

# **Buddha's Brain:**

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***Weaving Positive Emotions,  
Optimism, and Resilience  
Into the Brain and the Self***

**Munich, Germany**

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

# Topics

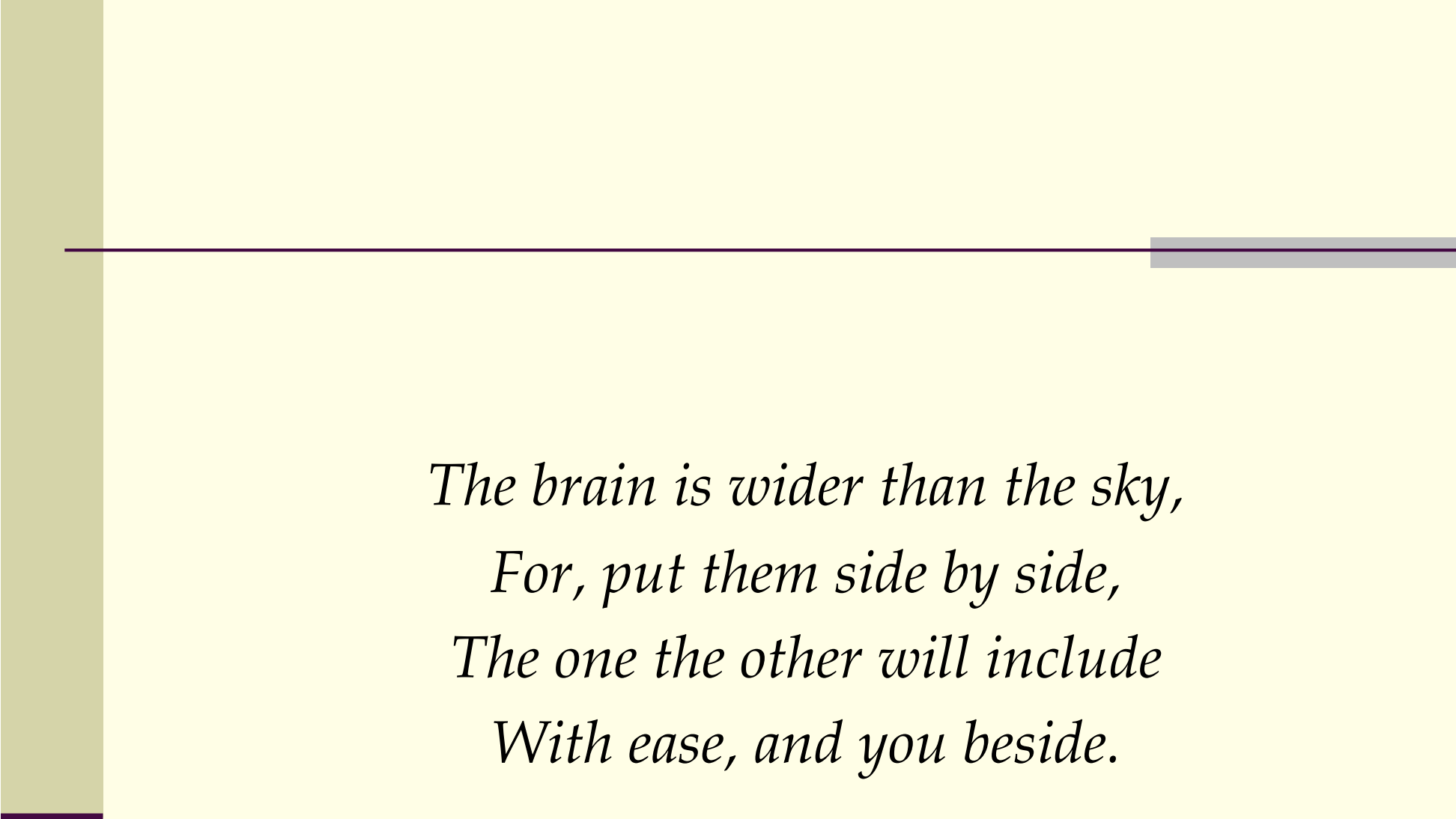
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- **Perspectives**
- **Growing inner strengths**
- **The negativity bias**
- **Taking in the good**
- **Research on the HEAL process**
- **Practical uses of the HEAL process**
- **The evolving brain**
- **Key resource experiences**
- **Healing old pain**
- **The fruit as the path**



# Perspectives



A decorative vertical bar in a light olive green color runs along the left edge of the slide. A thin, dark purple horizontal line spans the width of the slide, intersecting the vertical bar. On the right side of this horizontal line, there is a small rectangular block composed of two stacked layers: a light gray top layer and a dark purple bottom layer.

*The brain is wider than the sky,  
For, put them side by side,  
The one the other will include  
With ease, and you beside.*

Emily Dickinson

# The Natural Mind

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Apart from the hypothetical influence of a transcendental X factor . . .

Awareness and unconsciousness, mindfulness and delusion, and happiness and suffering must be natural processes.

Mind is grounded in life.



A detailed illustration of a neural network. Numerous yellow, thread-like axons crisscross the frame, connecting various cell bodies. In the center, a single neuron is highlighted with a bright green nucleus and a glowing green cell body, making it stand out from the yellow network. The background is dark, emphasizing the luminous structure of the neurons.

Neurons that fire together,

wire together.

# Self-Directed Neuroplasticity

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**We can use the mind**

**To change the brain**

**To change the mind for the better**

**To benefit ourselves and other beings.**





*If one going down into a river,  
swollen and swiftly flowing,  
is carried away by the current --  
how can one help others across?*

The Buddha



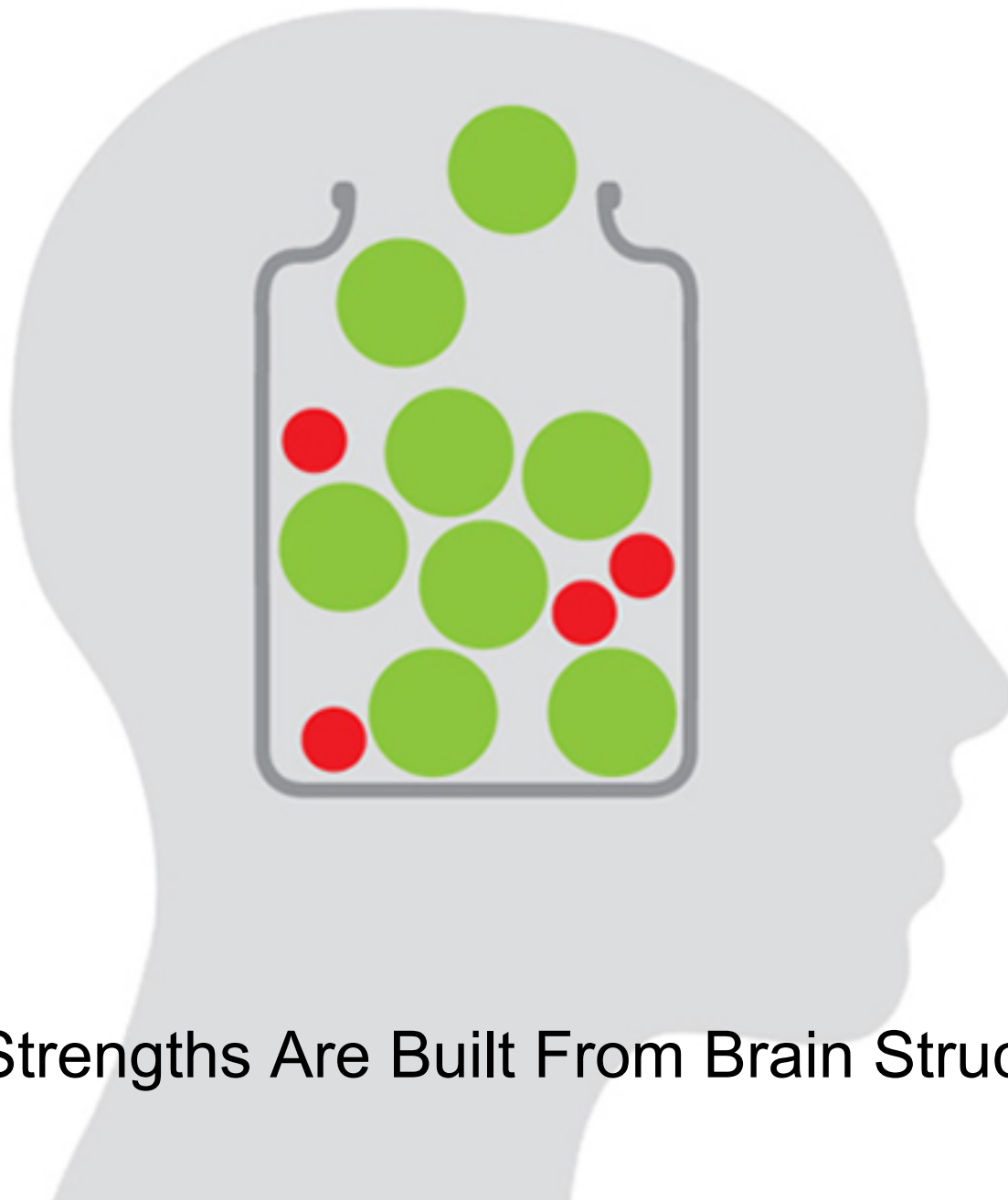
# **Growing Inner Strengths**

Two wolves in the heart

# Inner Strengths Include

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- **Virtues** (e.g., patience, energy, generosity, restraint)
- **Executive functions** (e.g., meta-cognition)
- **Attitudes** (e.g., optimism, openness, confidence)
- **Capabilities** (e.g., mindfulness, emotional intelligence, resilience)
- **Positive emotions** (e.g., gratitude, self-compassion)
- **Approach orientation** (e.g., curiosity, exploration)



Inner Strengths Are Built From Brain Structure

# Let's Try It

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- **Notice** the experience already present in awareness that you are alright right now
  - Have the experience
  - Enrich it
  - Absorb it
  
- **Create** the experience of compassion
  - Have the experience - bring to mind someone you care about . . . Feel caring . . . Wish that he or she not suffer . . . Open to compassion
  - Enrich it
  - Absorb it



# The Machinery of Memory

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States are temporary, traits are enduring.

States foster traits, and traits foster states

Activated states --> Installed traits --> Reactivated states --> Reinforced traits

Negative states --> Negative traits --> Reactivated negative states --> Reinforced negative traits

Positive states --> Positive traits --> Reactivated positive states --> Reinforced positive traits

# Growing Inner Strengths

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Inner strengths are grown from positive mental states that are turned into positive neural traits.

Change in neural structure and function (learning, memory) involves activation and installation.

We become more compassionate by repeatedly internalizing feelings of compassion; etc.

Without **installation**, there is no growth, no learning, no lasting benefit.



# **The Negativity Bias**

# Negative Experiences In Context

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- Going negative about negative --> more negative
- Some inner strengths come only from negative experiences, e.g., knowing you'll do the hard thing.
- But negative experiences have inherent costs, in discomfort and stress.
- Many inner strengths could have been developed without the costs of negative experiences.
- Many negative experiences are pain with no gain.

# The Brain's Negativity Bias

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- As our ancestors evolved, avoiding “sticks” was more important for survival than getting “carrots.”
- Negative stimuli:
  - More attention and processing
  - Greater motivational focus: loss aversion
- Preferential encoding in implicit memory:
  - We learn faster from pain than pleasure.
  - Negative interactions: more impactful than positive
  - Easy to create learned helplessness, hard to undo
  - Rapid sensitization to negative through cortisol

# Velcro for Bad, Teflon for Good

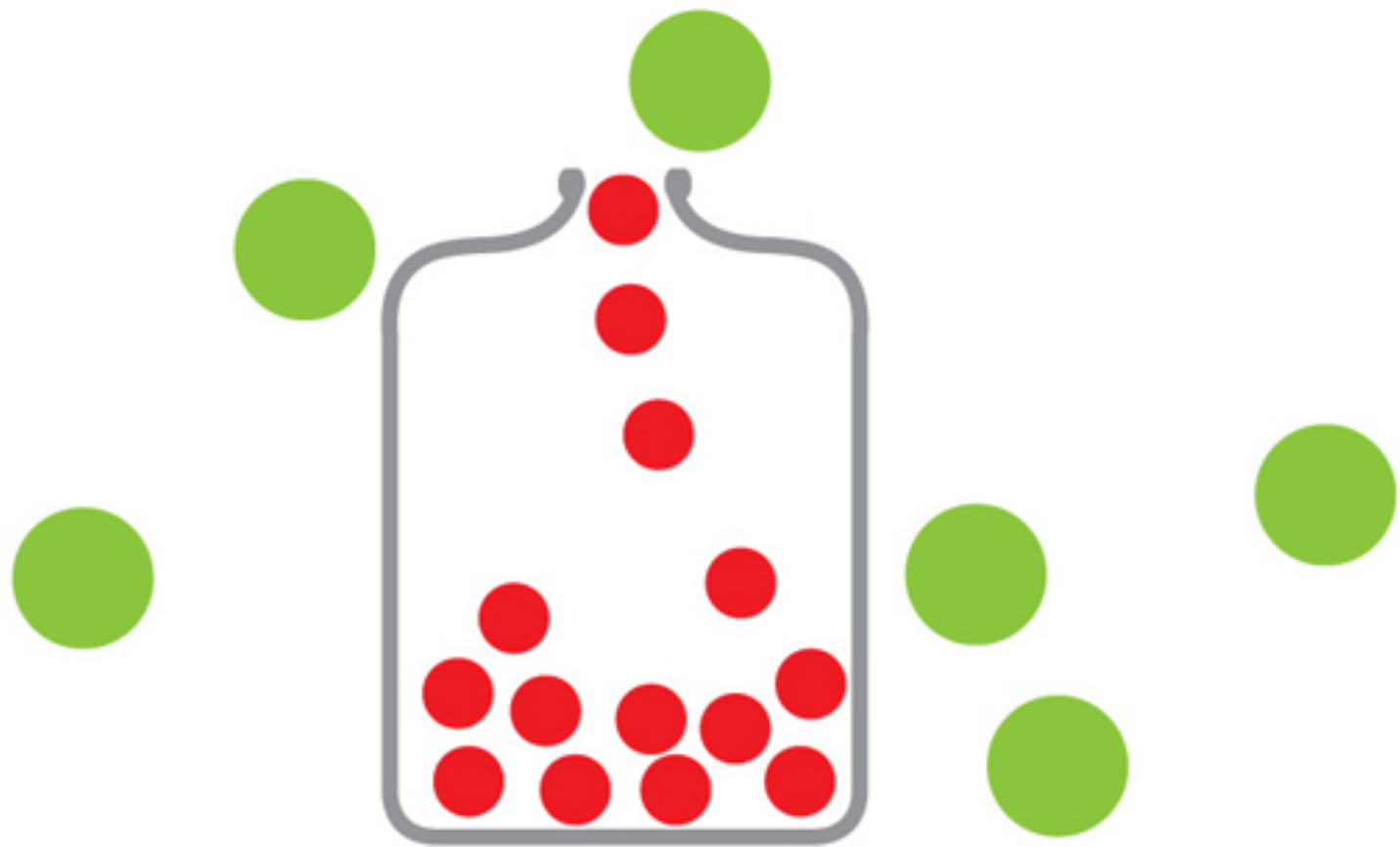
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The negativity bias

*bad experiences*

*good experiences*






The Negativity Bias

# Stone age brains in the 21st century





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



# **Taking in the Good**




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**Just having positive experiences is not enough.**

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

**This is the fundamental weakness in most psychotherapy, human resources training, and spiritual practices.**


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



*The same research that proves therapy works  
shows no improvement in outcomes  
over the last 30 or so years.*

Scott Miller





*To see what is in front of one's nose  
takes a constant struggle.*

George Orwell


# The Humility of Receptivity

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It's easy and tempting to be fascinated with the rapid flow of thought, and with a mind darting toward or away from anticipated pleasures or pains.

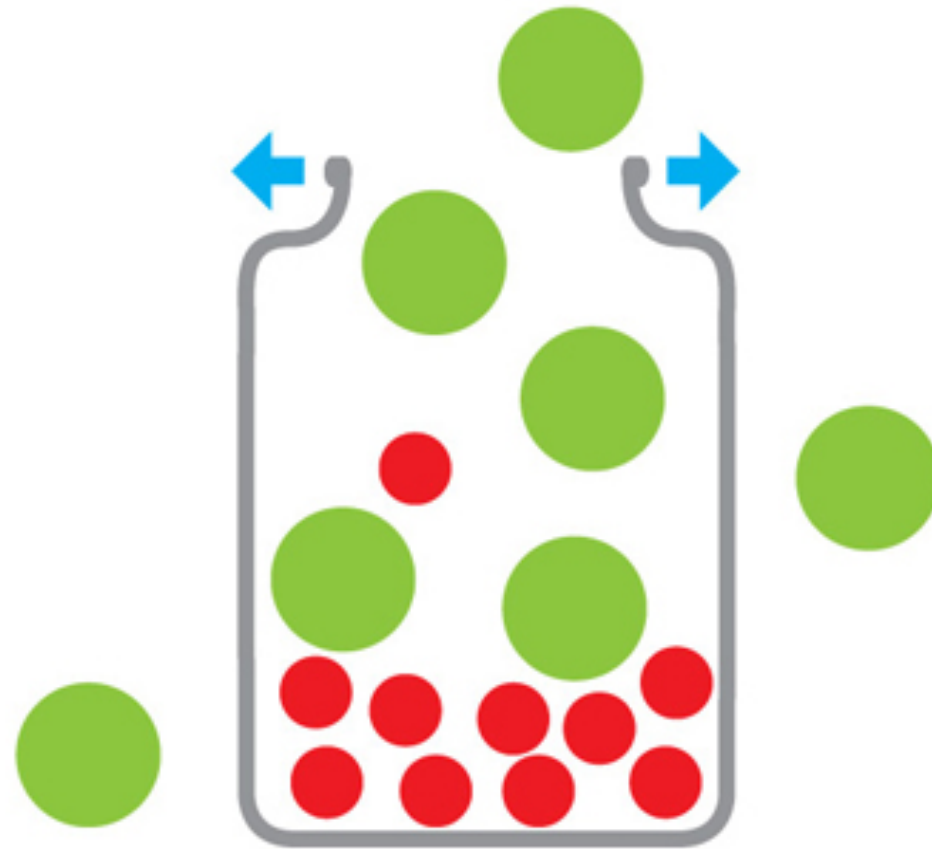
But the memory-making – neural structure and function changing – processes of the brain, especially for emotional, somatic, and motivational learning, are generally slower than cascading thought.

To consolidate useful experiences in the brain takes time . . . Accepting the rhythms of the flesh.

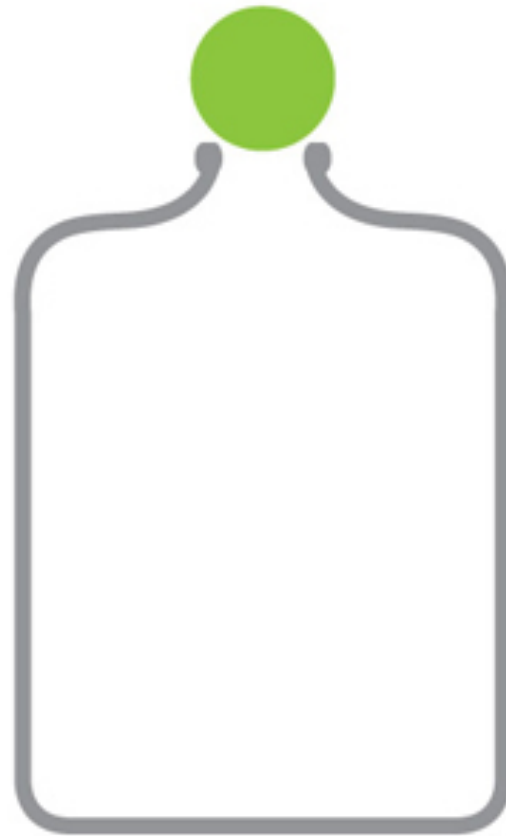


*The education of attention  
would be the education par excellence.*

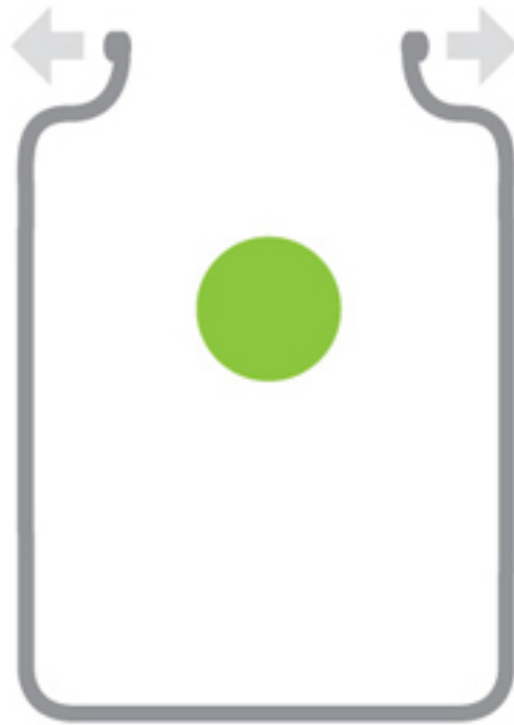
William James



Learning to Take in the Good



Have a Good Experience



Enrich It



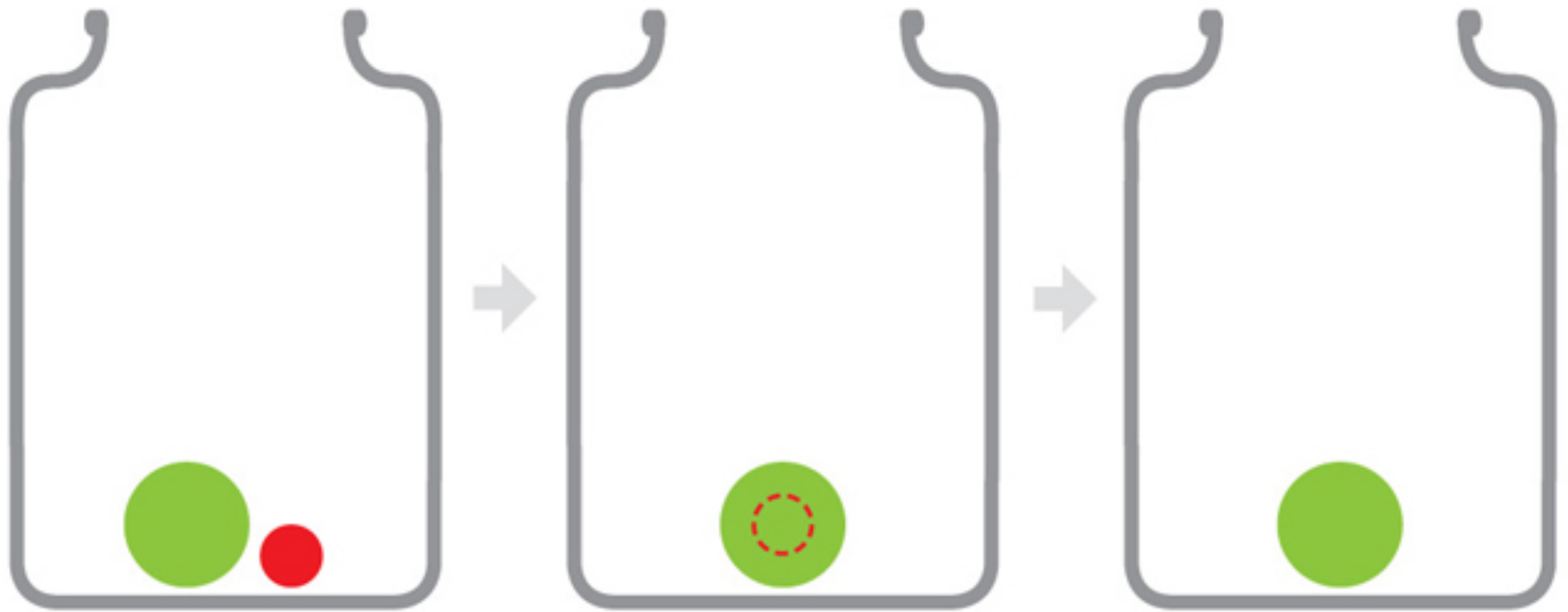
# “Enriching” Factors

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- Duration
- Intensity
- Multimodality – thought, perception, emotion, desire, action
- Novelty
- Personal relevance



Absorb It

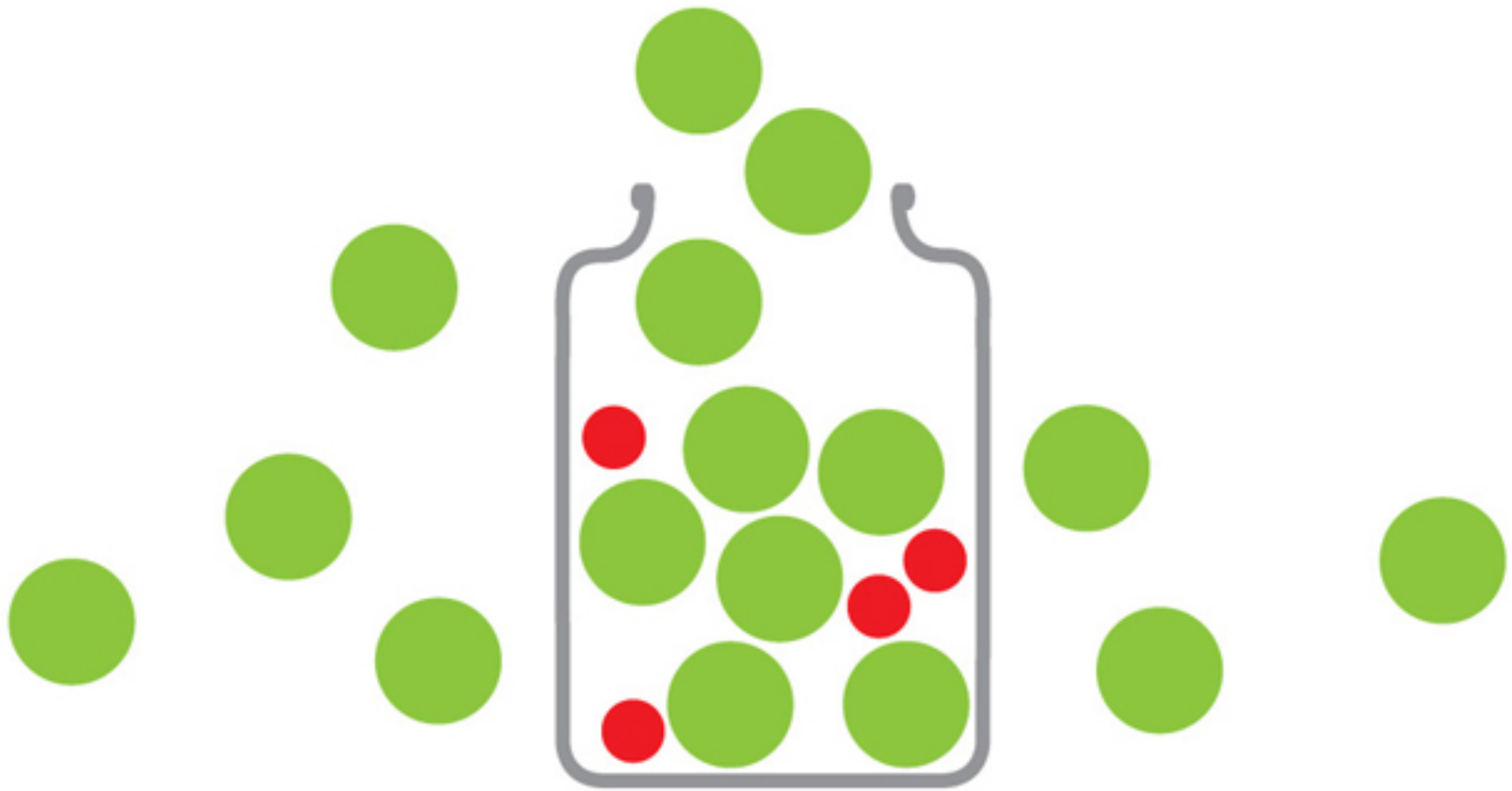


**L**ink Positive and Negative Material

# HEAL by Taking in the Good

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1. Have a positive experience. Notice it or create it.
2. Enrich the experience through duration, intensity, multimodality, novelty, personal relevance
3. Absorb the experience by intending and sensing that it is sinking into you as you sink into it.
4. Link positive and negative material. [optional]



Have It, Enjoy It

# Let's Try It Again

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- **Notice** the experience already present in awareness of some kind of strength . . . focus, determination, vitality, endurance
  - Have the experience
  - Enrich it
  - Absorb it
  
- **Create** the experience of goals attained
  - Have the experience - bring to mind a time you finished something large or small . . . Open to a sense of completion, accomplishment, relief, success . . .
  - Enrich it
  - Absorb it

# It's Good to Take in the Good

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- Development of specific inner strengths
  - General - resilience, positive mood, feeling loved
  - “Antidote experiences” - Healing old wounds, filling the hole in the heart
- Implicit benefits:
  - Shows that there is still good in the world
  - Being active rather than passive
  - Treating yourself kindly, like you matter
  - Rights an unfair imbalance, given the negativity bias
  - Training of attention and executive functions
- Sensitizes brain to positive: like Velcro for good





*Keep a green bough in your heart,  
and a singing bird will come.*

Lao Tsu

# The Role of Cultivation

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- Three fundamental ways to engage the mind:
  - Be with it. Decrease negative. Increase positive.
  - The garden: Observe. Pull weeds. Plant flowers.
  - Let be. Let go. Let in.
  - Mindfulness present in all three ways to engage mind
- While “being with” is profound, it can be isolated and over-valued in some therapies or spiritual practices.
- Skillful means for decreasing the negative and increasing the positive have developed over thousands of years. Why not use them?



# **Research on the HEAL Process**

# Teaching the HEAL Process

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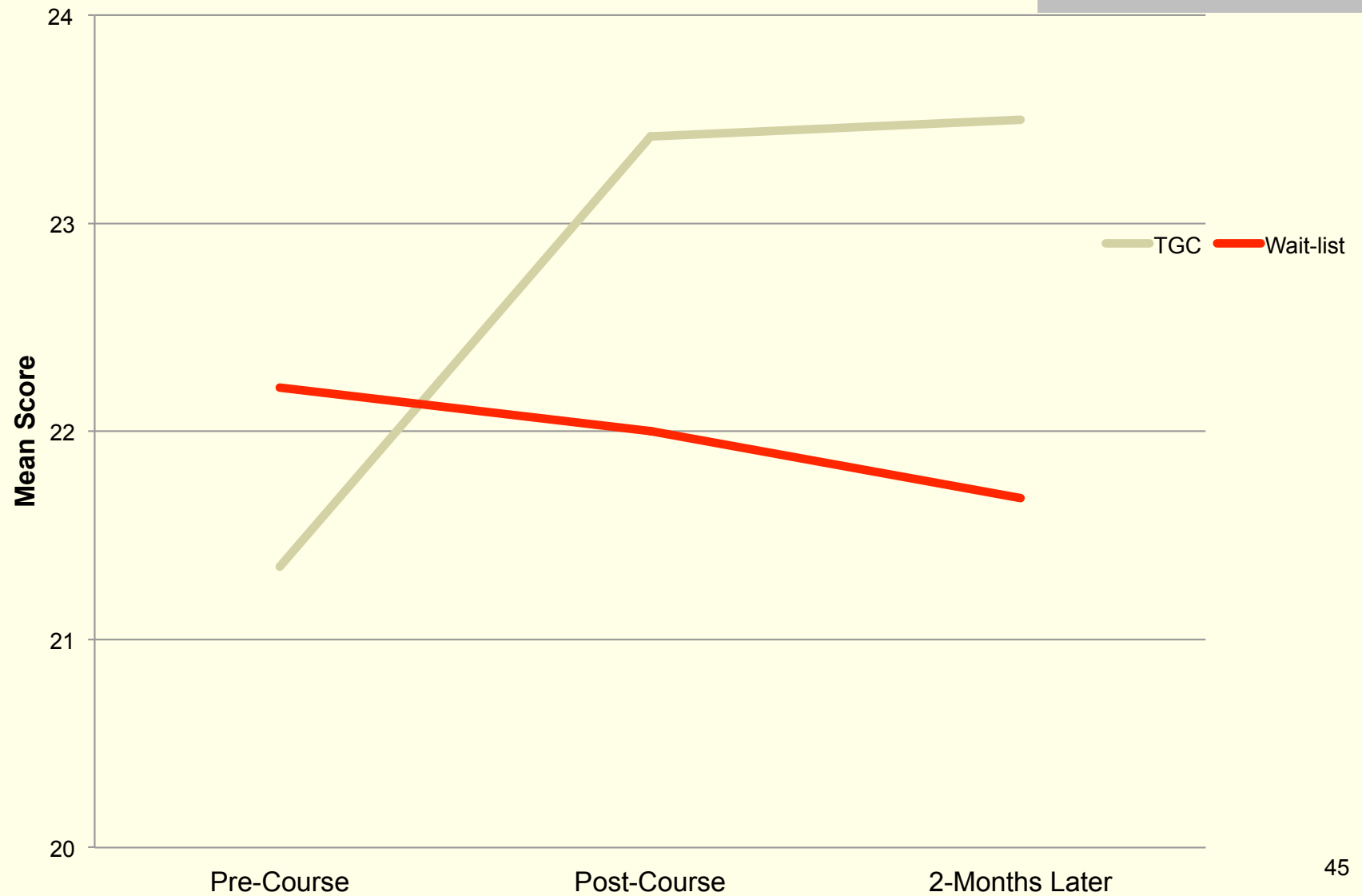
- 18 hour course, currently formatted in 3-hour classes spread over six or seven weeks
- First two classes lay a foundation and teach the first three steps of HEAL; third class teaches the fourth step (Link); remaining classes focus on internalizing experiences and growing inner strengths related to the Avoiding harms, Approaching rewards, and Attaching to others systems
- Information about taking the course, training in applying it in professional settings, and training to teach it is available at [www.RickHanson.net](http://www.RickHanson.net).

# Study on the HEAL Process

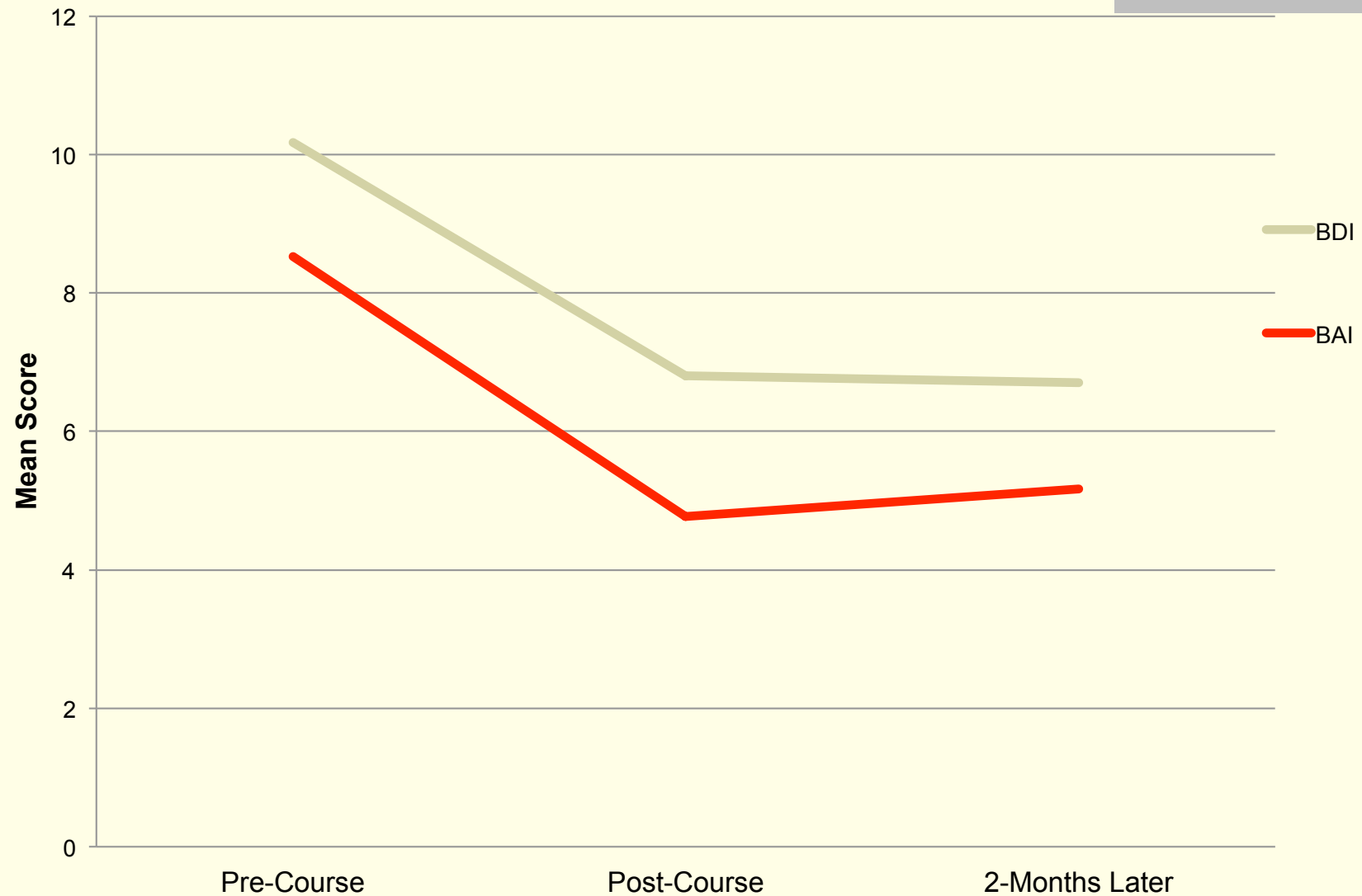
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- With collaborators from the University of California, a 2013 study on the HEAL course, using a randomized waitlist control group design (46 subjects).
- Course participants, compared to the control group, reported more Contentment, Self-Esteem, Satisfaction with Life, Savoring, and Gratitude.
- After the course and at two month follow-up, pooled participants also reported more Love, Compassion, Self-Compassion, Mindfulness, Self-Control, Positive Rumination, Joy, Amusement, Awe, and Happiness, and less Anxiety and Depression.

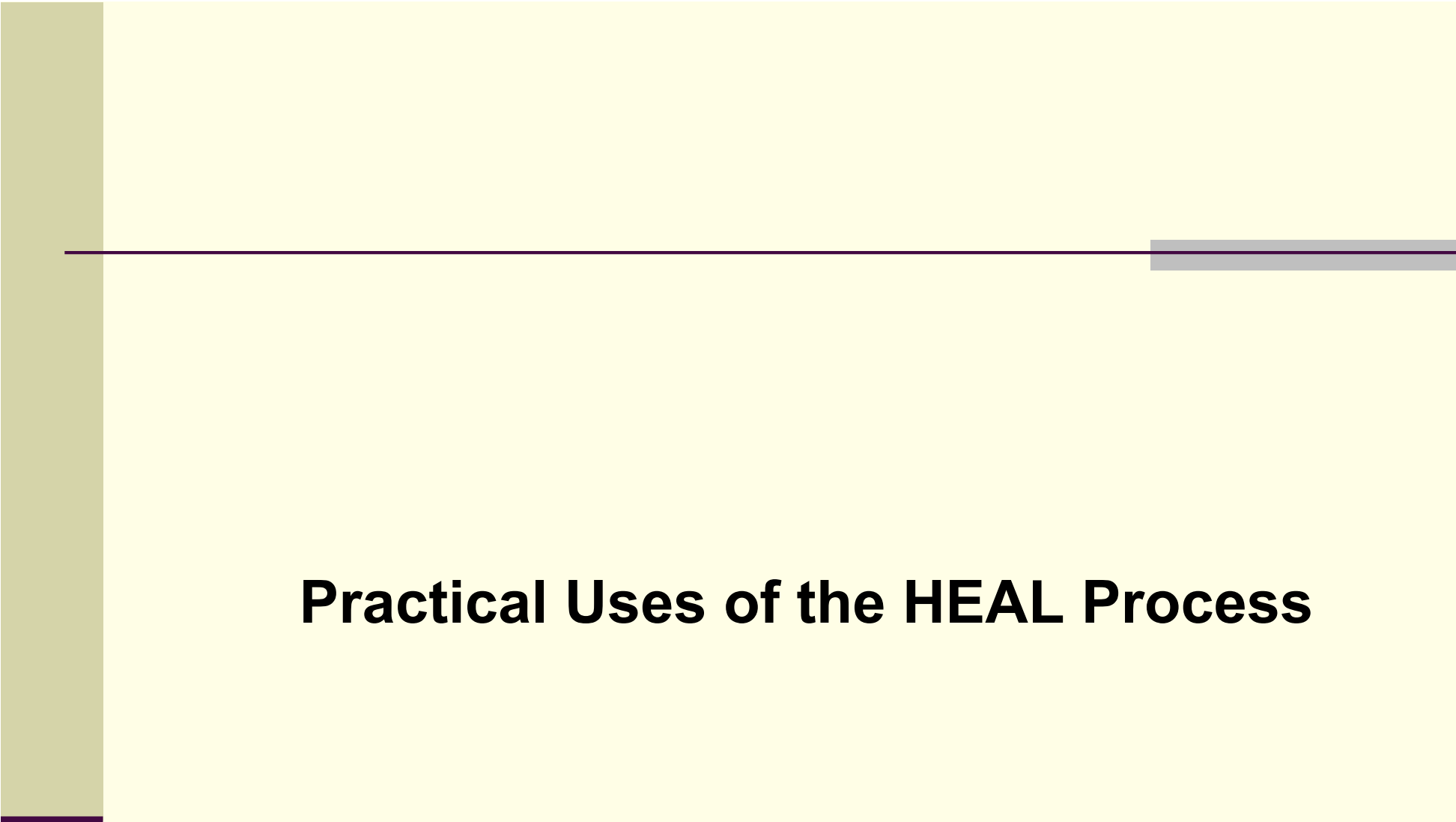
# Self-Esteem



# Combined Sample: Depression (BDI) & Anxiety (BAI)







# **Practical Uses of the HEAL Process**

# The Four Ways to Offer a Method

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- Doing it implicitly
- Teaching it and then leaving it up to the person
- Doing it explicitly with the person
- Asking the person to do it on his or her own

# 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 TG to sustain them
- Working through obstructions

# Targets of TG

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- **Thoughts** - expectations; object relations; perspectives on self, world, past and future
- **Perceptions** - sensations; relaxation; vitality
- **Emotions** - both feelings and mood
- **Desires** - values, aspirations, passions, wants
- **Behaviors** - repertoire; inclinations

# Promoting Client Motivation

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- During therapy and between sessions, TG:
  - Key resource experiences
  - When learning from therapy works well
  - When realistic views of you, the world, etc. come true
  - Good qualities in yourself
  - New insights
- Can be formalized in daily reflections, journaling
- Try appropriate risks of “dreaded experiences,” notice the (usually) good results, and then take these in.

# TG and Children

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

# Doing TG with a Couple

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- Basic steps (often informal):
  - Attention to a good fact
  - Evoking and sustaining a good experience
  - Managing obstructions
  - Awareness of the impact on one's partner
  - Debriefing, often from both partners
  
- Pitfalls to avoid:
  - Seeming to side with one person
  - Unwittingly helping a person overlook real issues
  - Letting the other partner pile on



# Synergies of TG and Mindfulness

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- Improved mindfulness enhances TG.
- TG increases factors of mindfulness (e.g., self-acceptance, self-compassion, distress tolerance).
- TG heightens learning from mindfulness:
  - The sense of stable presence itself
  - Confidence that awareness itself is never disturbed
  - Peace of realizing that experiences come and go

# Obstructions to Taking in the Good

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## ■ General

- Distractibility
- Blocks to self-awareness in general

## ■ Specific

- Fears of losing one's edge or lowering one's guard
- Sense of disloyalty to others (e.g., survivor guilt)
- Culture (e.g., selfish, vain, sinful)
- Gender style
- Associations to painful states
- Secondary gains in feeling bad
- Not wanting to let someone off the hook
- Thoughts that TG is craving that leads to suffering



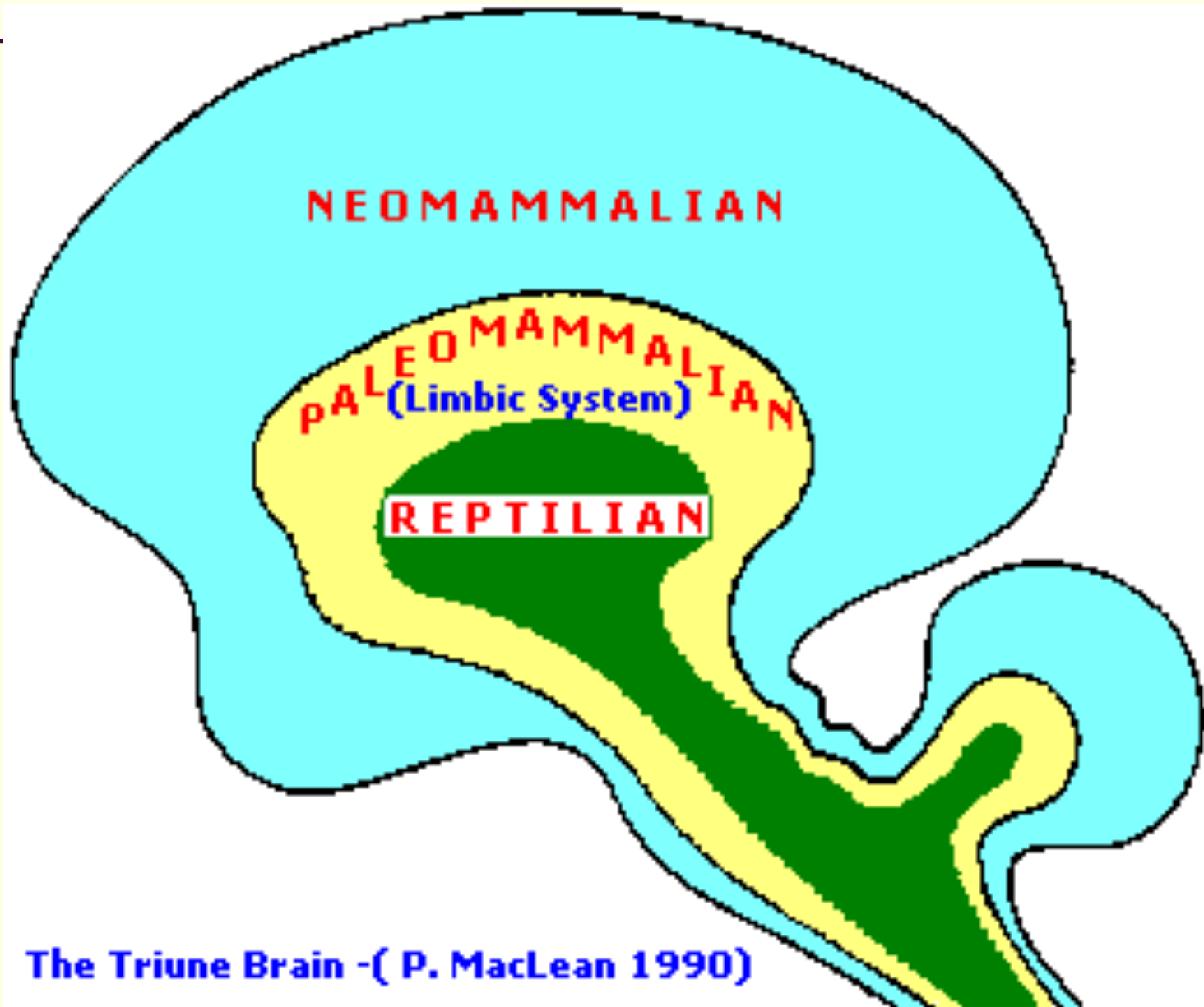
# **The Evolving Brain**

# Biological 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: ancestor with chimpanzees
- 2.5 million years of tool-making
- 150,000 years of *homo sapiens*

# Evolution of the Brain



# Three Motivational and Self-Regulatory Systems

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## ■ Avoid Harms:

- Predators, natural hazards, aggression, pain
- Primary need, tends to trump all others

## ■ Approach Rewards:

- Food, shelter, mating, pleasure
- Mammals: rich emotions and sustained pursuit

## ■ Attach to Others:

- Bonding, language, empathy, cooperation, love
- Taps older Avoiding and Approaching networks

Each system can draw on the other two for its ends.<sup>59</sup>

# The Homeostatic Home Base

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*When not invaded by threat, loss, or rejection [no felt deficit or disturbance of safety, satisfaction, and connection]*

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

The mind defaults to a sustainable equilibrium of:

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

This is the brain in its homeostatic **Responsive**,  
*minimal craving* mode.



# But to Cope with Urgent Needs, We Leave Home . . .

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*When invaded by threat, loss, or rejection [felt deficit or disturbance of safety, satisfaction, or connection]:*

The body fires up into the stress response; outputs exceed inputs; long-term building is deferred.

The mind fires up into:

- **Fear** (the Avoiding system)
- **Frustration** (the Approaching system)
- **Heartache** (the Attaching system)

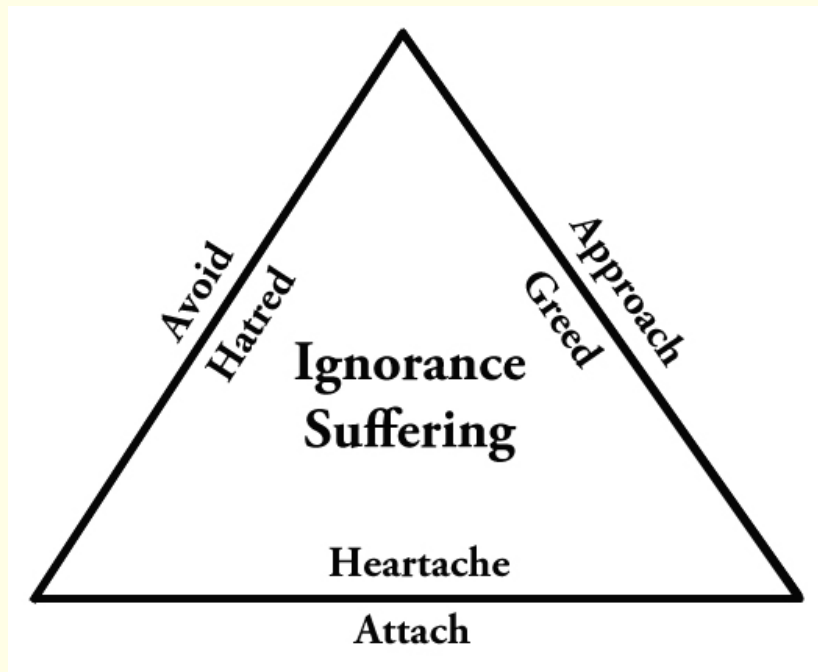
This is the brain in allostatic, **Reactive**, *craving* mode.<sup>61</sup>

# Reactive Dysfunctions in Each System

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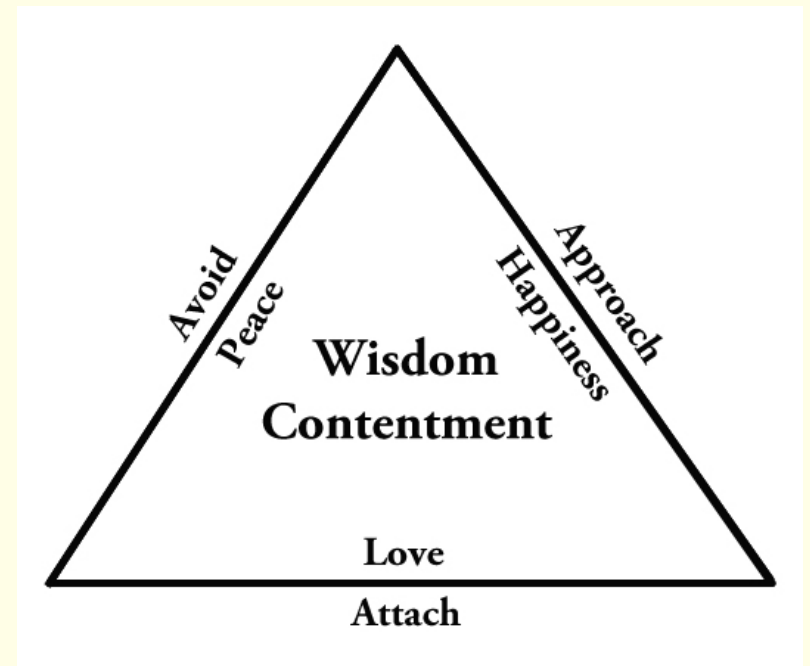
- **Avoiding** - Anxiety disorders; PTSD; panic, terror; rage; violence
- **Approaching** - Addiction; over-drinking, -eating, -gambling; compulsion; hoarding; driving for goals at great cost
- **Attaching** - Borderline, narcissistic, antisocial PD; symbiosis; “looking for love in all the wrong places”

# Choices . . .



**Reactive Mode**

Or?



**Responsive Mode**

# Coming Home, Staying Home

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**Positive experiences of core needs met - the felt sense of safety, satisfaction, and connection - activate Responsive mode.**

**Activated Responsive states can become installed Responsive traits. Responsive traits foster Responsive states.**

**Responsive states and traits enable us to stay Responsive with challenges.**



# **Key Resource Experiences**

# Pet the Lizard



# Feed the Mouse

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# Hug the Monkey

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**Peace**

**Contentment**

**Love**

# Some Types of Resource Experiences

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## Avoiding Harms

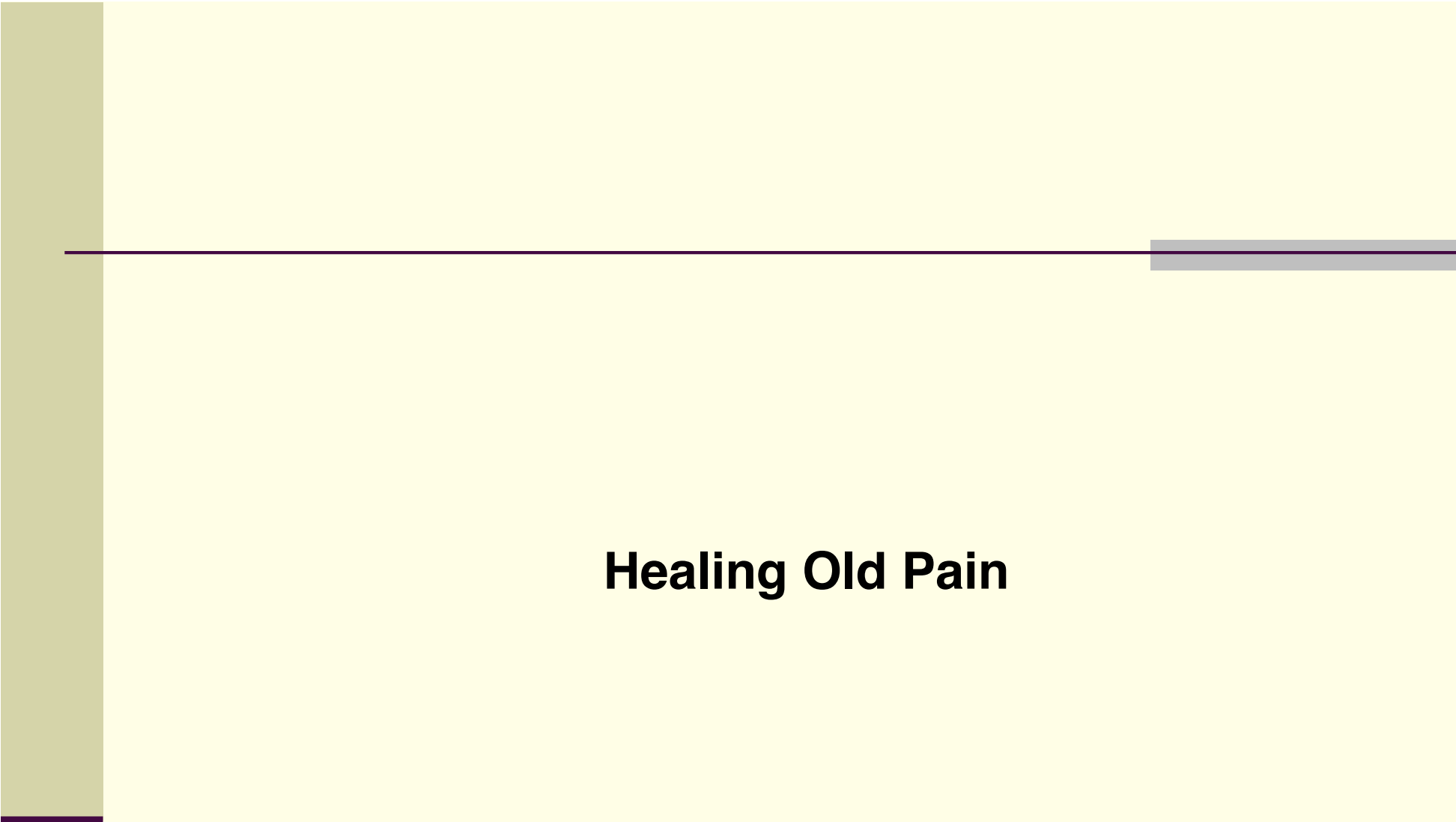
- Feeling basically alright right now
- Feeling protected, strong, safe, at peace
- The sense that awareness itself is untroubled

## Approaching Rewards

- Feeling basically full, the enoughness in this moment as it is
- Feeling pleased, glad, grateful, satisfied
- Therapeutic, spiritual, or existential realizations

## Attaching to Others

- Feeling basically connected
- Feeling included, seen, liked, appreciated, loved
- Feeling compassionate, kind, generous, loving



# **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 TG

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- When you are having a positive experience:
  - Sense the experience sinking down into old pain and deficits, and soothing and replacing them.
- When you are having a negative experience:
  - Bring to mind a positive experience that is its antidote.
- Have the positive experience be prominent while the negative experience is small and in the background.
- You're not resisting negative experiences or getting attached to positive ones. You're being kind to yourself and cultivating resources in your mind.

# Psychological Antidotes

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## Avoiding Harms

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

## Approaching Rewards

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

## Attaching to Others

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

# 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

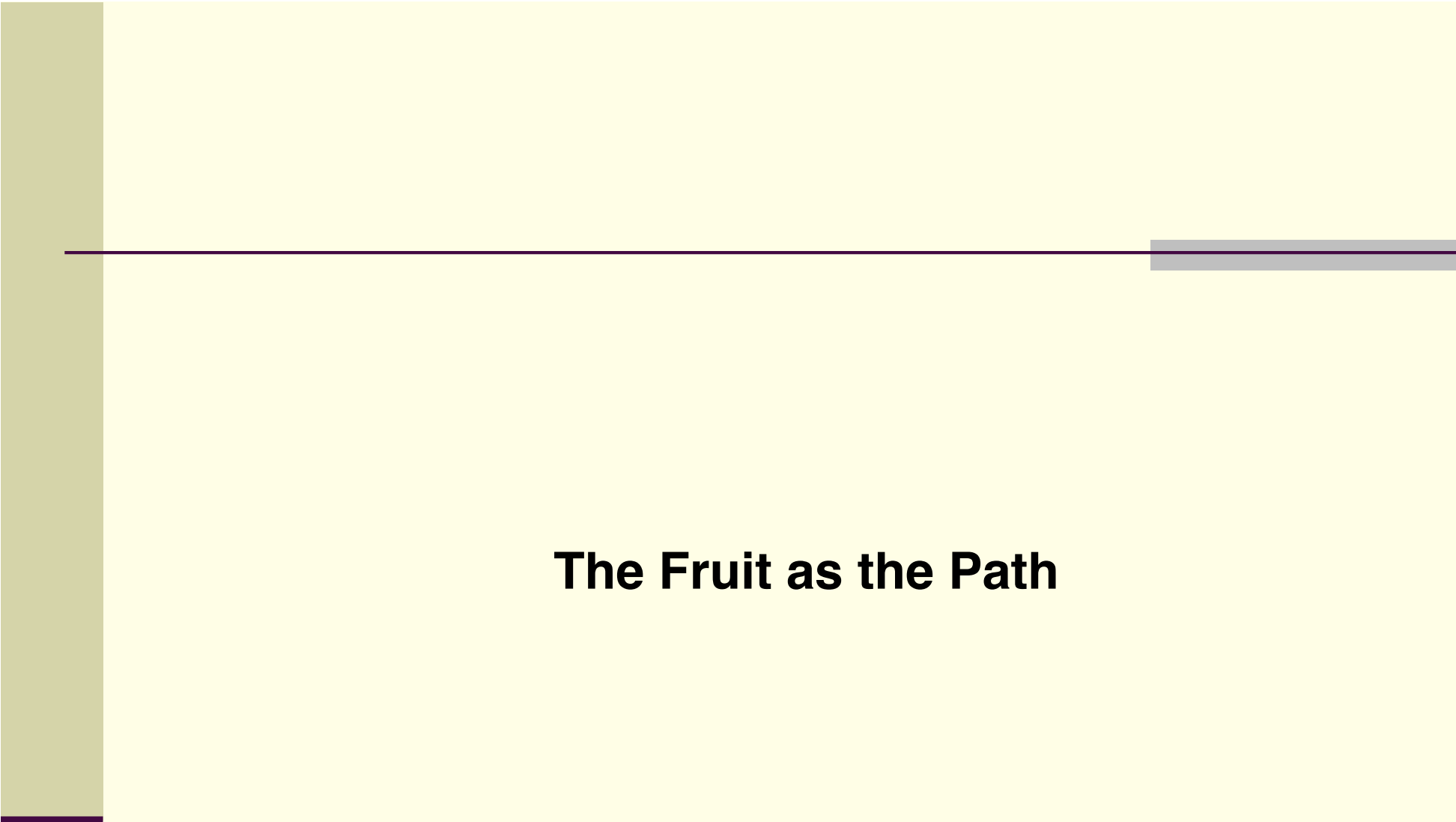
# TG and Trauma

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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 TG are generally safe. Use them to build resources for tackling the trauma directly.
- As indicated, use the fourth step of TG 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.*





# **The Fruit as the Path**

# Cultivation Undoes Craving

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- Taking in the good is an openness to positive experience while letting go – allowing the experience in and through you.
- Much suffering and harm comes from “craving” – resisting the unpleasant, grasping after the pleasant, and clinging to the heartfelt – a drive state based on deficit or disturbance of core needs – safety, satisfaction, connection – being met.
- By repeatedly internalizing the felt sense of core needs being met, we gradually reduce the sense of deficit or disturbance, and rest increasingly in a peace, happiness, and love that is independent of external conditions.
- With time, even the practice of cultivation falls away - like a raft that is no longer needed once we reach the farther shore.

# Coming Home

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**Peace**

**Contentment**

**Love**

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*Think not lightly of good, saying,  
"It will not come to me."*

*Drop by drop is the water pot filled.*

*Likewise, the wise one,  
gathering it little by little,  
fills oneself with good.*

# Suggested Books

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See [www.RickHanson.net](http://www.RickHanson.net) for other suggestions.

- Austin, J. 2009. *Selfless Insight*. MIT Press.
- Begley, S. 2007. *Train Your Mind, Change Your Brain*. Ballantine.
- Carter, C. 2010. *Raising Happiness*. Ballantine.
- Hanson, R. (with R. Mendius). 2009. *Buddha's Brain: The Practical Neuroscience of Happiness, Love, and Wisdom*. New Harbinger.
- Johnson, S. 2005. *Mind Wide Open*. Scribner.
- Keltner, D. 2009. *Born to Be Good*. Norton.
- Kornfield, J. 2009. *The Wise Heart*. Bantam.
- LeDoux, J. 2003. *Synaptic Self*. Penguin.
- Linden, D. 2008. *The Accidental Mind*. Belknap.
- Sapolsky, R. 2004. *Why Zebras Don't Get Ulcers*. Holt.
- Siegel, D. 2007. *The Mindful Brain*. Norton.
- Thompson, E. 2007. *Mind in Life*. Belknap.

# Key Papers - 1

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See [www.RickHanson.net](http://www.RickHanson.net) for other scientific papers.

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

# Key Papers - 2

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

# Key Papers - 3

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

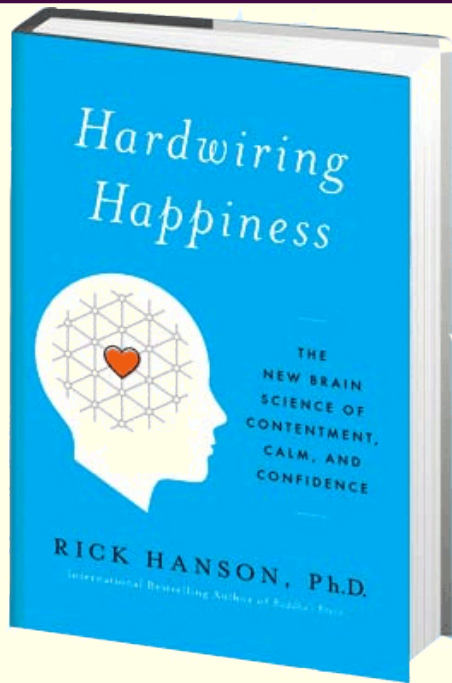


# Key Papers - 4

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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



## ***Hardwiring Happiness: The New Brain Science of Contentment, Calm, and Confidence***

[www.rickhanson.net/hardwiringhappiness](http://www.rickhanson.net/hardwiringhappiness)

Personal website: [www.rickhanson.net](http://www.rickhanson.net)

Wellspring Institute: [www.wisebrain.org](http://www.wisebrain.org)



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