

The Neurodharma of Love:

Using Brain Science and Buddhist Wisdom To Illuminate the Heart Of Important Relationships

New York Insight Meditation Center

April 19, 2009

Rick Hanson, Ph.D.

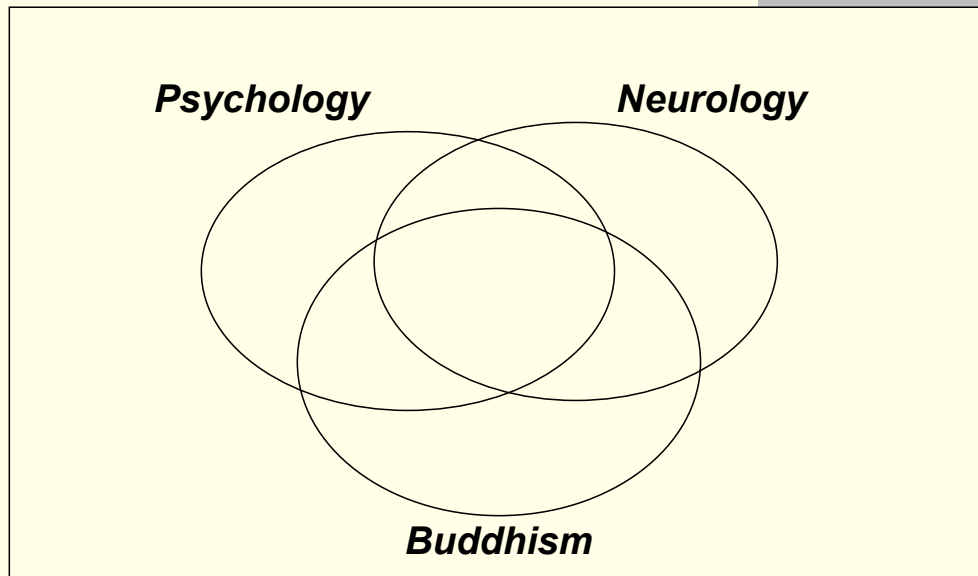
drh@comcast.net

© 2009

Plan for the Day

- Context
- Foundations of Meditation
- Balancing Joining and Separation
- Mind/Brain Integration
- Your Amazing Brain
- Being for Yourself in Relationships
- Goodness and Virtue in Relationships
- Compassion, Kindness, and the Evolution of Love
- Empathy in the Brain and in Practice
- The Wolves of Love and Hate
- Lovingkindness for the Whole Wide World

Common - and Fertile - Ground



Balancing Joining and Separation

- We want to be our own person, and we want to join with others.
- This balance - closeness and distance, intimacy and autonomy - varies from individual to individual, due to genetic factors, and the effects of personal choices and environmental influences.
- It's natural to be wary of closeness:
 - Most psychological wounds occur in relationships.
 - "Stranger danger" in our evolutionary history
- Individuality and relationship support each other; "fences make for good neighbors."
- Feeling strong helps you enter the depths of relationship.

"We ask, 'What is a thought?'
We don't know,
yet we are thinking continually."

- Ven. Tenzin Palmo

A Few Disclaimers

- On the frontiers of science
- Neuropsychology is no replacement for contemplative wisdom.
- It's OK to focus more on psychology, neurology, or contemplation today.
- Within the frame of the Buddhist contemplative tradition, particularly its Theravadan wing
- In particular, an emphasis on steadying the mind for the concentration that fosters deep insights
- Adapt this to your own needs and practices.
- There are lots of important perspectives besides the ones you'll hear today.

Basics of Meditation

- Relax
- Posture that is comfortable and alert
- Simple good will toward yourself
- Awareness of your body
- Focus on something to steady your attention
- Accepting whatever passes through awareness, not resisting it or chasing it
- Gently settling into peaceful well-being

Foundations of Meditation

- Setting an intention - “top-down” frontal lobes, “bottom-up” limbic system
- Relaxing the body - parasympathetic nervous system
- Feeling safer - inhibits amygdala/ hippocampus vigilance circuits
- Evoking positive emotion - dopamine, norepinephrine
- Absorbing the benefits - primes memory circuits throughout the brain

Know the mind.

Shape the mind.

Free the mind.

The Mind/Brain System

- “Mind” = flow of information within the nervous system; mainly forever unconscious
- Apart from hypothetical transcendental factors, your mind *is* what your brain *does*. **The brain is the *necessary* and *proximally sufficient* condition for the mind.**
- As brain changes, mind changes. As mind changes, brain changes. Mental activity - the flow of information - maps to neural activity, the flow of matter and energy.
- Therefore, you can use your mind to change your brain to change your mind - to benefit your whole being and every other being you touch.

Mental Activity Sculpts Neural Structure

- What flows through your mind sculpts your brain. Immaterial experience leaves material traces behind.
- “Neurons that fire together wire together.”
 - Neuronal “pruning” - Natural selection in the brain
 - Changes in excitability of individual neurons due to activity
 - Increased blood flow
 - Strengthen existing synapses
 - Building new synapses; from *in utero* to your deathbed
 - Observable thickening of cortical layers
- 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 being.

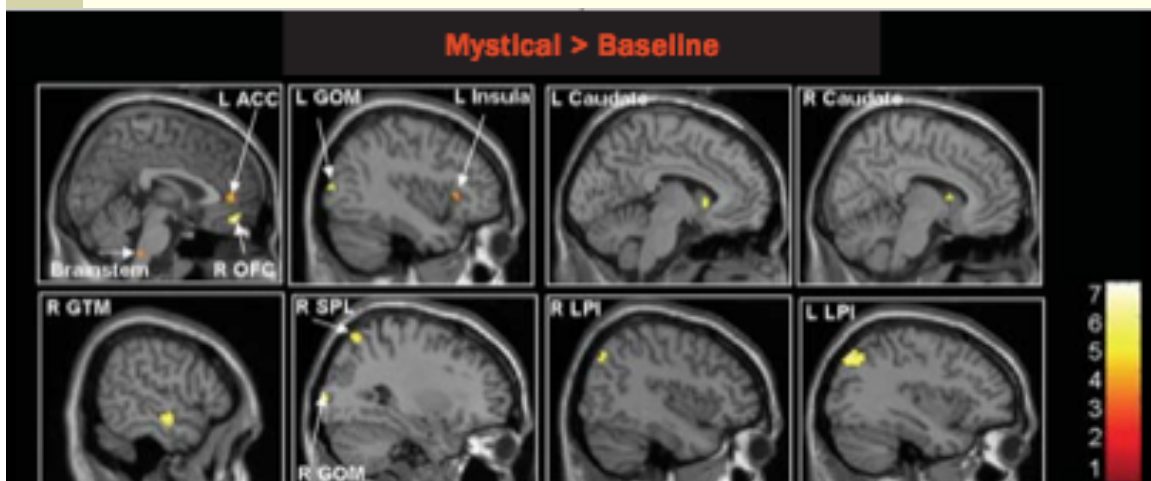
The Mind/Brain System

- “Mind” = flow of information within the nervous system; mainly forever unconscious
- Apart from hypothetical transcendental factors, your mind *is* what your brain *does*. **The brain is the *necessary* and *proximally sufficient* condition for the mind.**
- As brain changes, mind changes. As mind changes, brain changes. Mental activity - the flow of information - maps to neural activity, the flow of matter and energy.
- Therefore, you can use your mind to change your brain to change your mind - to benefit your whole being and every other being you touch.

“Ardent, Diligent, Resolute, and Mindful”



Nuns in Prayer



Beauregard, et al., *Neuroscience Letters*, 9/25/06

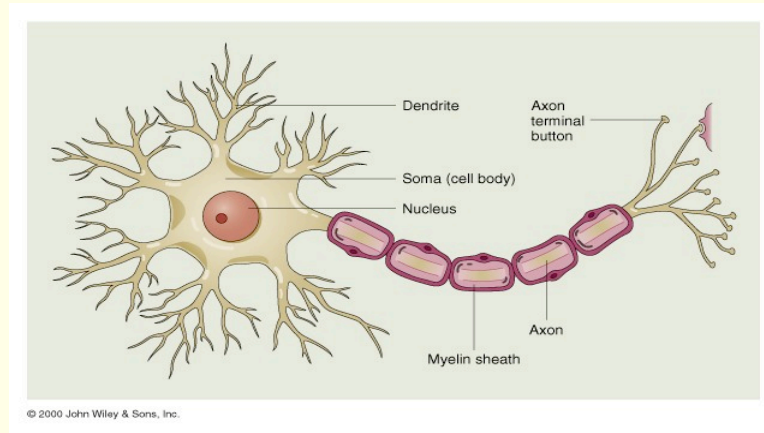
Physical Effects of Meditation

- Thickens and strengthens the anterior (frontal) cingulate cortex and the insula. Those regions are involved with controlled attention, empathy, and compassion – meditation improves those functions.
- Less cortical thinning with aging
- Increases activation of the left frontal regions, which lifts mood
- Increases the power and reach of fast, gamma-range brainwaves
- Decreases stress-related cortisol
- Stronger immune system

Your Amazing Brain

- **Size:**
 - 3 pounds of tofu-like tissue
 - 1.1 trillion brain cells; 100 billion "gray matter" neurons
 - Each neuron connects with about 1000 others: 100 trillion synapses
- **Activity:**
 - Neurons fire around 5 to 50+ times a second
 - A firing signals downstream neurons to fire or not (green light or red)
 - A neuron fires based on the momentary summation of upstream signals
 - Always on 24/7/365 - instant access to information on demand
 - 20-25% of blood flow, oxygen, and glucose
 - About a quadrillion synaptic signals a second
 - The congealed, turgid stuff we call conscious thought is just the observable tip of an iceberg of lightning quick neural activities.

One Simple Neuron . . .



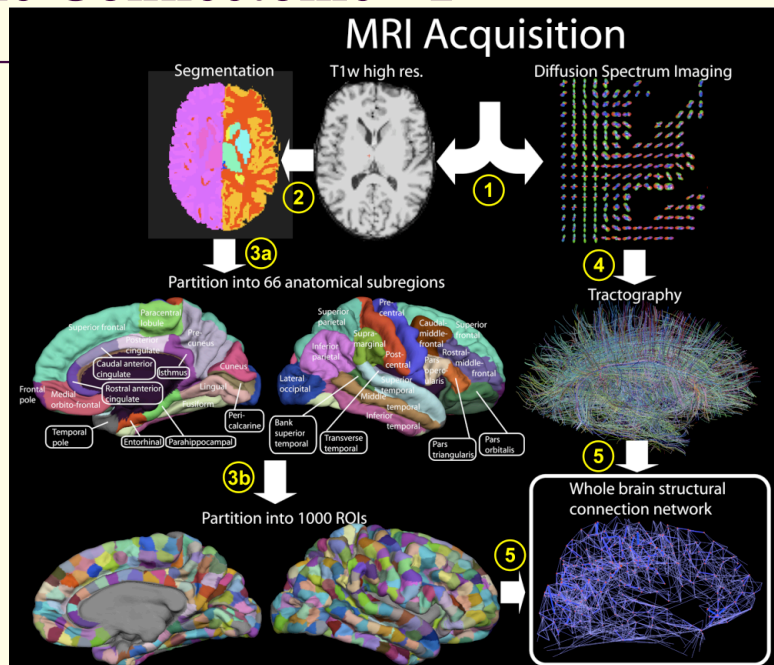
Your Amazing Brain

- **Size:**
 - 3 pounds of tofu-like tissue
 - 1.1 trillion brain cells; 100 billion "gray matter" neurons
 - Each neuron connects with about 1000 others: 100 trillion synapses
- **Activity:**
 - Neurons fire around 5 to 50+ times a second
 - A firing signals downstream neurons to fire or not (green light or red)
 - A neuron fires based on the momentary summation of upstream signals
 - Always on 24/7/365 - instant access to information on demand
 - 20-25% of blood flow, oxygen, and glucose
 - About a quadrillion synaptic signals a second
 - The congealed, turgid stuff we call conscious thought is just the observable tip of an iceberg of lightning quick neural activities.

Specialization and Teamwork

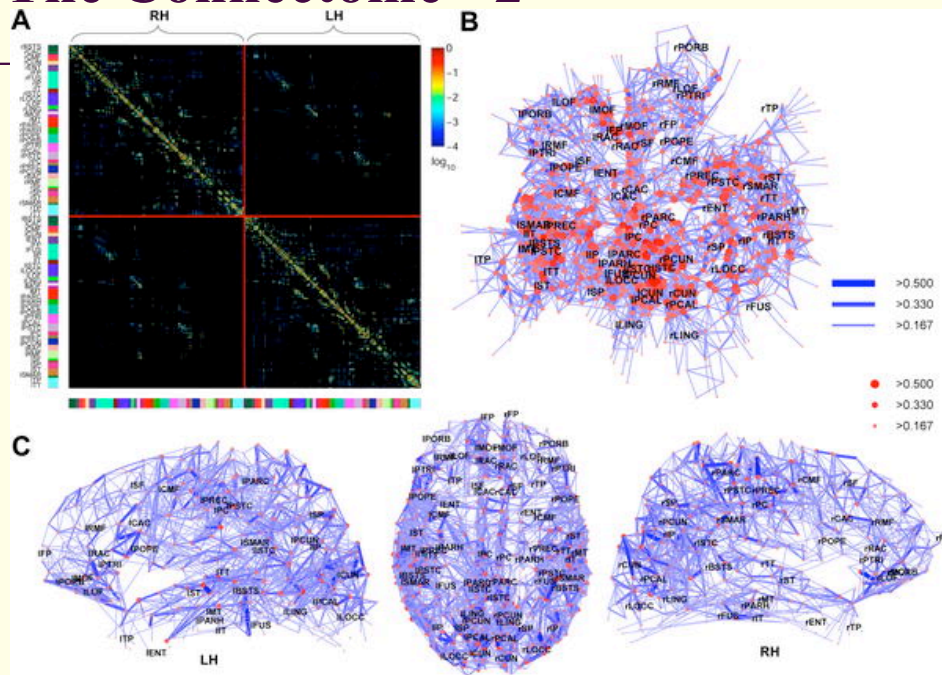
- Specialized functions
 - Speech production differs from comprehension.
 - Face recognition
- Working in harmony as a network
 - Connectivity is the hallmark of the brain
 - “*Specialization is for insects.*” - Robert Heinlein
 - Network “noise” facilitates individual signals.
 - Distributed information - “Holographic”
 - One part can compensate for damage to another.
 - No localized self - “Self” is in the system, not the cells.

The Connectome - 1

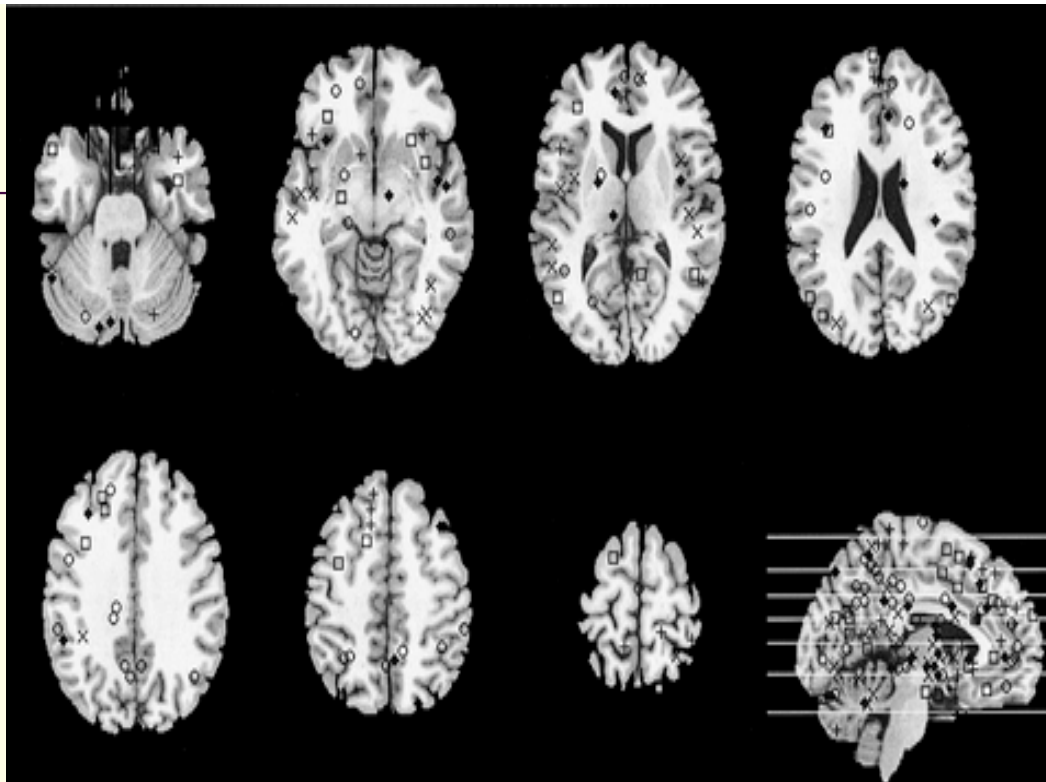


Hagmann, et al., 2008, *PLoS Biology*, 6:1479-1493.

The Connectome - 2

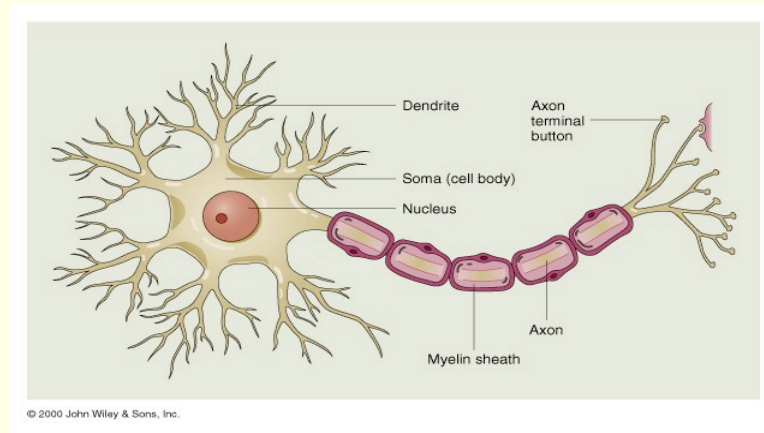


Hagmann, et al., 2008, *PLoS Biology*, 6:1479-1493.



Brain activations of "selfing" - Gillihan, et al., 2005. *Psych Bulletin*, 131:76-97.

One Simple Neuron . . .



. . . Multiplied by Billions of Neurons

- 100 billion neurons either firing or not: the number of possible brain states is 1 followed by a million zeros.
 - The number of particles in the universe: 1 with eighty zeros
- Your brain is the most complex object known in the universe
- Circular loops:
 - Recursion, self-regulation, and self-observation
 - Dynamic, “chaotic” effects: determined, but unpredictable
 - Shared circuitry triggers wandering stream of consciousness
- Overlapping, connected sub-networks: “stream of consciousness” - don’t take it too seriously

Stability and Instability

- Organization alternates with disorganization
- Rhythms lasting milliseconds and decades
- Stability needed to have a place to operate from, and instability needed to have any learning or adaptation
 - Out of chaotic potentiality, brain forms neural assemblies from millions of synapses that last a few hundred milliseconds to several seconds, and then disperse back into “noise” to make way for new ones
 - Eddies swirling together and dispersing in a stream
- Forever pulsing: Impermanence
- Fertile openness to creation: Emptiness

Lunchtime Reflections . . .

Wisdom is . . . all about understanding the underlying spacious and empty quality of the person and of all experienced phenomena.

To attain this quality of deep insight, we must have a mind that is quiet and malleable.

Achieving such a state of mind requires that we first develop the ability to regulate our body and speech so as to cause no conflict.

Venerable Ani Tenzin Palmo

Feeling Strong

- Relaxed, resting in awareness
- Feeling the strength in awareness itself, never sullied or rattled by what passes through it.
- Sense the vitality in your body
- Recall a time you felt really strong, and sense those feelings.
- Energy and strength in your breathing . . . in arms and legs . . . in your whole being . . .
- A spacious strength that lets others flow through
- In relationship and at peace
- Relaxed in a spacious world; no need for struggle

Being for Yourself

- The dharma teaches us to be compassionate and kind toward all beings. And that whatever we do to the world affects us, and whatever we do to ourselves affects the world.
- You are one of the “all beings!” And kindness to yourself benefits the world, while hurting yourself harms the world.
- It’s a general moral principle that the more power you have over someone, the greater your duty is to use that power wisely. Well, who is the one person in the world you have the greatest power over? It’s your future self. You hold that life in your hands, and what it will be depends on how you care for it.
- Consider yourself as an innocent child, as deserving of care and happiness as any other.

Three Pillars of Buddhist Practice

Sila - Restraint, morality, virtue

- Samadhi - Steadiness of mind, meditative absorption, non-ordinary states of being
- Panna - Wisdom
- Correspond closely to the three neural functions of reulating, learning, and selecting

*The point is not that these are “good,”
but that they are effective.*

How Virtue Supports Relationships

- Brings peace of mind, “the bliss of blamelessness”
- Reduces interpersonal wrangles
- Encourages good behavior in others
- Teaches us what we can ask for from others

Goodness and Virtue

- Virtue is the outer expression of inner goodness.
 - Virtue: “top-down”
 - Goodness: “bottom-up”
- The ultimate is unbidden, naturally flowing goodness.
- But that’s hard, so we take refuge in virtue.
- The real test of virtue is doing the right thing when we don’t feel like it.
- Virtues are specific and clear; it’s usually apparent if we are living by a virtue or not.

Buddhist Relationship Virtues

- These are aids to practice, not rules that are a sin to break.
- The Five Precepts: Do not kill, steal, create harms through sexuality, lie, or abuse intoxicants.
- Wise Livelihood: Do not trade in weapons, living beings, meat, intoxicants, or poisons.
- Wise Speech: Say only what is true, beneficial, timely, expressed without harshness, and - ideally - what is wanted.
- The fundamental principle of non-harming . . . including oneself

Benefits of Unilateral Virtue

- Simplifies things: all you have to do is just live by your own code, and others will do whatever they do.
- Feels good in its own right.
- Minimizes inflammatory triggers, evokes good treatment, empowers you to ask for it.
- Stands you on the moral high ground.

Remaining virtuous in the face of provocation is a profound expression of non-harming and benevolence toward all beings.

Wisdom Comes from Virtue

Wisdom is a huge subject. It is all about understanding the underlying spacious and empty quality of the person and of all experienced phenomena.

To attain this quality of deep insight, we must have a mind that is quiet and malleable.

Achieving such a state of mind requires that we first develop the ability to regulate our body and speech so as to cause no conflict.

Venerable Tenzin Palmo

The Buddha's Words on Lovingkindness

Wishing: In gladness and in safety, may all beings be at ease.

Omitting none, whether they are weak or strong, the great or the mighty, medium, short, or small, the seen and the unseen, those living near and far away, those born and to-be-born: May all beings be at ease.

Let none through anger or ill-will wish harm upon another. Even as a mother protects with her life her child, her only child, so with a boundless heart should one cherish all living beings; radiating kindness over the entire world: spreading upwards to the skies, and downwards to the depths, outwards and unbounded, freed from hatred and ill-will.

One should sustain this recollection.

This is said to be the sublime abiding.

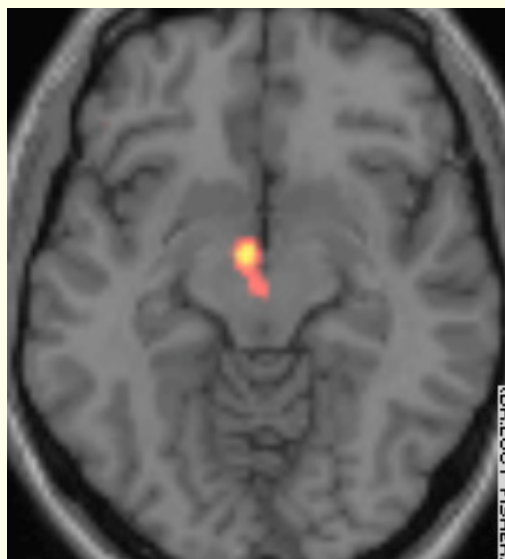
Evolution of Bonding, Cooperation, and Love

- Mammals and birds have bigger brains than reptiles and fish do because they raise their young and often pair-bond.
 - Monogamous species have the biggest brains.
- The more social the primate group, the bigger the brain
 - Groomers get more of a stress relief benefit than groomees.
- Human hunter-gatherer bands competed intensely with other bands; the ones with the best teamwork usually won.
 - Genetically, it makes sense to altruistically sacrifice your own life if that promotes the survival of others with whom you share genes.

The Brain in Lust and Love

- When we see someone we are infatuated with or love, the tegmentum on top of the brainstem sends dopamine to the caudate nucleus (basal ganglia); caudate signals: “Send more!”
- Being rejected in love activates the insula, also involved in the experience of physical pain.
- Lust activates hypothalamus and amygdala: drives, emotion, and arousal
- Over time, the intensity of rewards settles down; they can remain powerful even if more diffuse.

The Rewards of Love



(DR. LUCY FISHER)

Grandchildren!



Oxytocin

- Promotes bonding between mothers and children, and between mates, keeping those kids alive
- In women, triggers let-down reflex in nursing, and tend-and-befriend behaviors during stress
- In both women and men it dampens stress response, and it feels pleasurable, relaxed, a “rightness”
- Rewards all bonding behaviors
- Triggered by:
 - Nipple stimulation
 - Orgasm
 - Physical contact (especially skin to skin)
 - Moving together harmoniously (dancing)
 - Warm feelings of rapport or love (lovingkindness); devotion
 - Imagination of these

What Is Empathy?

- Sensing, feeling, and understanding how it is for the other person
- Both a bodily resonance and a conceptual understanding
- Empathy is usually communicated, though often tacitly.
- We can give empathy, we can receive it, and we can ask for it.

Why Is Empathy Important?

- We benefit from both receiving empathy and giving it.
- We all need to feel *felt*. To exist as a Thou to their I.
- Empathy says, "Message received." Often, that's all the situation requires, and if not, it's still easier to deal with the topic at hand.
- Empathy provides useful information.
- Helpful with people who are aversive to you

Empathy in Buddhist Practice

- Empathy expresses Wise View, which sees how we are all related to each other.
 - Empathy is thus, in a deep sense, self-understanding
- Empathy is sila in action, the restraint of reactive patterns to be present with others.
- Empathy involves non-attachment to view, dropping our “case,” entering into “don’t know mind.”
- Empathy embodies non-harming.
- Compassion is not enough; we need to feel the weight of the other person’s experience.

Feeling Strong

- Relaxed, resting in awareness
- Feeling the strength in awareness itself
- Energy and strength in your breathing . . . in arms and legs . . . in your whole being . . .
- A spacious strength that lets others flow through
- In relationship and at peace

Neural Substrates of Empathy

- Three *simulating* systems:
 - Actions: “mirror” systems; temporal-parietal junction
 - Feelings: resonating emotionally; insula
 - Thoughts: “theory of mind”; prefrontal cortex
- Interacting with each other: association and active inquiry
- Automatic, continual re-creation of traces of others’ experience
- Development:
 - In phylogeny; spindle cells
 - In ontogeny
- Decay in dementia

Empathy Skills

- Pay attention.
- Be open.
- Read emotion in face and eyes.
- Sense beneath the surface.
- Drop aversion (judgments, distaste, fear, anger, withdrawal).
- Investigate actively.
- Express empathic understanding:
 - Reflect the content
 - Resonate with the tone and implicit material
 - Questions are fine
 - Offer respect and wise speech throughout

Reflections about Empathy

- You're more likely to get empathy if you're:
 - Open, present
 - Honest, real, authentic
 - Reasonably clear
 - Responsible for your own experience
 - Taking it in when you feel felt
- Empathy can be negotiated:
 - Name it as a topic in the relationship
 - Follow NVC format: "When X happens, I feel Y, because I need Z. So I request _____."
 - Stay with it.

Us and Them

- Core evolutionary strategy: within-group cooperation, and between-group aggression.
- Both capacities and tendencies are hard-wired into our brains, ready for activation. And there is individual variation.
- Our biological nature is much more inclined toward cooperative sociability than toward aggression and indifference or cruelty. We are just very reactive to social distinctions and threats.
- That reactivity is intensified and often exploited by economic, cultural, and religious factors.
- Two wolves in your heart:
 - Love sees a vast circle in which all beings are "us."
 - Hate sees a small circle of "us," even only the self.

Which one will you feed?

In between-family fights, the baboon's 'I' expands to include all of her close kin; in within-family fights, it contracts to include only herself.

This explanation serves for baboons as much as for the Montagues and Capulets.

Baboon Metaphysics: The Evolution of a Social Mind,
by Dorothy Cheney and Robert Seyfarth

Us and Them

- Core evolutionary strategy: within-group cooperation, and between-group aggression.
- Both capacities and tendencies are hard-wired into our brains, ready for activation. And there is individual variation.
- Our biological nature is much more inclined toward cooperative sociability than toward aggression and indifference or cruelty. We are just very reactive to social distinctions and threats.
- That reactivity is intensified and often exploited by economic, cultural, and religious factors.
- Two wolves in your heart:
 - Love sees a vast circle in which all beings are "us."
 - Hate sees a small circle of "us," even only the self.

Which one will you feed?

Feeding the Wolf of Love

- Focus on similarities between “us” and “them.”
- Consider others as young children.
- Notice good things about neutral or unpleasant people.
- Bring to mind the sense of someone who cares about you.
- Keep extending out the sense of “us” to include everyone.
- Consider others as your mother or dear friend in a past life.
- Sila/restraint about over-identifying with “us”
- Reflect on the suffering of so many people in the world.
- Self-generate feelings of kindness and love.

So that all cubs are our own . . .
So that all beings are our clan . . .
All life, our relatives . . .
The whole earth, our home . . .

*May you know love, joy, wonder, and wisdom,
in this life, just as it is.*

Thank you!

The Buddha's Words on Lovingkindness

Wishing: In gladness and in safety, may all beings be at ease.

Omitting none, whether they are weak or strong, the great or the mighty, medium, short, or small, the seen and the unseen, those living near and far away, those born and to-be-born: May all beings be at ease.

Let none through anger or ill-will wish harm upon another. Even as a mother protects with her life her child, her only child, so with a boundless heart should one cherish all living beings; radiating kindness over the entire world: spreading upwards to the skies, and downwards to the depths, outwards and unbounded, freed from hatred and ill-will.

One should sustain this recollection.

This is said to be the sublime abiding.