
***Taking in the Good:
The Science of Weaving Positive Experiences
Into the Brain and the “Self”***

Openground

February, 2010

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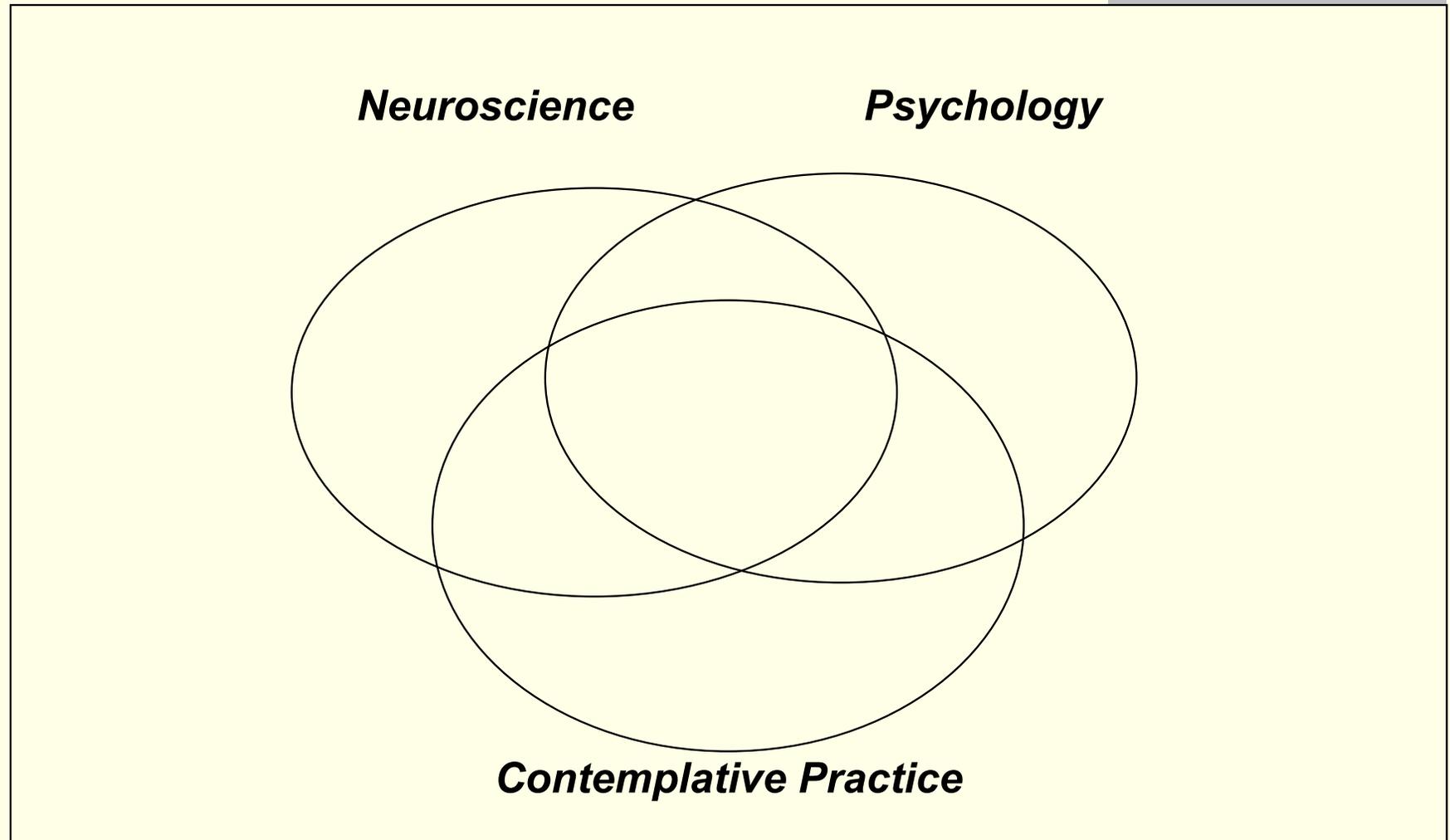
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Common - and Fertile - Ground



Within the Frame of Western Science

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

There could be Transcendental factors at work in the brain and the mind. (That's my personal opinion.)

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

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

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

We don't know,

yet we are thinking continually."

- Ven. Tenzin Palmo

Basics of Meditation

- Relax
- Posture that is comfortable and alert
- Simple good will toward yourself
- Awareness of your body
- Focus on something to steady your attention (e.g., sensations of breathing, a saying)
- Accepting whatever passes through awareness, not resisting it or chasing it
- Gently settling into peaceful well-being

Foundations of Meditation

- Setting an intention - top-down frontal lobes; bottom-up subcortical arousal and emotional valence; whole-brain embodied cognition
- Relaxing the body - parasympathetic nervous system
- Feeling safer - dials down amygdala/hippocampus vigilance circuits; reduces internal signals of anxiety and vicious cycles
- Evoking positive emotion - high stable dopamine steadies the mind; it and norepinephrine promote synaptic formation
- Absorbing the benefits - primes memory circuits; compensates for the negativity bias

Your Amazing Brain

■ **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 or hundredth of a second

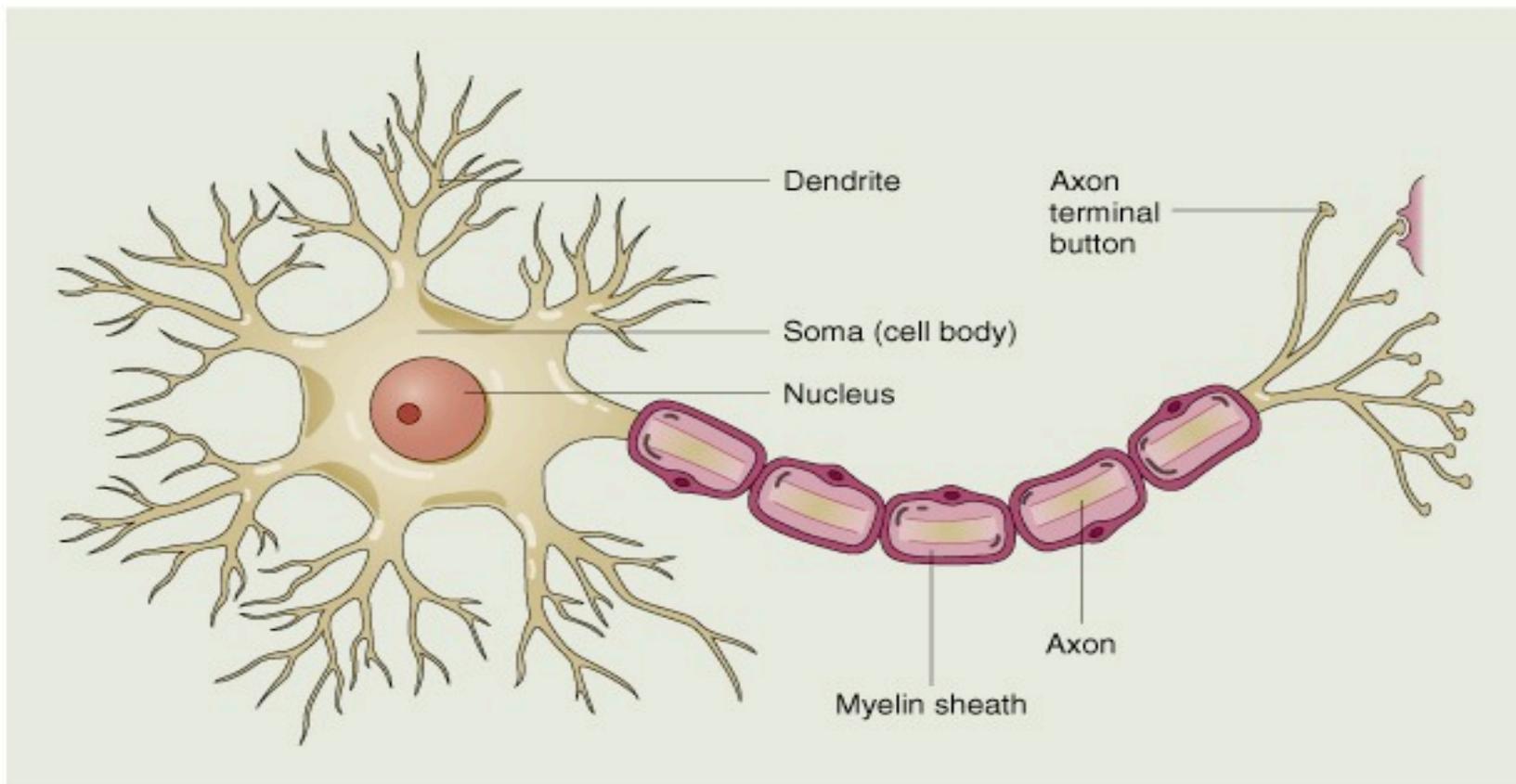
■ **Connectivity:**

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

■ **Complexity:**

- Potentially 10 to a millionth power brain states

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

Three Consequences of Brain-Mind Integration

1. As your brain changes, your mind changes.
2. As your mind changes, your brain changes. What flows through your mind sculpts your brain:
 - Increased blood/nutrient flow to active regions
 - Epigenetics: experience affects gene expression
 - “Neurons that fire together wire together.”
 - Increasing excitability of active neurons
 - Strengthening existing synapses
 - Building new synapses; thickening cortex; life-long
 - Neuronal “pruning” - “use it or lose it”
 - Changes within and between neural networks
3. Brain and mind arise co-dependently, shaping each other.

Honoring Subjective Experience

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 being.

A Fourth, and Very Useful Consequence of Brain/Mind Integration

Because the mind and brain co-arise:

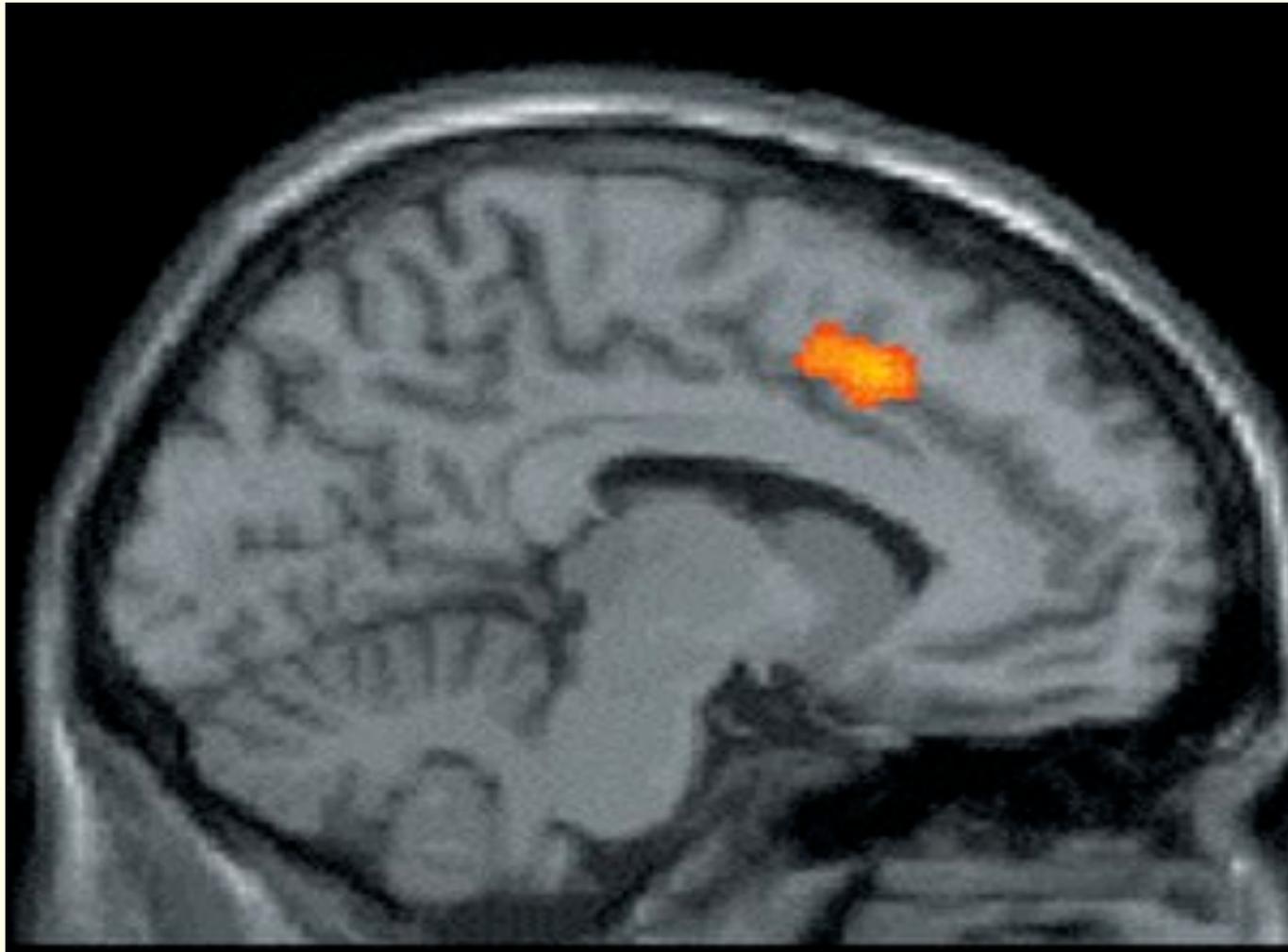
You can use your mind to change your brain to change your mind.

To benefit your whole being, and every other being whose life you touch.

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

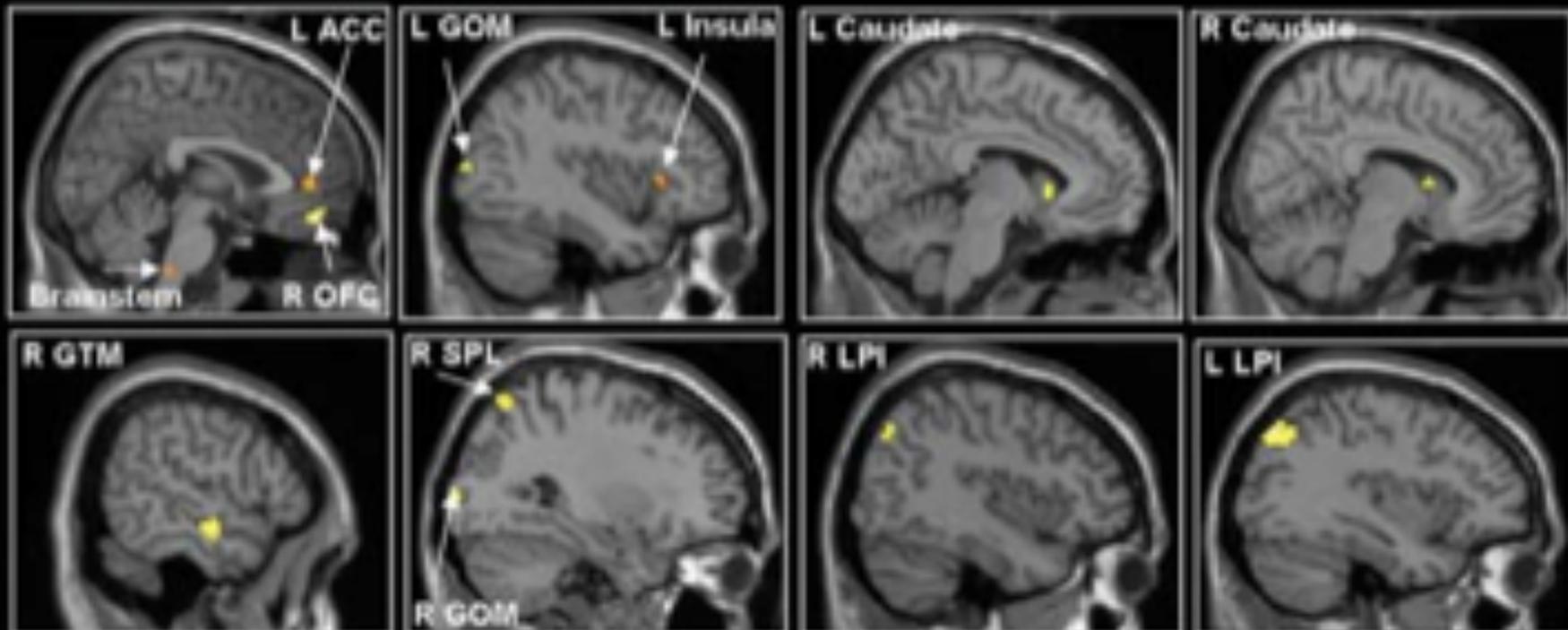
Marvin L. Minsky

A Meditator

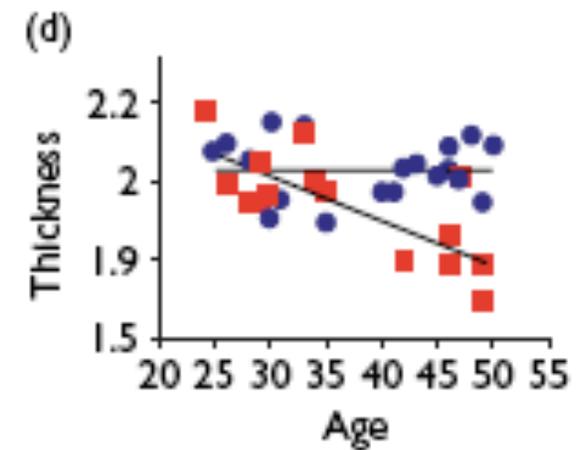
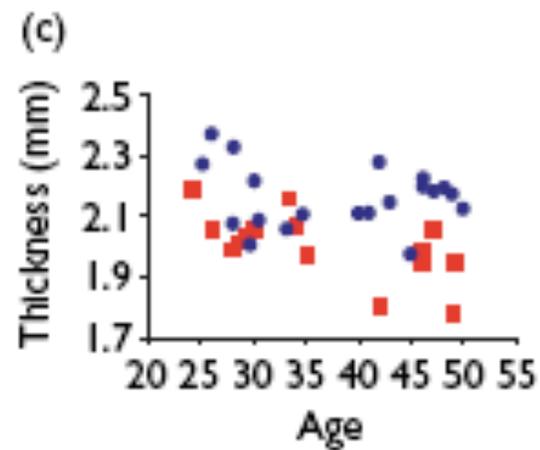
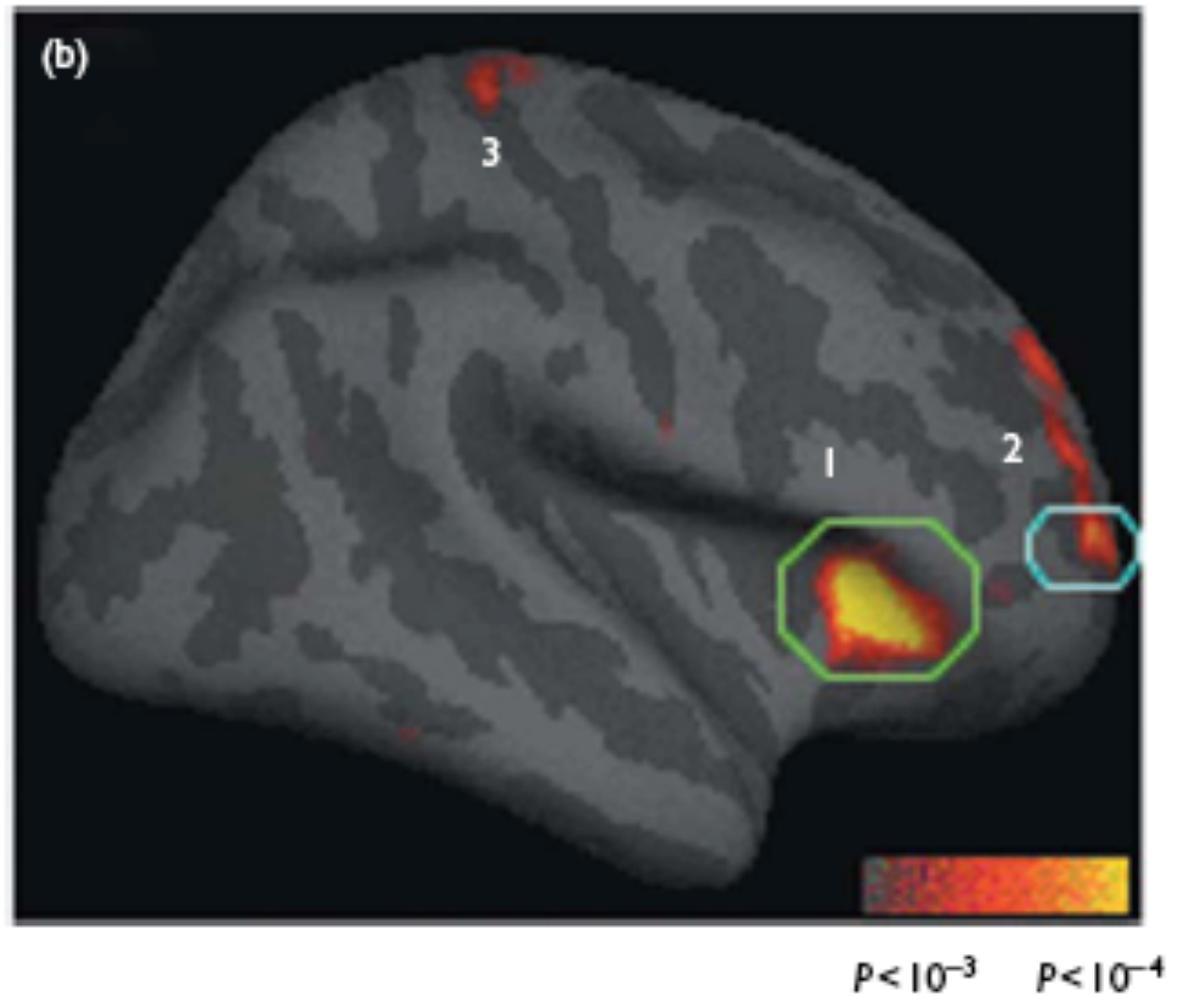


Nuns in Prayer

Mystical > Baseline



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



Physical Effects of Meditation

- Thickens and strengthens anterior (frontal) cingulate cortex and insula. Results include improved attention, empathy, and compassion.
- Less cortical thinning with aging
- Increases activation of left frontal regions, which lifts mood
- Increases power and reach of gamma-range brainwaves
- Decreases stress-related cortisol
- Stronger immune system

A Fourth, and Very Useful Consequence of Brain/Mind Integration

Because the mind and brain co-arise:

*You can use your mind to change your brain to
change your mind.*

To benefit your whole being, and every other
being whose life you touch.

Being for Yourself

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

“Anthem”

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

Leonard Cohen

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

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

Ajahn Sumedho

Evolution Grinding Away

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

The 2% Difference

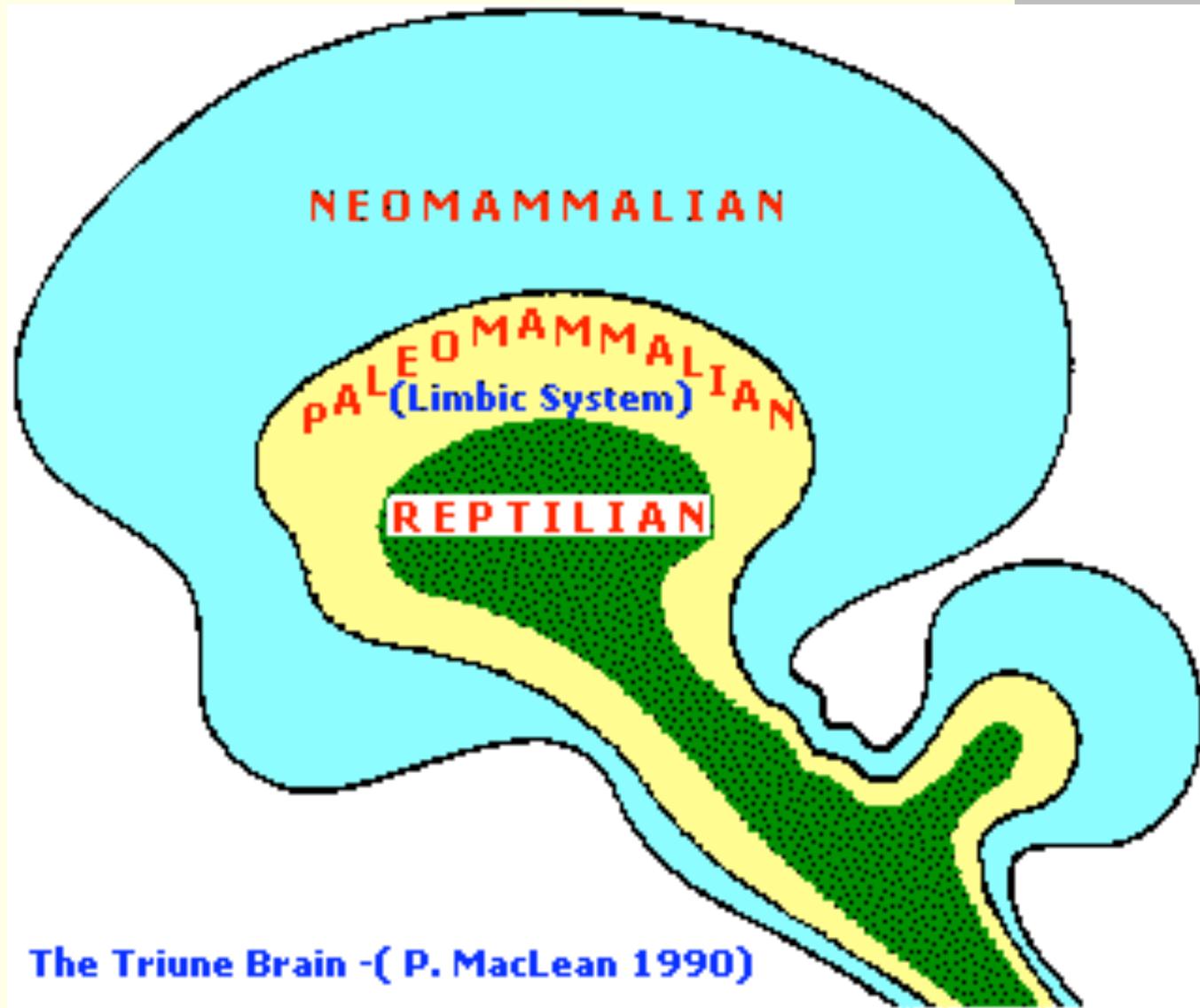
- Chimpanzee DNA is 98-99% identical to yours and mine.
- Most of that crucial 1-2% difference codes genes for your brain.
- Human evolution is about mainly one thing: Brain. Brain. Brain.

All for what purpose?

Grandchildren!



The “Triune Brain”



Three Stages of Brain Evolution

- **Reptilian:**

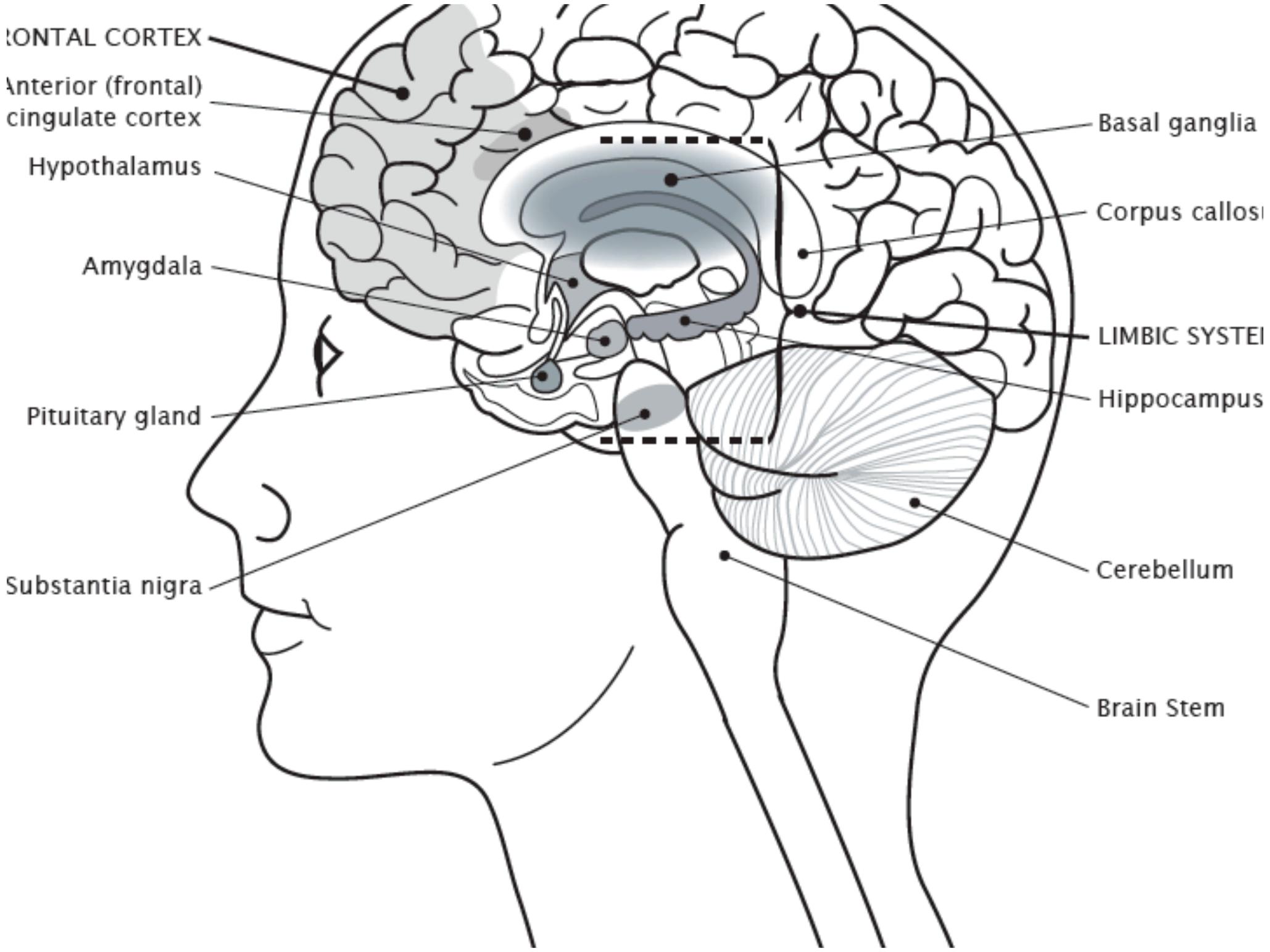
- Brainstem, cerebellum, hypothalamus
- Reactive and reflexive

- **Mammalian:**

- Limbic system, cingulate, early cortex
- Memory, emotion, social behavior

- **“Clever Ape”** (*Homo sapiens*):

- Cerebral hemispheres
- Self-reflection, cooperative planning, abstract thought, language, empathy, altruism



FRONTAL CORTEX

Anterior (frontal) cingulate cortex

Hypothalamus

Amygdala

Pituitary gland

Substantia nigra

Basal ganglia

Corpus callosum

LIMBIC SYSTEM

Hippocampus

Cerebellum

Brain Stem

The Negativity Bias - Sources and Dynamics

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

Negative Experiences Can Have Benefits

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

Negative Experiences Are Stressful

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

Health Consequences of Chronic Stress

■ Physical:

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

■ Mental:

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

Neural Consequences of Negative Experiences

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

A Poignant Truth

Mother Nature is tilted toward producing gene copies.

But tilted against personal quality of life.

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

What shall we do?

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

Learning and Memory

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

How to Increase Neuroplasticity

■ Physiological factors:

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

■ Mental factors:

- Intention
- Within awareness
- Receives focused attention
- Is sustained, multimodal, and intense
- Is (alas) negative

Some Key Strategies

- Improve views:
 - Insight into one's psychology, history, others
 - Cognitive reframing
 - Increasingly coherent attachment narratives
- Look for positive facts and experiences:
 - Moments of accomplishment, beauty, warmth from others, the magnificence of life itself.
- Create positive experiences:
 - Increase skills, coping
 - Be compassionate, kind to oneself
 - Gratitude: the amazing big picture; "Three Blessings"

Another Strategy: Take in the Good

1. Register positive facts as positive experiences.
2. Savor the experience:
 - Sustain it.
 - Have it be emotional and sensate.
 - Intensify it.
3. Sense and intend that the positive experience is soaking into your brain and body - registering deeply in emotional memory.

Types of Positive Facts

- Things are alright; nothing is wrong; there is no threat
- A feared event did not occur
- Good conditions (e.g., alive, human, not in war zone)
- Accomplishments - especially small, everyday ones
- Coping: not overrun
- Efficacy: hammer, not nail
- Included, wanted, liked, cared about, loved
- Respected, valued, approved of
- Positive character traits
- Insights from life (and therapy, etc.)
- Existential or spiritual realizations

Key Positive Experiences

- Physical pleasure; health; vigor
- Relief, safety, calming, soothing
- Gladness, gratitude
- Connected, belonging; seen, accepted, empathized with; matter, cared about, supported; liked, loved, cherished
- Managing; self-regulating
- Feeling at cause; courage, strength, determination, grit
- Adequacy, capability, productivity; worth, wholesome pride

Targets of TIG

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

Why It's Good to Take in the Good

- Rights an unfair imbalance, given the negativity bias
- Gives oneself today the caring and support one should have received as a child, but perhaps didn't get in full measure; an inherent, implicit benefit
- Increases positive resources, such as:
 - Postive emotions
 - Capacity to manage stress and negative experiences
- Can help heal trauma (we'll get to this one soon)

Increasing Positive Resources

- TIG increases positive resources through:
 - Looking for positive facts
 - Cultivating positive bodily states, emotional residues, views, and behaviors
- This cultivation:
 - Creates resources that buffer against stress, reducing negative experiences
 - Improves the “default” resting state
 - Promotes actions that increase future positive emotions, such as approach and prosocial behaviors

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

Bertrand Russell

Benefits of Positive Emotions

- The benefits of positive emotions are a proxy for many of the benefits of TIG.
- Emotions organize the brain as a whole, so positive ones have far-reaching benefits
- These include:
 - Stronger immune system; less stress-reactive cardiovascular
 - Lift mood; increase optimism, resilience
 - Counteract trauma
 - Promote exploratory, “approach” behaviors
 - Create positive cycles

TIG and the Stress Response

- Activates and thereby strengthens general, top-down PFC-hippocampal (PFC-A) capabilities, which become enhanced resources for coping
- Generally desensitizes amygdaloid-SNS-HPAA networks
- Can include internalizing specifically regulatory experiences, which strengthens PFC-A and inhibits A-SNS-HPAA
- Can include other specific experiences that buffer stress and/or begin to remedy an individual's past deficits (e.g., self-confidence, being soothed or encouraged, feeling of worth)

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

Key Points about Memory

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

The Fourth Step of TIG

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

Plausible Neurology of TIG4

- Extinction, through pairing a negative experience with a powerful positive one.
- Reinforces maintaining PFC-H activation and control during A-SNS-HPAA 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 (the third fundamental motivational system)

■ Skills:

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

Self-Compassion

- Compassion is the wish that someone not suffer, combined with feelings of sympathetic concern. Self-compassion simply applies that to oneself. It is not self-pity, complaining, or wallowing in pain.
- Self-compassion is a major area of research, with studies showing that it buffers stress and increases resilience and self-worth.
- But self-compassion is hard for many people, due to feelings of unworthiness, self-criticism, or “internalized oppression.” To encourage the neural substrates of self-compassion:
 - Get the sense of being cared about by someone else.
 - Bring to mind someone you naturally feel compassion for
 - Sink into the experience of compassion in your body
- Then shift the focus of compassion to yourself, perhaps with phrases like: “May I not suffer. May the pain of this moment pass.”

Psychological Antidotes

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

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”); this stimulates and strengthens the PFC-A “locale” system

Respecting Neurological Diversity

- Temperament:
 - “Fearful, feisty, and flexible”
 - “Choleric, melancholic, phlegmatic, sanguine”
 - “Turtles and jackrabbits”
- Cognitive styles and abilities
- Executive functions (e.g., self-monitoring, dividing attn.)
- Male and female (though these differences are averages of groups with many exceptions; often overstated; always less than the differences within a given gender)

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.

TIG and Children

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

Potential Synergies of TIG and MBSR

- Increased positive experiences and resources as general aids to MBSR
- Deliberate, systematic activation of specific, individualized positive resource states during MBSR
- Heightened internalization of positive experiences during MBSR, such as:
 - Stable mindfulness
 - Confidence that awareness itself is not in pain
 - Presence of supportive others (e.g., MBSR groups)
- Using improved mindfulness to enhance TIG

Equanimity - stability and balance,

neither grasping at what's pleasant

nor resisting what's unpleasant -

is both a result of and a growing resource for

taking in the good.

Equanimity in Buddhism

- The feeling tone of experience
- Tone -> Craving -> Clinging -> Suffering
- Equanimity is the circuit breaker
 - Stops the flow of second darts
 - Bringing spaciousness and stability
 - Not indifference and apathy
- One of the Brahmaviharas and Paramis
- Central to the 4th Jhana
- Enables us to handle the Eight Worldly Winds

Parasympathetic Nervous System

- The “rest-and-digest” parasympathetic nervous system (PNS) balances and dials down the “fight-or-flight” sympathetic nervous system
- It soothes, resets, renews the body-mind. Though the SNS gets more press, the PNS is more primary.
- Methods for PNS activation:
 - Relax the tongue
 - Touch the lips
 - Long exhalation
 - Bodily relaxation

If you let go a little, you will have a little happiness.

If you let go a lot, you will have a lot of happiness.

If you let go completely, you will be completely happy.

Ajahn Chah

The Factors of Concentration

- Applied attention - bringing it to bear
- Sustained attention - staying with the target
- Rapture - great interest in the target, bliss
- Joy - happiness, contentment, and tranquility
- Singleness - unification of awareness

Penetrative insight

joined with calm abiding

utterly eradicates

afflicted states.

Shantideva



Equanimity is intertwined with
the three other “blessed attributes,” of
compassion, lovingkindness,
and sympathetic joy.



Equanimity supports them,
and is supported by them in turn.

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

Basho

Great Books

See www.RickHanson.net for other great books.

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See www.RickHanson.net for other scientific papers.

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