup>38</sup> no more carrots forever.



**With the negativity bias, the Avoid system hijacks the Approach and Attach systems, inhibiting them or using them for its ends.**

# Negativity Bias: Physiology and Neuropsychology

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- 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

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- 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)

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- 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)

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- 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 <sup>43</sup>

# Negativity Bias: Complications

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- 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

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- 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

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## ■ Physical:

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

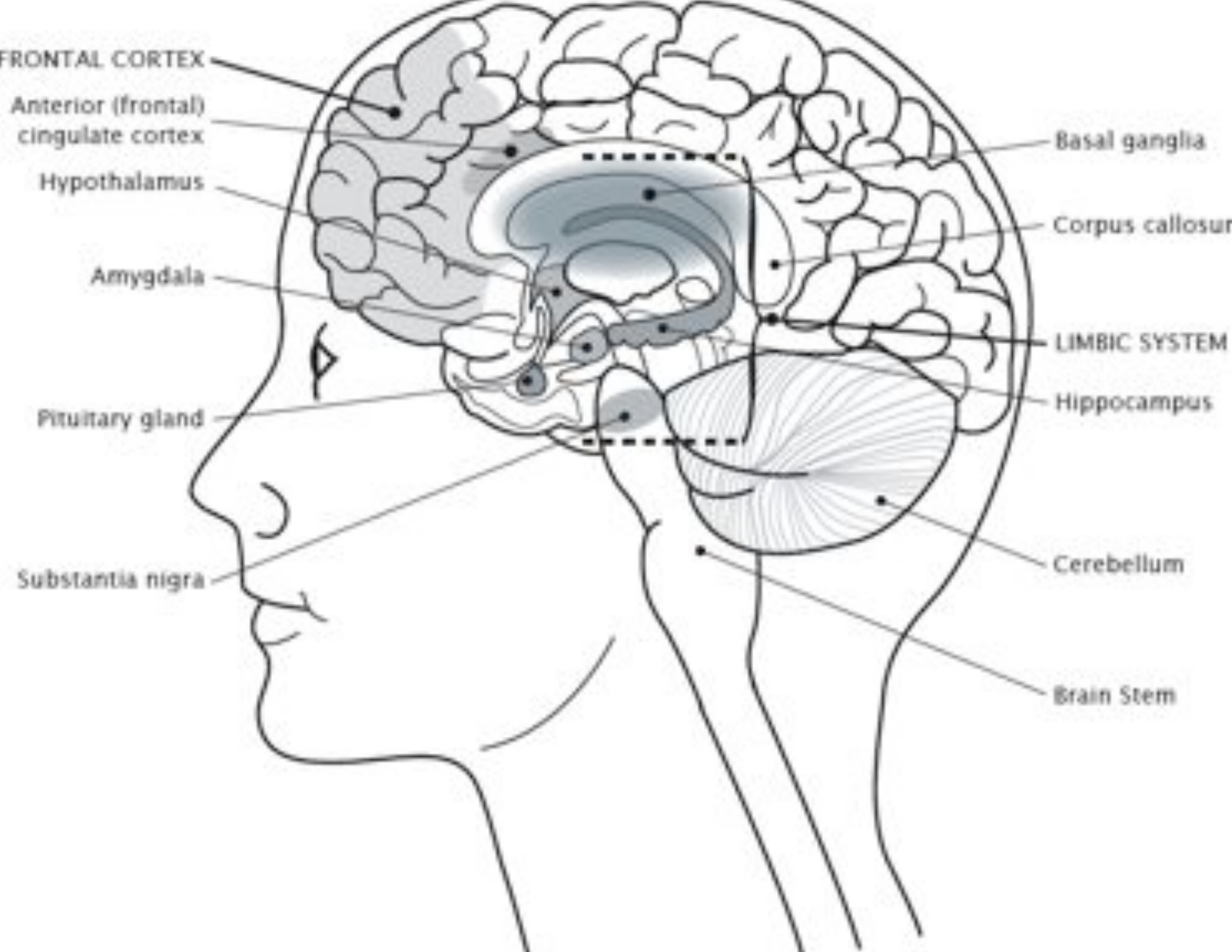
## ■ Mental:

- 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

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- 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

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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. 51

# 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 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


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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

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- 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

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## ■ 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


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## ■ 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**

# Mindfulness, Virtue, Wisdom

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- **Mindfulness** (or “concentration”), **virtue**, and **wisdom** are identified in Buddhism and other contemplative traditions as the pillars of practice.
- In Western psychology, these are the foundations of mental health and well-being.
- These three pillars map to three core functions of the nervous system:
  - Receiving/learning
  - Regulating
  - Prioritizing/selecting

# “Know the Mind, Shape the Mind, Free the Mind”

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- **Mindfulness, virtue, and wisdom** - and their neural correlates - also map to three phases of practice:
  - Be aware of the garden, pull weeds, plant flowers.
  - Be mindful of, release, replace.
  - Let be, let go, let in.
- People vary in their inclinations and strengths with the phases.
- Sometimes we need to take in resources in the third phase in order to bear our own experience.
- 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.



**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

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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

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- 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

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- 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

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- 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

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- 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

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*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

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- 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

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- 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

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- 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


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- 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

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- 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

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- 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

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- 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

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- 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

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## ■ 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

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## 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

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- 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

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- 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”)<sup>82</sup>; this stimulates and strengthens the PFC-A “locale” system

# TIG and Trauma

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- 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

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- 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.



# Natural Happiness

# Reverse Engineering the Brain

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*What is the nature of the brain when a person is:*

- In peak states of productivity or “flow?”
- Experiencing inner peace?
- Self-actualizing?
- Enlightened (or close to it)?

# Three Motivational Systems

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- **Avoid** “sticks,” threats, penalties, pain
- **Approach** “carrots,” opportunities, rewards, pleasure
- **Attach** to “us,” for proximity, bonds, feeling close
  
- Reptiles and fish avoid and approach. Mammals and birds also *attach* - especially primates and humans. Attaching is a breakthrough, co-evolving with emotion.
  
- Although the three branches of the vagus nerve loosely map to the three systems, the essence of each is its aim, not its neuropsychology. Each system can draw on another system for its ends.

# Home Base of the Human Brain

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*When not threatened, ill, in pain, hungry, upset, or chemically disturbed, most people settle into being:*

- **Calm** (the Avoid system)
- **Contented** (the Approach system)
- **Caring** (the Attach system)
- **Creative** - synergy of all three systems

This is the brain in its natural, ***responsive*** mode.



# The Responsive Mode

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# Some Benefits of Responsive Mode

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- Recovery from “mobilizations” for survival:
  - Refueling after depleting outpourings
  - Restoring equilibrium to perturbed systems
  - Reinterpreting negative events in a positive frame
  - Reconciling after separations and conflicts
- Promotes prosocial behaviors:
  - Experiencing safety decreases aggression.
  - Experiencing sufficiency decreases envy.
  - Experiencing connection decreases jealousy.
  - We’re more generous when our own cup runneth over.

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*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

# But to Survive, We Leave Home . . .

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- **Avoid:** When we feel threatened or harmed
- **Approach:** When we can't attain important goals
- **Attach:** When we feel isolated, disconnected, unseen, unappreciated, unloved

This is the brain in its *reactive* mode of functioning  
- a kind of inner homelessness.

# The Reactive Mode



# Reactive Dysfunctions in Each System

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- **Approach** - Addiction; over-drinking, -eating, -gambling; compulsion; hoarding; driving for goals at great cost; spiritual materialism
- **Avoid** - Anxiety disorders; PTSD; panic, terror; rage; violence
- **Attach** - Borderline, narcissistic, antisocial PD; symbiosis; *folie a deux*; “looking for love in all the wrong places”

# Choices . . .



Or?



**Reactive Mode**

**Responsive Mode**

# Coming Home . . .

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**Gladness**

**Love**

**Peace**



# Ways to “Take the Fruit as the Path”

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General factors: See clearly. Have compassion for yourself. Take life less personally. Take in the good. Deepen equanimity.

## Approach system


- Be glad.
- Appreciate your resources.
- Give over to your best purposes.

## Attach system

- Sense the suffering in others.
- Be kind.
- Act with unilateral virtue.

## Avoid system

- Cool the fires.
- Recognize paper tigers.
- Tolerate risking the dreaded experience.



*Penetrative insight*

*joined with calm abiding*

*utterly eradicates*

*afflicted states.*

Shantideva

# 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

---

- 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. 101

# 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.

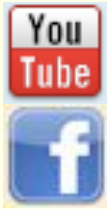
# Key Papers - 4

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- 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.

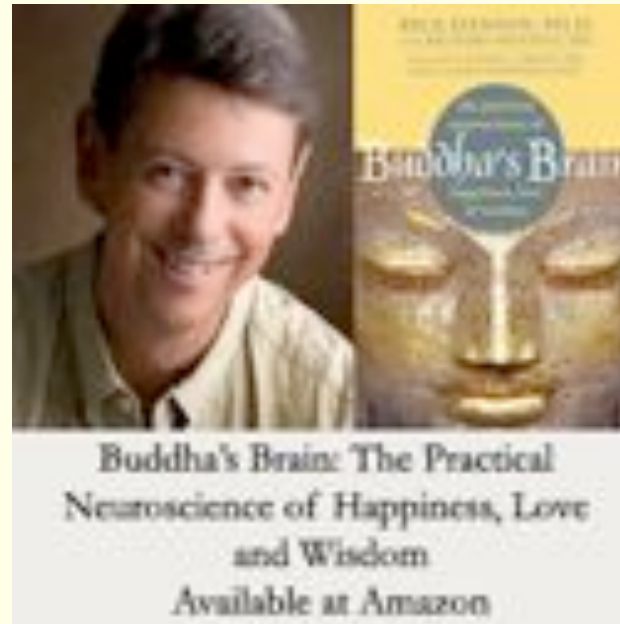
## *Where to Find Rick Hanson Online*

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

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



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

[www.WiseBrain.org](http://www.WiseBrain.org)