Stress-Proofing Your Brain
For Inner Peace

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Topics

- Using your mind to change your brain
- The evolving brain - and its challenges today
- Implicit memory and inner resources
- “Taking in the good” (TIG)
- Natural happiness
Domains of Intervention

- We can intervene in three domains:
  - World (including relationships)
  - Body
  - Mind

- All three are important. And they work together.

- We have limited influence over world and body.

- In the mind:
  - Much more influence
  - Changes are with us wherever we go
Self-Directed Neuroplasticity
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 makes ~5000 connections with other neurons:
  ~ 500 trillion synapses
- During one breath, a quadrillion-plus signals coursed through your head.

Complexity:
- Potentially 10 to the millionth power brain states
A Neuron
Your Amazing Brain

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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.
Fact #1

As your brain changes, your mind changes.
Ways That Brain Can Change Mind

For better:
- A little caffeine: more alertness
- Thicker insula: more self-awareness, empathy
- More left prefrontal activation: more happiness

For worse:
- Intoxication; imbalances in neurotransmitters
- Concussion, stroke, tumor, Alzheimer’s
- Cortisol-based shrinkage of hippocampus: less capacity for contextual memory
Fact #2

As your mind changes, your brain changes.

Immaterial mental activity maps to material neural activity.

This produces temporary changes in your brain and lasting ones.

Temporary changes include:
- Alterations in brainwaves (= changes in the firing patterns of synchronized neurons)
- Increased or decreased use of oxygen and glucose
- Ebbs and flows of neurochemicals
The Rewards of Love
Tibetan Monk, Boundless Compassion
Christian Nuns, Recalling Profound Spiritual Experiences

Beauregard, et al., *Neuroscience Letters*, 9/25/06
Mind Changes Brain in Lasting Ways

- What flows through the mind sculpts your brain. Immaterial experience leaves material traces behind:
  - Increased blood/nutrient flow to active regions
  - Altered epigenetics (gene expression)
  - “Neurons that fire together wire together.”
    - Increasing excitability of active neurons
    - Strengthening existing synapses
    - Building new synapses; thickening cortex
    - Neuronal “pruning” - “use it or lose it”

- Experience *matters*. Both for how it feels in the moment and for the lasting residues it leaves behind, woven into the fabric of a person’s brain and being.
The principal activities of brains are making changes in themselves.

Marvin L. Minsky
Honoring Experience

One’s experience *matters*. Both for how it feels in the moment and for the lasting residues it leaves behind, woven into the fabric of a person’s brain and being.
Fact #3

You can use your mind
to change your brain
to change your mind for the better.

This is self-directed neuroplasticity.

How to do this, in skillful ways?
Perspectives on Neuroplasticity

- Neuroplasticity is not breaking news. For a century or more, it’s been presumed that mental activity changed neural structure: what else is learning? The news is in the details of how.

- Most neuroplasticity is incremental.

- Awareness increases neural structure-building. Residues of conscious experience continually sift into implicit memory.

- Most experience is background, in the “simulator.” Thus the importance of mindfulness.
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.”
Ring the bells that still can ring
Forget your perfect offering
There is a crack in everything
That’s how the light gets in
That’s how the light gets in

Leonard Cohen
The Evolving Brain - and Its Challenges
Evolution

- ~ 4+ billion years of earth
- 3.5 billion years of life
- 650 million years of multi-celled organisms
- 600 million years of nervous system
- ~ 80 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 eyes
Three Stages of Brain Evolution

- **Reptilian:**
  - Brainstem, cerebellum, hypothalamus
  - Reactive and reflexive
  - “Avoiding”

- **Mammalian:**
  - Limbic system, cingulate, early cortex
  - Memory, emotion, social behavior
  - “Approaching”

- **Human:**
  - Massive cerebral cortex
  - Abstract thought, language, cooperative planning, empathy
  - “Attaching”
Evolutionary History

The Triune Brain

The Triune Brain - (P. MacLean 1990)
In evolution, threats usually had more impact on survival than opportunities did. 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 but Teflon for positive ones.*

Consequently, negative trumps positive:

- It takes five positive interactions to undo a negative one.
- People will do more to avoid a loss than get a gain.
- It’s easy to create learned helplessness, but hard to undo.

Negative experiences create vicious cycles.
Negative Experiences Can Have Benefits

There’s a place for negative emotions:
- Anxiety alerts us to inner and outer threats
- Sorrow opens the heart
- Remorse helps us steer a virtuous course
- Anger highlights mistreatment; energizes to handle it

Negative experiences can:
- Increase tolerance for stress, emotional pain
- Build grit, resilience, confidence
- Increase compassion and tolerance for others

*But is there really any shortage of negative experiences?*
Health Consequences of Chronic Stress

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)
A Major Result 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 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)

- 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.
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.
Implicit Memory and Inner Resources
Learning and Memory

- The sculpting of the brain by experience is memory:
  - Explicit - Personal recollections; semantic memory
  - Implicit - Bodily states; emotional residues; “views” (expectations, object relations, perspectives); behavioral repertoire and inclinations; what it feels like to be “me”

- Implicit memory is much larger than explicit memory. Resources are embedded mainly in implicit memory.

- Therefore, the key target is implicit memory. So what matters most is not the explicit recollection of positive events but the implicit emotional residue of positive experiences.
The Importance of Inner Resources

Examples:
- Freud’s “positive introjects”
- Internalization of “corrective emotional experiences” during psychotherapy
- “Learned optimism”

Benefits
- Increase positive emotions: many physical and mental health benefits
- Improve self-soothing
- Improve outlook on world, self, and future
- Increase resilience, determination
Factors of Neuroplasticity

**Physiological:**
- Norepinephrine (moderate)
- Dopamine
- Acetylcholine
- Brain-derived neurotrophic factor (BDNF)
- Natural opioids (?) (e.g., endorphins)
- Neurogenesis (promoted by exercise)

**Mental:**
- Priming memory through intention
- Target material:
  - Is within awareness
  - Receives focused attention
  - Is sustained, multimodal, and intense
  - Is (alas) negative
The Power of Mindfulness

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

- **Mindfulness**, **virtue**, and **wisdom** are identified in both Western psychology and the contemplative traditions as key pillars of mental health.

- These map to three core functions of the nervous system: receiving/learning, regulating, and prioritizing. And map to the three phases of psychological healing and personal growth:
  - Be mindful of, release, replace.
  - Let be, let go, let in.

- Mindfulness is vital, but not enough by itself.
Just **having** positive experiences is not enough.

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

We need to engage positive experiences actively to weave them into the brain.
How to Take in the Good

1. Look for positive **facts**, and let them become positive experiences.

2. Savor the positive experience:
   - Sustain it for 10-20-30 seconds.
   - Feel it in your body and emotions.
   - Intensify it.

3. Sense and intend that the positive experience is soaking into your brain and body - registering deeply in emotional memory.
Targets of TIG

- Bodily states - healthy arousal; PNS; vitality
- Emotions - both feelings and mood
- Views - expectations; object relations; perspectives on self, world, past and future
- Behaviors - repertoires; inclinations
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
Resources for Taking in the Good

- 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

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:
- Promote exploratory, “approach” behaviors
- Create positive cycles
- Lift mood; increase optimism and resilience
- Help heal trauma
- Strengthen immune and protect cardiovascular systems
Why It’s Good to Take in the Good - 1

- In general, adds positive contents to implicit memory

- Internalizes psychological growth (e.g., it usually feels good and goes well to speak from my heart)

- Associates rewards to good steps; boosts motivation

- Brings in missing “supplies” (e.g., love, worth) to help remedy deficits and heal painful experiences

- Encourages prosocial experiences and actions
The good life, as I conceive it, is a happy life.
I do not mean that if you are good you will be happy;
I mean that if you are happy you will be good.

Bertrand Russell
Why It’s Good to Take in the Good - 2

- Reduces threat reactivity (by taking in resources, opportunities fulfilled, and reasonable safety)

- Counteracts “learned helplessness” (by taking in assertiveness, efficacy, internal locus of control)

- Reduces suffering due to alarm signals from endlessly disturbed equilibria by taking in their also endless re-balancing

-Implicitly: Rights the internal injustice of the negativity bias; embodies self-attunement, -nurturance, and -advocacy (vital if a person hasn’t received these)
TIG and the Stress Response

- Activates and thereby strengthens general, top-down PFC-hippocampal (PFC-H) capabilities, which become enhanced resources for coping.

- Generally desensitizes amygdaloid-sympathetic nervous system (A-SNS) networks.

- Internalizes specific regulatory resources, which strengthens PFC-H and inhibits A-SNS (e.g., feeling soothed or encouraged).
TIG and Children

- All kids benefit from TIG.

- Particular benefits for mistreated, anxious, spirited/ADHD, or LD children.

- Adaptations:
  - Brief
  - Concrete
  - Natural occasions (e.g., bedtimes)
Potential Synergies of TIG and MBSR

- Improved mindfulness from MBSR enhances TIG.

- TIG increases general resources for MBSR (e.g., heighten the PNS activation that promotes stable attention).

- TIG increases specific factors of MBSR (e.g., self-acceptance, self-compassion, tolerance of negative affect)

- TIG heightens internalization of key MBSR experiences:
  - The sense of stable mindfulness itself
  - Confidence that awareness itself is not in pain, upset, etc.
  - Presence of supportive others (e.g., MBSR groups)
  - Peacefulness of realizing that experiences come and go
Clearing Old Pain
Using Memory Mechanisms to Help Heal Painful Experiences

- The machinery of memory:
  - When explicit or implicit memory is re-activated, it is re-built from schematic elements, not retrieved in toto.
  - When attention moves on, elements of the memory get re-consolidated.

- The open processes of memory activation and consolidation create a window of opportunity for shaping your internal world.

- Activated memory tends to associate with other things in awareness (e.g., thoughts, sensations), esp. if they are prominent and lasting.

- When memory goes back into storage, it takes associations with it.

- You can imbue implicit and explicit memory with positive associations.
The Fourth Step of TIG

- When you are having a positive experience:
  - Sense the current positive experience sinking down into old pain, and soothing and replacing it.

- When you are having a negative experience:
  - Bring to mind a positive experience that is its antidote.

- In both cases, have the positive experience be big and strong, in the forefront of awareness, while the negative experience is small and in the background.

- You are not resisting negative experiences or getting attached to positive ones. You are being kind to yourself and cultivating positive resources in your mind.
Psychological Antidotes

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

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

Avoiding Threats
- Strength, efficacy --> Weakness, helplessness, pessimism
- Safety, security --> Alarm, anxiety
- Compassion for oneself and others --> Resentment, anger
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.
Natural Happiness
Reverse Engineering the Brain

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

- In peak states of productivity or "flow?"
- Experiencing inner peace?
- Self-actualizing?
- Enlightened (or close to it)?
Three Motivational Systems

- **Avoid** “sticks,” threats, penalties, pain
- **Approach** “carrots,” opportunities, rewards, pleasure
- **Attach** to “us,” for proximity, bonds, feeling close

- Reptiles and fish avoid and approach. Mammals and birds also *affiliate* - especially primates and humans. Affiliating is a breakthrough, co-evolving with emotion.

- Although the three branches of the vagus nerve loosely map to the three systems, the essence of each is its *aim*, not its neuropsychology. Each system can draw on another system for its ends.
Home Base of the Human Brain

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

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

This is the brain in its natural, *responsive* mode.
The Responsive Mode
To Survive, We Leave Home . . .

- **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

- Approach "Greed"
- Ignorance Suffering
- Avoid "Hatred"
- Heartache
- Affiliate
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”
Choices . . .

Or?

Responses

Approach  
"Greed"  
Ignorance  
Suffering  
Heartache  
Affiliate

Avoid  
"Hatred"

Approach  
Gratitude  
Wisdom  
Contentment  
Love  
Affiliate

Avoid  
Peace
Coming Home . . .

Gladness

Love

Peace
Some Ways to Take the Fruit as the Path


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

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

Avoid system
- Cool the fires.
- Recognize paper tigers.
- Tolerate risking the dreaded experience.
Penetrative insight

joined with calm abiding

utterly eradicates

afflicted states.

Shantideva
Great Books

See www.RickHanson.net for other great books.

See www.RickHanson.net for other scientific papers.


Key Papers - 2


- 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


Key Papers - 4


