

# ***The Awakened Brain:***

---

## ***From Greed, Hatred, and Heartache To Gladness, Peace, and Love***

**FACES Conference  
October 7, 2010**

**Rick Hanson, Ph.D.**

The Wellspring Institute for Neuroscience and Contemplative Wisdom

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

[drh@comcast.net](mailto:drh@comcast.net)

# Topics

---

- **Three evolving neural systems:  
Avoid, Approach, Attach**
- **Two modes for each system:**
  - **Responsive (replenishing)**
  - **Reactive (expending)**
- **The negativity bias and threat reactivity**
- **Stimulating and strengthening Responsive<sup>2</sup>**



# **Three Evolving Neural Systems: Avoid, Approach, Attach**

# Three Goal-Directed Systems Evolved in the Brain

---

- **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

---

- 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.



# **The Responsive Mode**

---

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

- Experiencing inner peace?
- Self-actualizing?
- Enlightened (or close to it)?

# Home Base of the Human Brain

---

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 *responsive* mode.



# 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



# The Reactive Mode

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

---

**With activations of the three systems:**

- **Avoid:** When we are 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 Triangle

---



The urgency of survival needs have made the *reactive* mode very powerful in the rapidity, intensity, and inflexibility of its activations.

# Reactive Mode

---

	<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

# Reactive Dysfunctions in Each System

---

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





# **The Negativity Bias and Threat Reactivity**


---

**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

---

- “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 impact 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>19</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

---

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

# Negativity Bias: Attention and Learning

---

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

# Negativity Bias: Consequences (1)

---

- Negative beats positive head to head:
  - “Endowment effect,” “prospect function,” “loss aversion”:  
People will do more to avoid a loss than to acquire a gain.
  - Immorality contaminates more than morality elevates.
  - “Pariahs” contaminate more than “saints” elevate.
- Negative beats positive in combination:
  - Negative information about a person shapes opinions most.
  - It’s easy to create learned helplessness, but hard to undo.
  - In health, parenting, and relationships, absence of negative generally matters more than presence of positive.

# Negativity Bias: Consequences (2)

---

- Negative is more differentiated:
  - There are more words for negative experiences.
- Negative is more alarming than positive is reassuring:
  - Negativity of negative stimuli grows faster with approach in time or space than positivity of positive stimuli.
- Negative vicious cycles:
  - Minimal inhibitory feedback on cortisol
  - Negative social behaviors produce confirming feedback.
- Individual differences in negativity bias: vulnerabilities for reactivity, stress, anxiety, anger, and depression <sup>24</sup>



# Negativity Bias: Complications

---

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

# A Major Aspect of the Negativity Bias: Threat Reactivity

---

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

# Results of Threat Reactivity (Personal, Organizational, National)

---

- Our initial appraisals are mistaken:
  - Overestimating threats
  - Underestimating opportunities
  - Underestimating inner and outer resources
- We update these appraisals with information that confirms them; we ignore, devalue, or alter information that doesn't.
- Thus we end up with views of ourselves, others, and the world that are ignorant, selective, and distorted. 27

# Costs of Threat Reactivity

## (Personal, Organizational, National)

---

- Feeling threatened feels bad, and triggers stress consequences.
- We over-invest in threat protection.
- The boy who cried tiger: flooding with paper tigers makes it harder to see the real ones.
- Acting while feeling threatened leads to over-reactions, makes others feel threatened, and creates vicious cycles.
- The Approach system is inhibited, so we don't pursue opportunities, play small, or give up too soon.
- In the Attach system, we bond tighter to "us," with more fear and anger toward "them."

---

**Besides its impacts at the personal and organizational level, threat reactivity is a major source of prejudice, oppression, and war.**

**Reducing threat reactivity is a key way to make this world a better place.**

# Choices . . .



Or?

Respo





# **Stimulating and Strengthening the Responsive Mode**

# Stimulate, Strengthen Responsive Mode

---

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

## Approach system

- Be glad and grateful.
- Find the sobriety of now; beware the intoxication of anticipation.
- Give over to your best purposes.

## Attach system

- Sense suffering in others.
- Access the sense of being cared about.
- Act with unilateral virtue.

## Avoid system

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



---

## **Let's explore:**

- **Taking in the good**
- **Feeling cared about**
- **Mindfulness of threats and fear**
- **Feeling stronger and safer**

# How to Take in the Good

---

1. Look for positive **facts**, and let them become positive experiences.
2. Savor the positive experience:
  - Sustain it for 10-20-30 seconds.
  - Feel it in your body and emotions.
  - Intensify it.
3. Sense and intend that the positive experience is soaking into your brain and body - registering deeply in emotional memory.

# Kinds of “Good” to Take in

---

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

# How to Take in the Good

---

1. Look for positive **facts**, and let them become positive experiences.
2. Savor the positive experience:
  - Sustain it for 10-20-30 seconds.
  - Feel it in your body and emotions.
  - Intensify it.
3. Sense and intend that the positive experience is soaking into your brain and body - registering deeply in emotional memory.

# Feeling Cared About

---

- As we evolved, we increasingly turned to and relied on others to feel safer and less threatened.
  - Exile from the band was a death sentence in the Serengeti.
  - Attachment behaviors: relying on the secure base
  - The well-documented power of social support to buffer stress and aid recovery from painful experiences
  
- Methods:
  - Recognize it's kind to others to feel cared about yourself.
  - Look for occasions to feel cared about and take them in.
  - Deliberately bring to mind the experience of being cared about in challenging situations.
  - Be caring yourself.

# Mindfulness of Threats and Fear

---

- Mindfulness of the negativity bias itself:
  - Primes recognition of threat reactivity in general
  - Fuels correcting of cognitive errors
- Mindfulness alerts us to specific assumptions or exaggerations of threat.
- Through mindfulness, we disidentify from threat appraisals and the reactive cascade.
- Mindfulness draws us into a centered place that feels relatively strong and safe.

# Parasympathetic Activation

---

- Parasympathetic inhibits sympathetic and hormonal arousal.
- Attitude: Regard stressful activation as an affliction.
- Methods for stimulating the parasympathetic nervous system:
  - Multiple, long exhalations
  - Relaxing the tongue
  - Pleasant tastes
  - Relaxing the body
- Get in the habit of rapidly activating a damping cascade when the body gets aroused.
- Regard bodily activation as just another compounded, “meaningless,” and impermanent phenomenon; don’t react to it.

# Feeling Stronger and Safer

---

- Be mindful of an experience of strength (e.g., physical challenge, standing up for someone).
- Staying grounded in strength, let things come to you without shaking your roots, like a mighty tree in a storm.
- Be mindful of:
  - Protections (e.g., being in a safe place, imagining a shield)
  - People who care about you
  - Resources inside and outside you
- Let yourself feel as safe as you reasonably can:
  - Noticing any anxiety about feeling safer
  - Feeling more relaxed, tranquil, peaceful
  - Releasing bracing, guardedness, vigilance



# **“Taking the Fruit as the Path”**

---

**Gladness**

**Love**

**Peace**

# Great Books

---

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

- Austin, J. 2009. *Selfless Insight: Zen and the Meditative Transformations of Consciousness*. MIT Press.
- Begley, S. 2007. *Train Your Mind, Change Your Brain: How a New Science Reveals Our Extraordinary Potential to Transform Ourselves*. Ballantine.
- Hanson, R. 2009 (with R. Mendius). *Buddha's Brain: The Practical Neuroscience of Happiness, Love, and Wisdom*. New Harbinger.
- Johnson, S. 2005. *Mind Wide Open: Your Brain and the Neuroscience of Everyday Life*. Scribner.
- Kornfield, J. 2009. *The Wise Heart: A Guide to the Universal Teachings of Buddhist Psychology*. Bantam.
- LeDoux, J. 2003. *Synaptic Self: How Our Brains Become Who We Are*. Penguin
- Sapolsky, R. 2004. *Why Zebras Don't Get Ulcers*. Holt.
- Siegel, D. 2007. *The Mindful Brain: Reflection and Attunement in the Cultivation of Well-Being*. W. W. Norton & Co.
- Thompson, E. 2007. *Mind in Life: Biology, Phenomenology, and the Sciences of Mind*. Belknap Press.

# Key Papers - 1

---

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. 44

# 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.

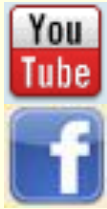
# Key Papers - 4

---

- 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.

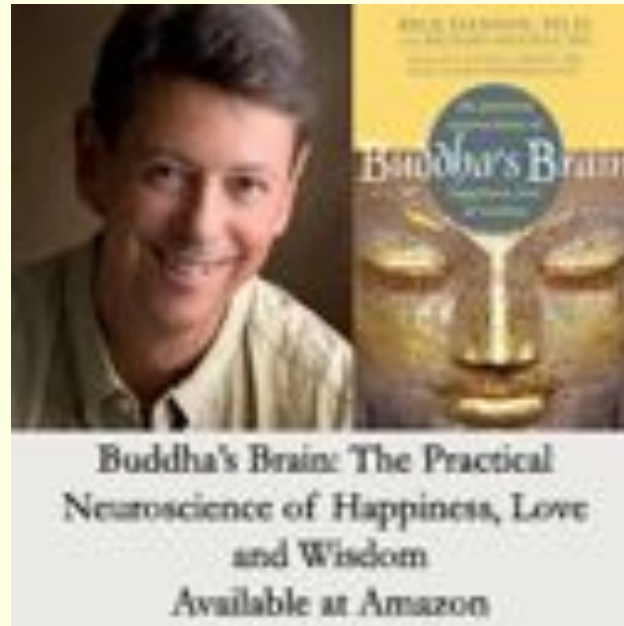
## *Where to Find Rick Hanson Online*

---



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

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



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

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