Neurobhavana

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Fertile Intersections
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.

What do you do?

John Maynard Keynes
Grounding in the Brain - Pitfalls

- **Adding little new meaning**
  - Replacing psych terms with neuro (“the 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, dogmatic atheism
- **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; naturalistic fallacy
Grounding in the Brain - Benefits

- **Organizing**
  - Human DNA and brain; evolutionary neuropsychology
  - Common ground across perspectives and practices

- **Motivating**
  - Concrete, in the body, *physical*; efforts bear tangible fruit
  - Status of medicine, science

- **Highlighting**
  - Neurological diversity; individualizing practices
  - Nonverbal processes

- **Innovating**
  - Four poisons, not three
  - Negativity bias; importance of taking in the good
  - Neurofeedback
Naturalizing the Dharma

To “naturalize” something is to place it in the frame of the natural world, to operationalize it in natural terms.

Buddhist practice engages the mental causes of suffering and its end. What could be the natural, neurobiological (NB) causes of those causes?

What could be a NB operationalization of dukkha, tanha, nirodha, sila, samadhi, panna, and bhavana?

It is ironic that a practice that is so much about coming into the body can be reluctant to engage the full implications of what embodiment in life means.
Demo or die.

The Media Lab, MIT
Neurodharma
All cells have specialized functions. Brain cells have particular ways of processing information and communicating with each other. Nerve cells form complete circuits that carry and transform information.

Electrical signaling represents the language of mind, the means whereby nerve cells, the building blocks of the brain, communicate with one another over great distances. Nerve cells generate electricity as a means of producing messages.

All animals have some form of mental life that reflects the architecture of their nervous system.

Eric R. Kandel, 2006
[People] ought to know that from nothing else but the brain come joys, delights, laughter and sports, and sorrows, griefs, despondency, and lamentations.

Hippocrates
The Mind/Brain System - A Working Model

Information in the nervous system:
- Immaterial information is represented by a material substrate; the shapes of these words convey their meanings.
- It includes signals, meanings, data, and instructions.

“Mind” = the information in the nervous system (NS):
- Mind is a natural phenomenon.
- Most mind is unconscious.
- Awareness, experience, and happiness are aspects of mind.
- The NS constrains, conditions, and constructs mind.
- Mind constrains, conditions, and constructs the NS.

NS and mind co-arise interdependently, two distinct aspects of one integrated system: “dual-aspect monism”
Key Brain Areas for Consciousness

(adapted from) M. T. Alkire et al., Science 322, 876-880 (2008)
We ask, “What is a thought?”

We don’t know,

yet we are thinking continually.

Venerable Tenzin Palmo
Self-Directed Neuroplasticity
The principal activities of brains are making changes in themselves.

Marvin L. Minsky
Change in the Mind/Brain System

- Buddhism is a pragmatic study of change. Including in and of oneself. What is it that changes? And how could we help those changes go well?

- Changing the mind means changing the brain.

- Activated, transient mental states can become installed as enduring neural traits: neuro-bhavana.
Three Facts about Brain and Mind

- As the brain changes, the mind changes.
  - Mental activity depends upon neural activity.

- As the mind changes, the brain changes.
  - Transient: brainwaves, local activation
  - Lasting: epigenetics, neural pruning, “neurons that fire together, wire together”
  - Experience-dependent neuroplasticity

- You can use the mind to change the brain to change the mind for the better: self-directed neuroplasticity.
Ardent, Diligent, Resolute, and Mindful
Increased gray matter in the:

- **Insula** - interoception; self-awareness; empathy for emotions (Holzel et al., 2008; Lazar et al., 2005)
- **Hippocampus** - visual-spatial memory; establishing context; inhibiting amygdala and cortisol (Holzel et al., 2008; Luders et al., 2009)
- **Prefrontal cortex** (PFC) - executive functions; attention control (Lazar et al., 2005; Luders et al., 2009)

Reduced cortical thinning with aging in insula and PFC (Lazar et al., 2005)
Effects of Meditation on Brain - 2

- Increased activation of left frontal regions (Davidson et al., 2003), which lifts mood (Davidson, 2004)

- Increased power and reach of gamma-range brainwaves (Cahn et al., 2010; Lutz et al., 2004) - may be associated with integration, “coming to singleness,” “unitary awareness”

- Preserved telomere length (Epel et al., 2009; Jacobs et al., 2011)
IN YOUR MIND’S BROWSER, CLEAR YOUR CACHE...

NOW DELETE YOUR HISTORY...

NOW NAVIGATE TO A BLANK WEB PAGE...
Honoring Experience

Your experience *matters*.

Both for how it feels in the moment and for the lasting residues it leaves behind, woven into the fabric of your brain and being.
The root of compassion is compassion for oneself.

Pema Chodron
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
Causes of Suffering and Its End

- Mental and physical phenomena change due to causes.

- Causes in the brain are shaped by the mental/neural states that are activated and then installed within it.

- Inner “poisons” (e.g., hatred, greed, heartache, delusion) cause suffering and harm.

- Inner strengths (e.g., virtue, mindfulness, wisdom, peace, contentment, love) cause happiness and benefit for oneself and others.
Craving
Evolution is a tinkerer. In living organisms, new capabilities are achieved by modifying existing molecules slightly and adjusting their interaction with other existing molecules.

Science has found surprisingly few proteins that are truly unique to the human brain and no signaling systems that are unique to it.

All life, including the substrate of our thoughts and memories, is composed of the same building blocks.

Eric R. Kandel
Evolutionary History

The Triune Brain - (P. MacLean 1990)
Three Fundamental Motivational and Self-Regulatory Systems

- **Avoid Harms:**
  - Primary need, tends to trump all others

- **Approach Rewards:**
  - Elaborated via sub-cortex in mammals for emotional valence, sustained pursuit

- **Attach to Others:**
  - Very elaborated via cortex in humans for pair bonding, language, empathy, cooperative planning, compassion, altruism, etc.
Neurobiological Basis of Craving

When disturbed by threat, loss, or rejection [deficit 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:
- Hatred (the Avoiding system)
- Greed (the Approaching system)
- Heartache (the Attaching system)

This is the brain in allostatic, Reactive, craving mode.
The Reactive Mode

- Avoid
- Hatred
- Greed

- Ignorance
- Suffering
- Heartache

- Approach
- Attach
Negativity Bias

- As our ancestors evolved, not getting hit by “sticks” was more important for survival than getting “carrots.”

- Negative stimuli get more attention and processing. Loss aversion.

- Preferential encoding in implicit memory:
  - Easy to create learned helplessness, hard to undo
  - Negative interactions: more powerful than positive
  - Good at learning from bad, bad at learning from good
  - Most good experiences are wasted on the brain: lowers both the results of practice and motivation
Not Craving
The Homeostatic Home Base

When not disturbed by threat, loss, or rejection [no deficit 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.
The Responsive Mode
Choices . . .

Or?

Reactive Mode

Responsive Mode
Neurobhavana
Join us for **Cultivating Inner Strength - Monastic Daylong [Dana - No Fee Day]**
with Ayya Anandabodhi and Ayya Santacitta
on **Sunday, July 8**
from 9:30 am - 5 pm.

(Photo by Ed Ritger)
Cultivation in Context

Three ways to engage the mind:
- Be with it. Decrease negative. Increase positive.
- Let be. Let go. Let in.

Mindfulness present in all three ways to engage mind

While “being with” is primary, it’s often isolated in Buddhist, nondual, and mindfulness-based practice.

Skillful means for decreasing the negative and increasing the positive have developed over 2500 years. Why not use them?
HEAL by Taking in the Good

1. **Have** a positive experience. Notice 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.

**Benefits:** Specific contents internalized. Implicit value of being active and treating yourself like you matter. Gradual sensitization of the brain to the positive.
Some Types of Resource Experiences

**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 pleasured, 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
The Fruit as the Path

Peace

Contentment

Love
Cultivation Undoes Craving

- All life has goals. The brain continually seeks to avoid harms, approach rewards, and attach to others - even that of a Buddha.

- It is wholesome to wish for the happiness, welfare, and awakening of all beings - including the one with your nametag.

- We rest the mind upon positive states so that the brain may gradually take their shape. This disentangles us from craving as we increasingly rest 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.
A Fifth (Sixth) Yana?

- In addition to - What is a secular Buddhism? - a useful question might be: What could be the seeds of an emergent Fifth Yana?
- Supple movement between first and third person perspectives?
- Skillful use of positive experiences?
- Integration of psychological and NB perspectives on mind?
- Eclectic application of deconstructed Buddhist perspectives and practices in non-Buddhist settings?
- ??
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.

Dhammapada 9.122
Great Books

See www.RickHanson.net for other great books.

Key Papers - 1

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.


Where to Find Rick Hanson Online

http://www.youtube.com/BuddhasBrain
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