

# ***Managing the Caveman/Cavewoman Brain in the 21st Century***

**Bridging the Hearts and Minds of Youth Conference**  
**UCSD Center for Mindfulness, February 4, 2012**

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# Topics

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- **Perspectives**
- **The evolving brain**
- **The negativity bias**
- **Self-directed neuroplasticity**
- **Coming home**



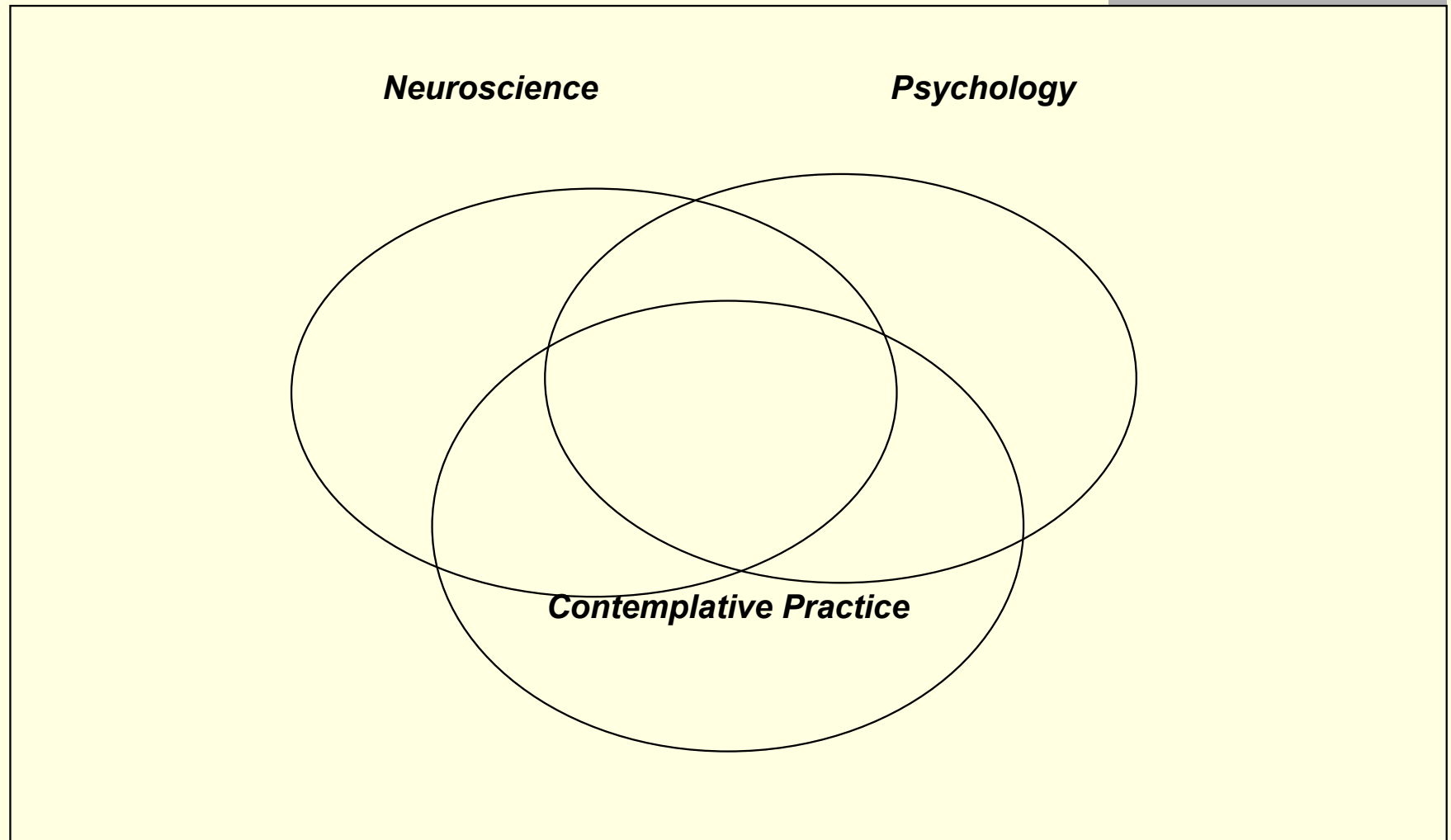
# Perspectives




*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

# Common - and Fertile - Ground





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

*What do you do?*

John Maynard Keynes



# **The Evolving Brain**

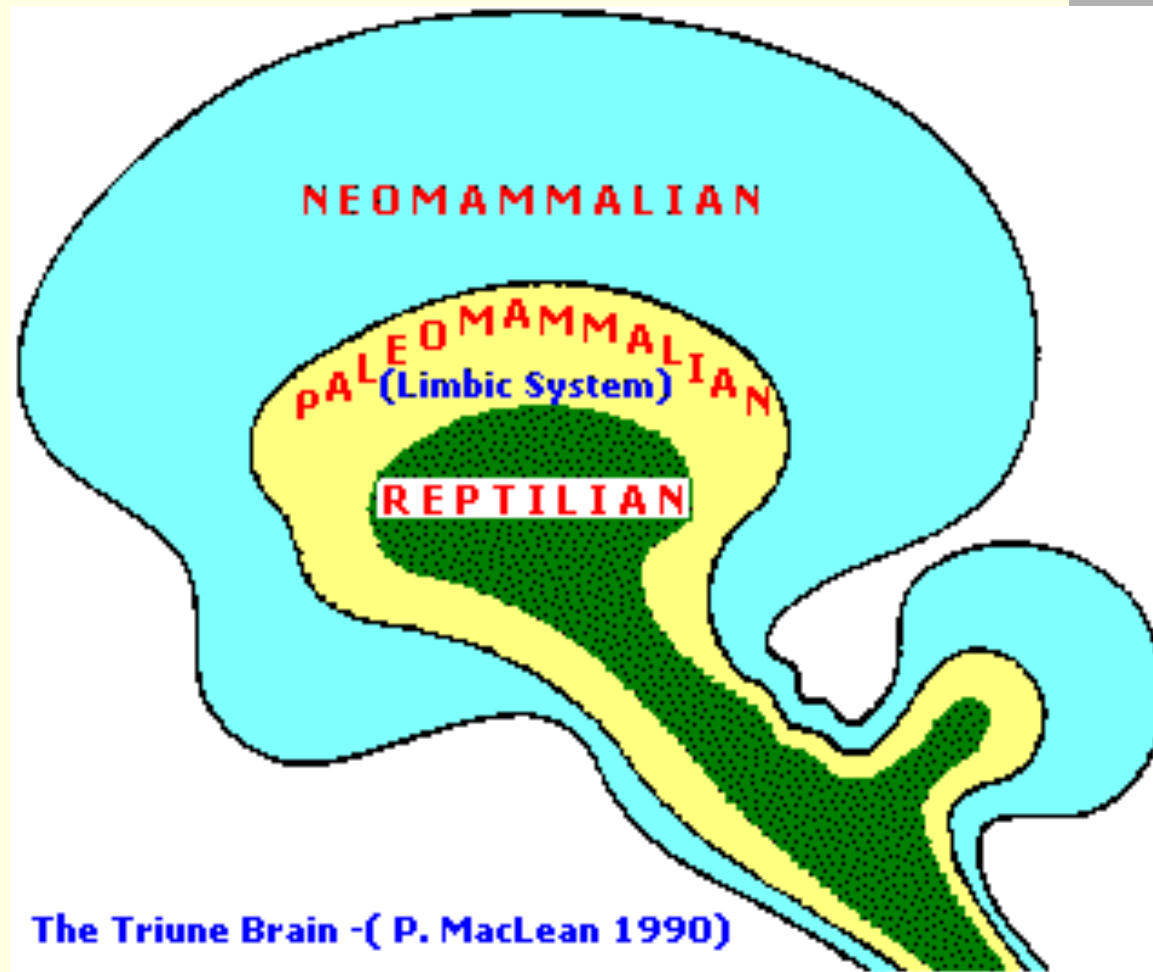
# Evolution

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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”





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

# Home Base of the Human Brain

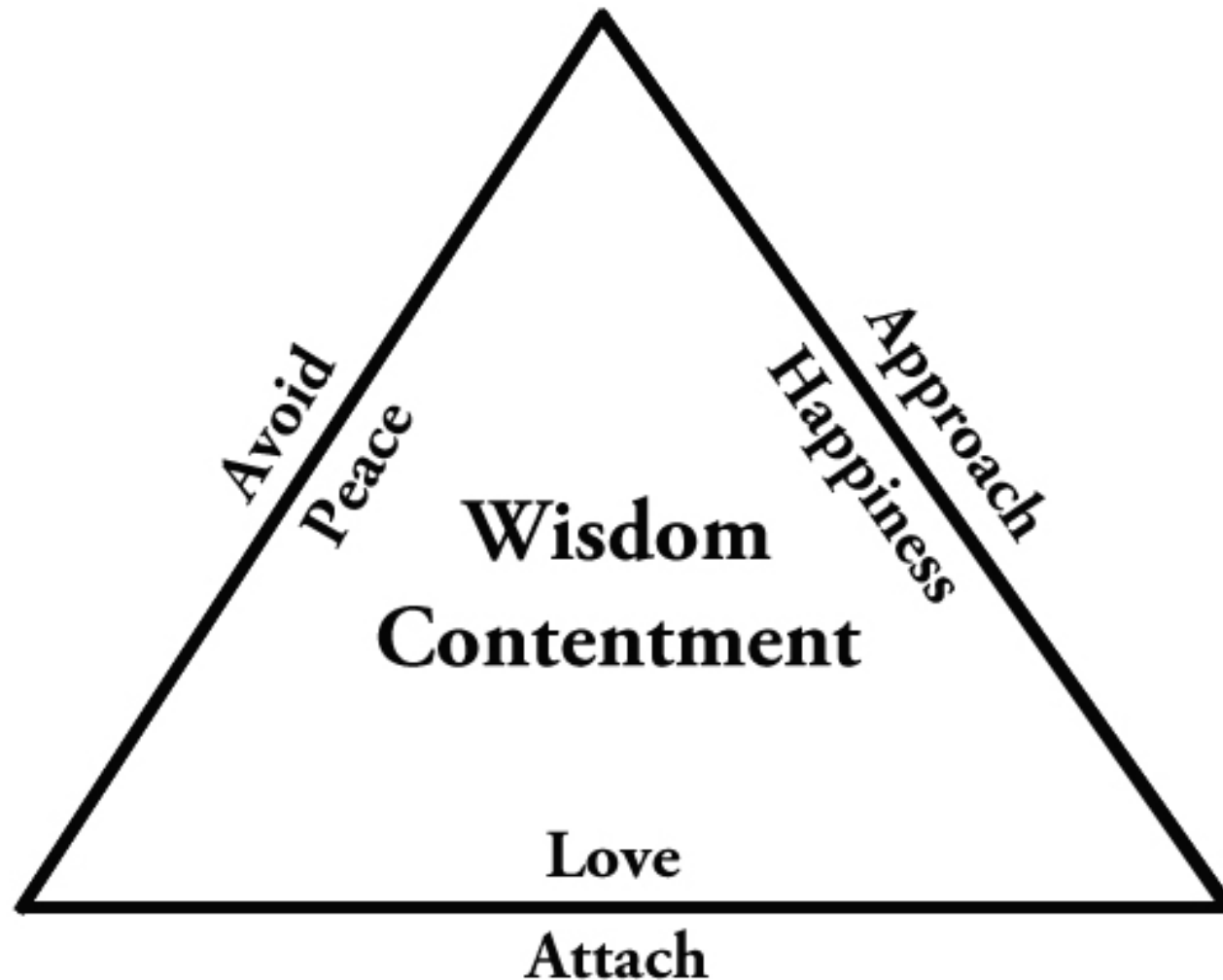
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*When not threatened, ill, in pain, hungry, upset, or chemically disturbed, most people settle into being:*

- **Peaceful** (the Avoid system)
- **Happy** (the Approach system)
- **Loving** (the Attach system)

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

# The Responsive Mode



# Responsive Mode

	<u>View</u>	<u>Action</u>	<u>Experience</u>
<b>Avoid</b>	Resources, challenges-in- context	Govern/restrain, truth-to-power, forgive	Strength, safety, peace
<b>Approach</b>	Sufficiency, abundance, disenchantment	Aspire, give, let go	Glad, grateful, fulfilled, satisfied
<b>Attach</b>	Connection, belonging, social supplies	Open to others; join; be empathic, compassionate, kind, caring; love	Membership, closeness, friend- ship, bonding loved and loving

# Key Benefits of Responsive Mode

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

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

Bertrand Russell



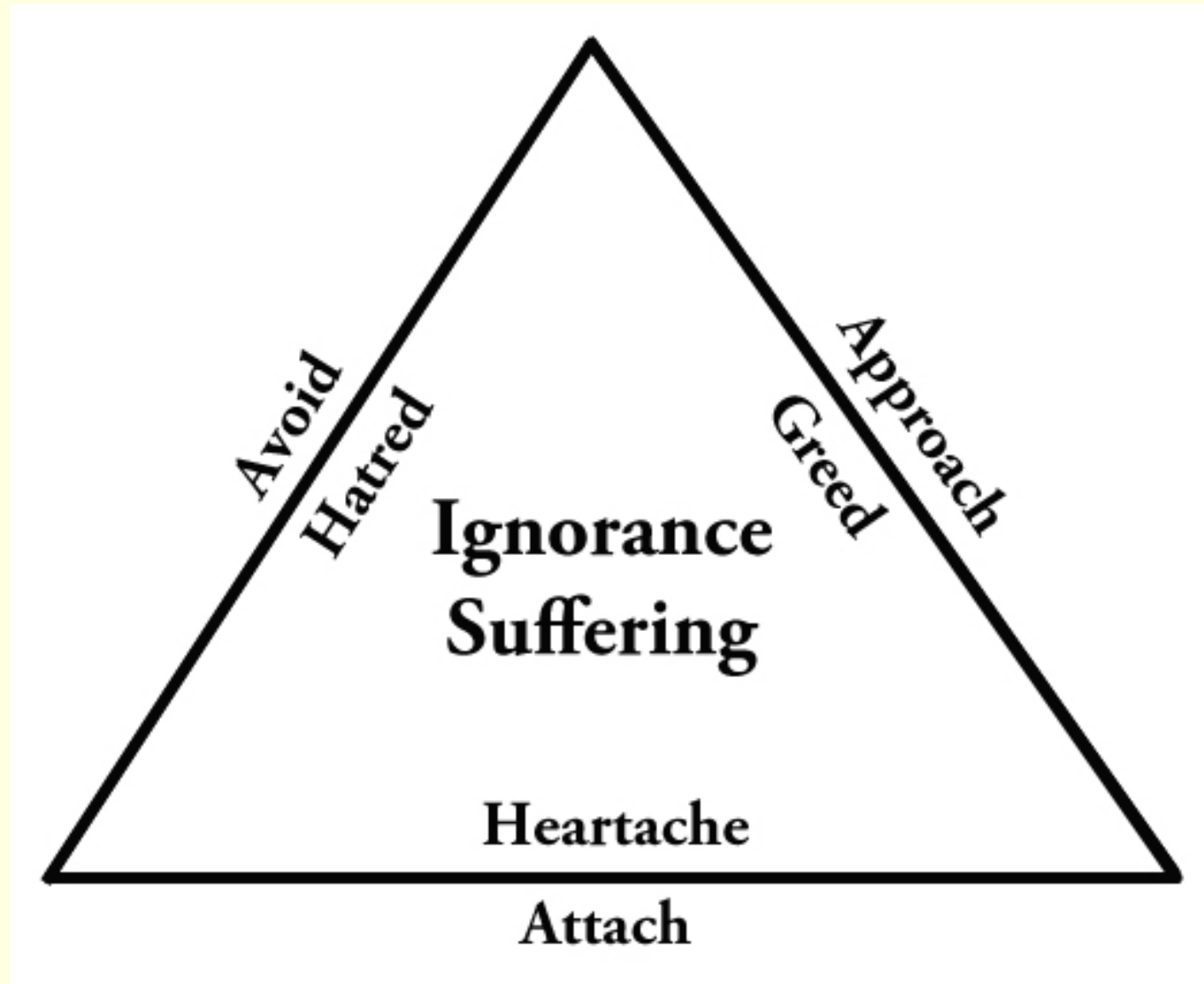
# But to Cope with Urgent Needs, We Leave Home . . .

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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 Mode

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	<u>View</u>	<u>Action</u>	<u>Experience</u>
<b>Avoid</b>	Harms present or lurking	Fight, flight, freeze	Fear, anger, weakness
<b>Approach</b>	Scarcity, loss, unreliability, not expected rewards	Grasp, acquire	Greed, longing, frustration, disappointment
<b>Attach</b>	Separated, being “beta,” devalued	Cling, seek approval, reproach	Loneliness, heart- break, envy, jealousy, shame

# Psychopathology as Reactive Dysfunctions

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



# **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>22</sup>  
- no more carrots forever.

# Negativity Bias: Some Consequences

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- Negative stimuli get more attention and processing.
- We generally learn faster from pain than pleasure.
- People work harder to avoid a loss than attain an equal gain (“endowment effect”)
- Easy to create learned helplessness, hard to undo
- Negative interactions: more powerful than positive
- Negative experiences sift into implicit memory.

# A Major Result of the Negativity Bias: Threat Reactivity

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



# Results of Threat Reactivity

## (Personal, Organizational, National)

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

# Costs of Threat Reactivity

## (Personal, Organizational, National)

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- Feeling threatened feels bad, and triggers stress consequences.
- We over-invest in threat protection.
- The boy who cried tiger: flooding with paper tigers makes it harder to see the real ones.
- Acting while feeling threatened leads to over-reactions, makes others feel threatened, and creates vicious cycles.
- The 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?*

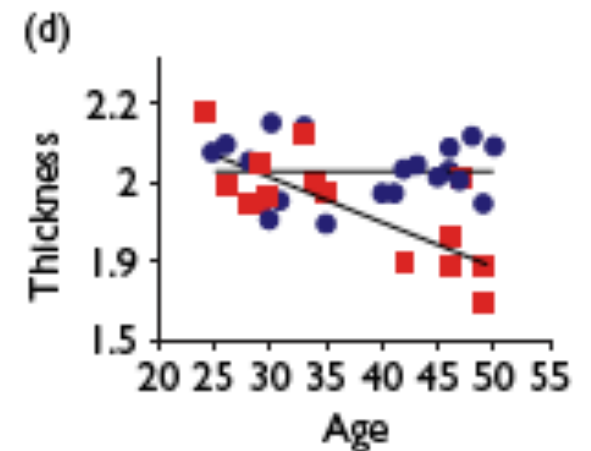
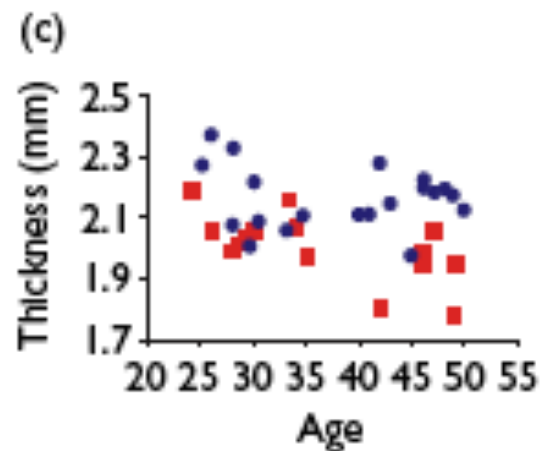
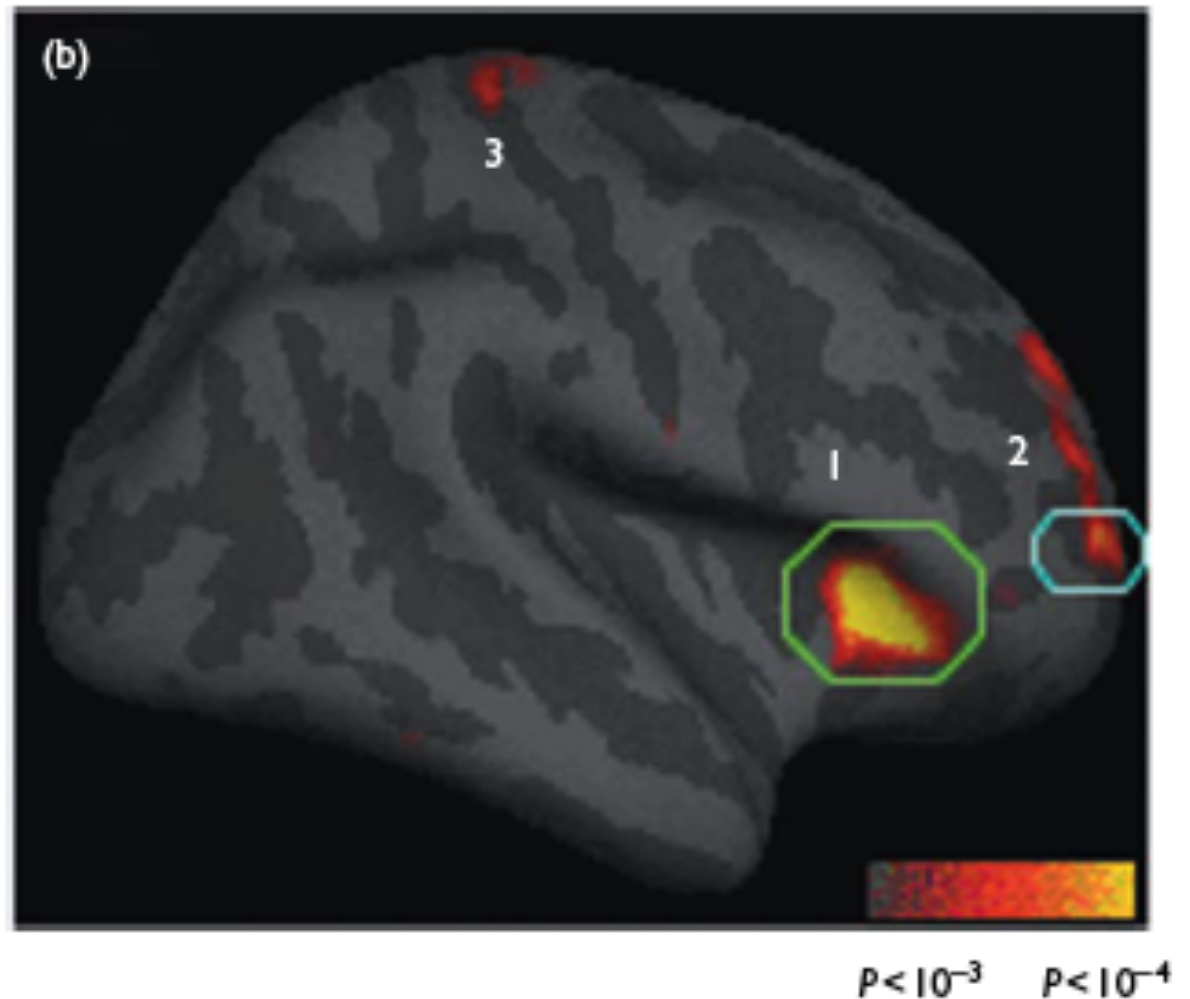


*We can deliberately use the mind  
to change the brain for the better.*



# **Mindfulness and Neuroplasticity**


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



# 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 tendencies; “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. What matters most are not recollections of positive *events* but implicit residues of positive *experiences*.



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



# 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

# 7 Neural Factors of Mindfulness

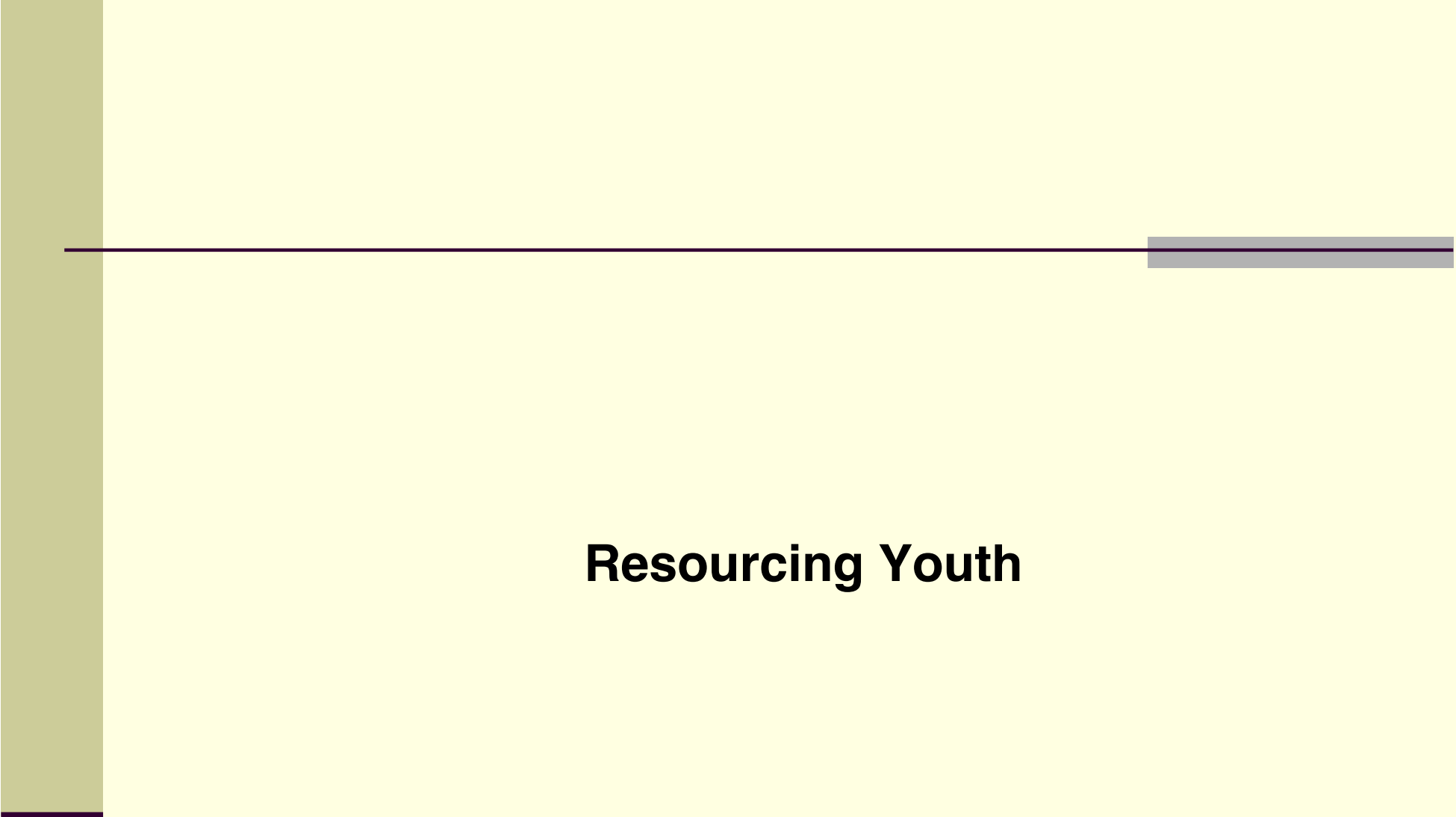
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- **Setting an intention** - “top-down” frontal, “bottom-up” limbic
- **Relaxing the body** - parasympathetic nervous system
- **Feeling cared about** - social engagement system
- **Feeling safer** - inhibits amygdala/ hippocampus alarms
- **Encouraging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

# Being with, Releasing, Replacing

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



# **Resourcing Youth**



**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.

# 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)

# 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



# 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 “Us”

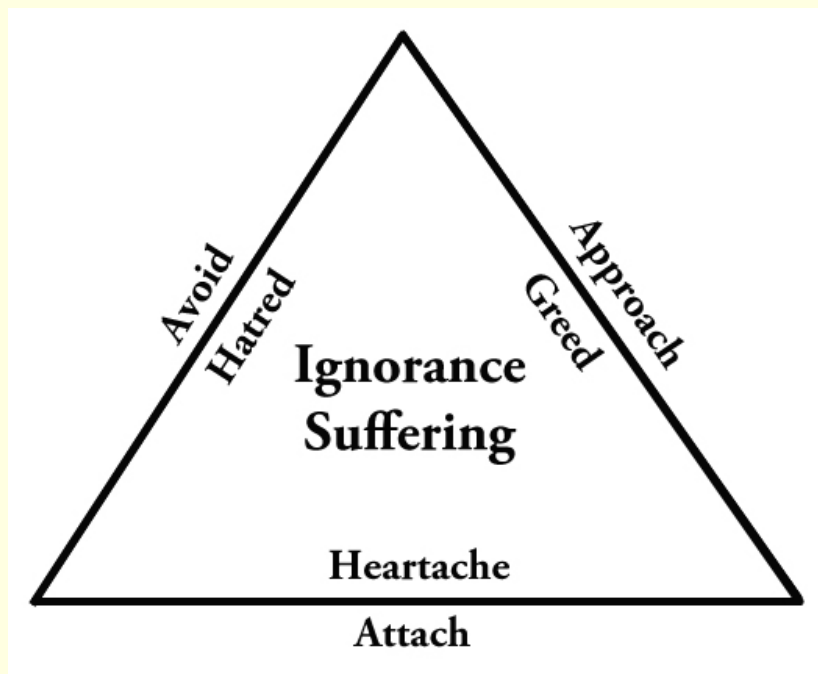
- Attunement, inclusion --> Not seen, rejected, left out
- Recognition, acknowledgement --> Inadequacy, shame
- Friendship, love --> Abandonment, feeling unloved or unlovable



# **Coming Home**

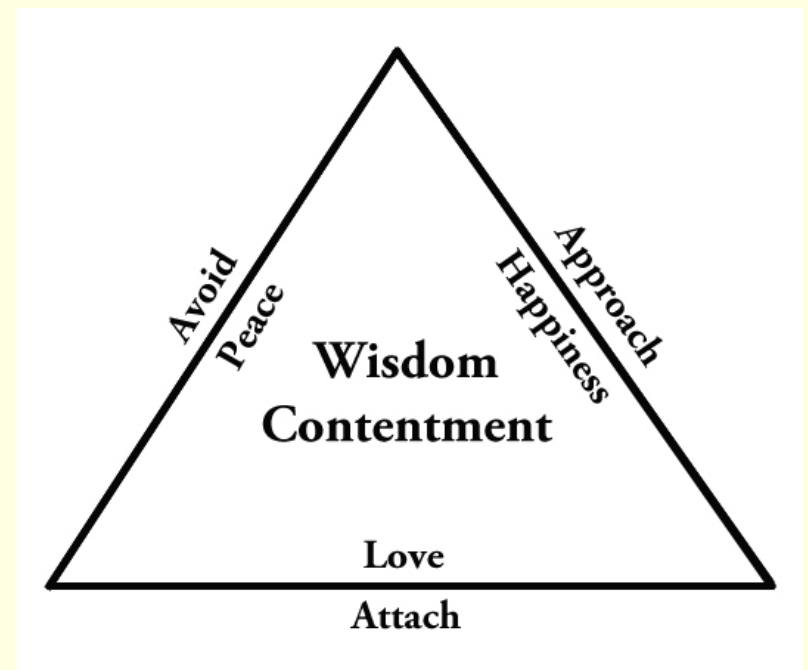
# Choices . . .

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**Reactive Mode**

Or?



**Responsive Mode**

# True Nature

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**Peaceful**

**Happy**

**Loving**

# 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.

## Avoid system


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

## 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.



*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.
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# 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.
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# Key Papers - 2

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- Hanson, R. 2008. Seven facts about the brain that incline the mind to joy. In *Measuring the immeasurable: The scientific case for spirituality*. Sounds True.

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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.
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- 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.
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# Key Papers - 4

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- 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.
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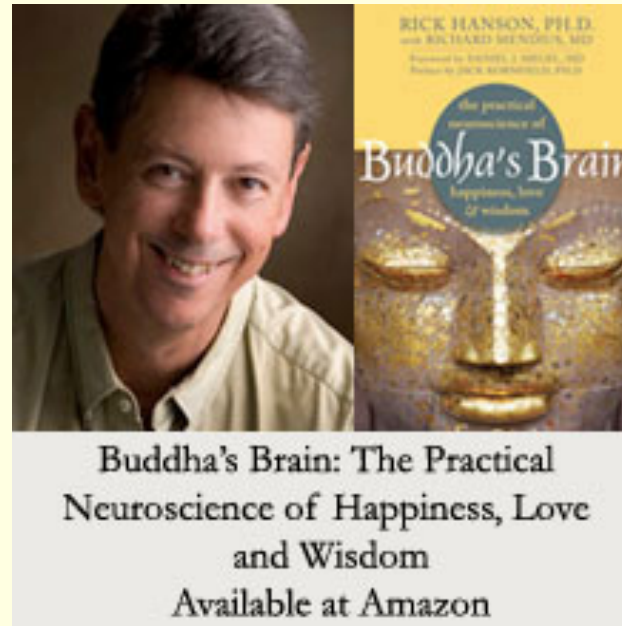
## ***Where to Find Rick Hanson Online***

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



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