The Power of Self-Directed Neuroplasticity

AMHCA
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Topics

- Perspectives
- Self-directed neuroplasticity
- The power of mindfulness
- The brain - so what?
- Self-compassion
- Lateral networks of mindful awareness
Perspectives
Common - and Fertile - Ground

Neuroscience  Psychology

Contemplative Practice
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
When the facts change,  
I change my mind, sir.

What do you do?

John Maynard Keynes
We ask, “What is a thought?”

We don’t know,

yet we are thinking continually.

Venerable Tenzin Palmo
Self-Directed Neuroplasticity
A Neuron
A SYNAPSE

Axon Terminal

Presynaptic membrane
neurotransmitter released by exocytosis

Mitochondrion
produce ATP

Synaptic vesicles
contain neurotransmitter

Postsynaptic membrane
has receptors for neurotransmitters

Synaptic Cleft

Dendrite of second neuron
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 an aspect of mind.
  - The headquarters of the nervous system is the brain.

- In essence then, apart from hypothetical transcendental factors, the mind is what the brain does.

- Brain = necessary, proximally sufficient condition for mind:
  - The brain depends on the nervous system, other bodily systems, nature, and culture.
  - As we’ll see, the brain also depends on the mind.

- Therefore, the brain and mind are two aspects of one system, interdependently arising.
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
Rewards of Love
Pain network: Dorsal anterior cingulate cortex (dACC), insula (Ins), somatosensory cortex (SSC), thalamus (Thal), and periaqueductal gray (PAG). Reward network: Ventral tegmental area (VTA), ventral striatum (VS), ventromedial prefrontal cortex (VMPFC), and amygdala (Amyg). K. Sutliff, in Lieberman & Eisenberger, 2009, *Science*, 323:890-891
Tibetan Monk, Boundless Compassion
Christian Nuns, Recalling a Profound Spiritual Experience

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”
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?*
The Power of Mindfulness
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
Some Neural Factors of Mindfulness

- **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
- **Absorbing the benefits** - positive implicit memories
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.
The Brain: So What?
Neuroplasticity in Context

- Neuroplasticity is not breaking news. It’s been long presumed that mental activity changed neural structure: what else is learning?

- The news is in how the mind changes the brain.

- Most neuroplasticity is incremental, not dramatic.

- Neuroplasticity is ethically neutral.
Grounding in the Brain - Benefits

- **Organizing framework**
  - Evolutionary neuropsychology
  - Common ground across theories and methods

- **Motivating to clients, clinicians, policy-makers**
  - Concrete, in the body, *physical*
  - Status of medicine, hard science

- **Highlighting key principles and practices**
  - Implicit memory
  - Nonverbal processes

- **Innovating with truly new methods**
  - Neurofeedback
  - Fear extinction
Grounding in the Brain - Pitfalls

- Adding little new meaning
  - Replacing psych terms with neuro (“amygdala made me do it”)

- Over-simplifying
  - Over-localizing function (e.g., empathy = mirror neurons)
  - Over-emphasizing one factor (e.g., attachment experiences)
  - Exaggerated terms (“God-gene,” “female brain”)
  - Materialistic reductionism, though brain and mind co-arise

- Claiming authority
  - Using neuro data to argue a political or cultural case
  - Using the secular religion of science to elevate status

- Underestimating the mind
  - Most big changes in psyche involve tiny changes in soma; mental plasticity holds more promise than neural plasticity.
  - Overlooking the insights and effectiveness of psychology
  - Ducking existential choices in values
Self-Compassion
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: 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.
Self-Compassion

Compassion is the wish that a being not suffer, combined with sympathetic concern. Self-compassion simply applies that to oneself. It is not self-pity, complaining, or wallowing in pain.

Studies show that self-compassion 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 compassion to yourself, perhaps with phrases like: “May I not suffer. May the pain of this moment pass.”
“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
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
Lateral Networks of Mindful Awareness
## Dual Modes

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<thead>
<tr>
<th>“Doing”</th>
<th>“Being”</th>
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<tbody>
<tr>
<td>Mainly representational</td>
<td>Mainly sensory</td>
</tr>
<tr>
<td>Much verbal activity</td>
<td>Little verbal activity</td>
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<td>Sense of peace</td>
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Increased **Medial** PFC Activation
Related to Self-Referencing Thought

Cortical Midline Areas for Self-Referencing Thought

Self-Focused (blue) and Open Awareness (red) Conditions (in the novice, pre MT group)

Self-Focused (blue) vs Open Awareness (red) Conditions (following 8 weeks of MT)

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Ways to Activate “Being” Mode

- Relax
- Focus on bare sensations and perceptions
- Sense the body as a whole
- Take a panoramic, “bird’s–eye” view
- Engage “don’t-know mind”; release judgments
- Don’t try to connect mental contents together
- Let experience flow, staying here now
- Relax the sense of “I, me, and mine”
Whole Body Awareness

- Sense the breath in one area (e.g., chest, upper lip)

- Sense the breath as a whole: one gestalt, percept

- Sense the body as a whole, a whole body breathing

- Sense experience as a whole: sensations, sounds, thoughts . . . all arising together as one unified thing

- It’s natural for this sense of the whole to be present for a second or two, then crumble; just open up to it again and again.
Panoramic Awareness

- Recall a bird’s-eye view (e.g., mountain, airplane)
- Be aware of sounds coming and going in an open space of awareness, without any edges: boundless
- Open to other contents of mind, coming and going like clouds moving across the sky.
- Pleasant or unpleasant, no matter: just more clouds
- No cloud ever harms or taints the sky.
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


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