The Social Brain

Louis Cozolino

The Broad Landscape

Biology - the wetware and functioning of the NS

Psychology - identity, cognitive style, beliefs

Social Relatedness - embeddedness, status, identity

Development - resilience, complex PTSD

What Science Will We Cover?

Evolution

Genetic & Epigenetics

Neurochemistry & Neuroanatomy

Plasticity and Learning

All Impacted by Trauma

The Social Context of Trauma

#1 Our Brains are Social Organs

#2 Our Brains connect with one another across the wide bandwidth of the social synapse

#3 We build and shape each other's brains via the process of epigenetics

The Social Context of Trauma

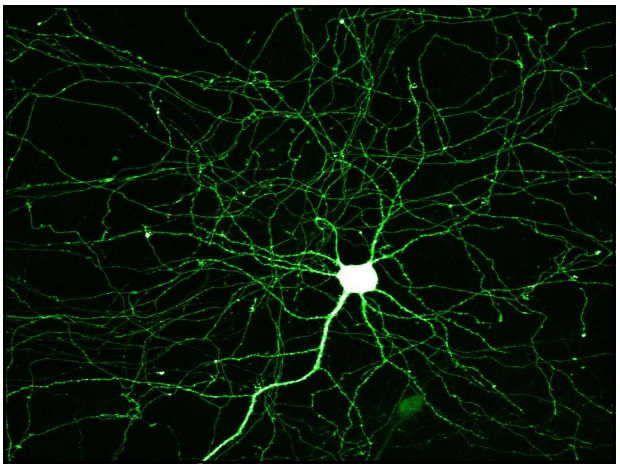
#4 We regulate each other's brains via sociostasis

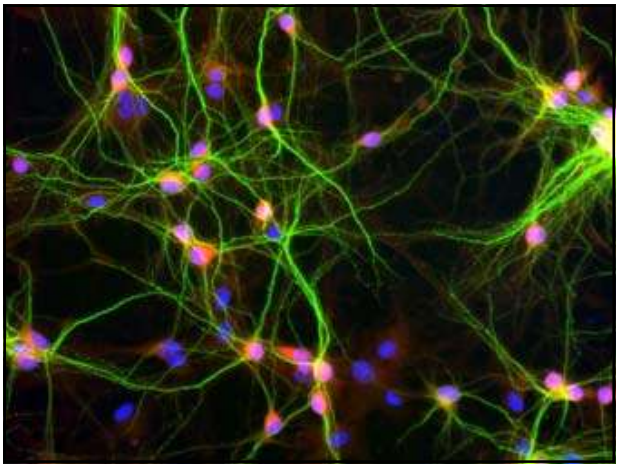
#5 Social interactions are a main source of nourishment for our brains

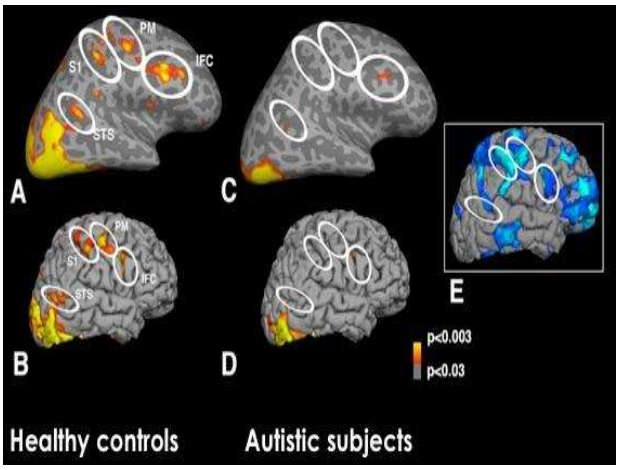
#6 Negative interactions and neglect create stress / adaptational challenge

Observations

- The Western mind favors straightforward cause and effect relationships.
- We're not as good at thinking in terms of complexity and interdependence.
- We are better at discovering the pieces than putting them together.



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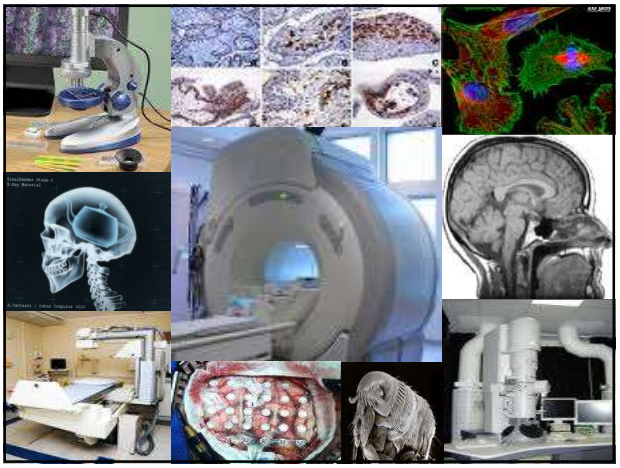
Healthy controls
Autistic subjects



Hinduism & Buddhism

interdependent co-origination

The experience of divisions, locations,
and self-identity are illusions,
generated by the body, senses and the mind,
possessing no intrinsic reality.

The Social Brain

Gregory Bateson - Cybernetics

"the world is made up of a set of interpenetrating systems"

* individuals – groups – ecosystems

Murray Bowen – Systemic Family Therapy

* the family as organism
* competing forces of symbiosis and individuation
* homeostasis and the regulation of anxiety

Converging Lines of Evidence

- Social psychology – the impact of relationships on cognitive and emotional processing
- Psycho-neuro-immunology – the role of social factors on health and longevity.
- Social neuroscience - specialized social information processing
- Epigenetics - the impact of experience on genetic expression.

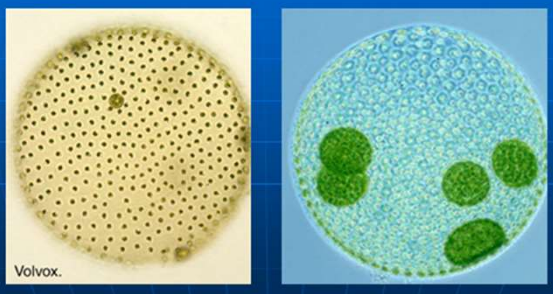
From Neurons to Neighborhoods

- The Evolution of Complexity
- Simple structures combine to create more complex organisms

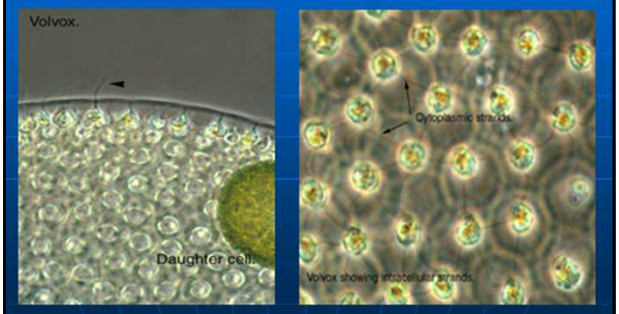
Neurons > Brains > Tribe

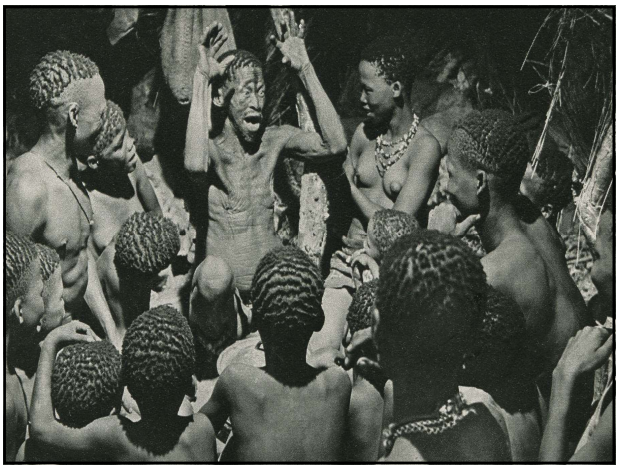
Trauma can uncouple us from the tribe

The Evolution of Complexity
The Volvox



The Evolution of Complexity
The Volvox






A New Way of Imagining the Brain

The Brain as a Social Organ: From Neurons to Neighborhoods

Neurons	Humans
There are no individual neurons	There are no individual infants
Unconnected neurons die	Attachment equals survival, abandonment = death
Apoptosis	Anaclitic Depression
Biological Regulation	Sociostatic Regulation

Evidence for the Social Brain

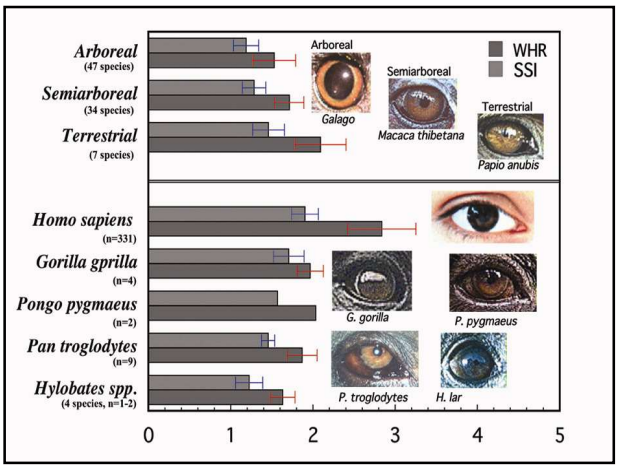
The evidence that the brain is a social organ is all around us but we can't find what we are not looking for.

Physical Evidence

- Eye Morphology
- Pupil Dilation
- Direction of Eye Gaze
- Blushing
- Complex Facial Expressions

Eye Morphology

- The disguise of gaze direction was trumped by the value of sharing gaze-based information
- Pupil-sclera contrast increased while the height/width ratio of the visual portion of the eye shifted to supply more lateral information



Pupil Dilation

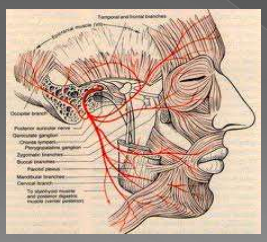
- The eye is the only visible part of the brain
- People with large pupils are chosen over those with small pupils
- The are seen as more trustworthy, attractive, interesting, and interested

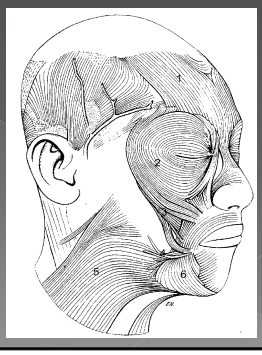
Eye gaze and gaze direction

Blushing

- Not Under Conscious Control
- Depends on an awareness of being observed
- Transmits to the other that we are aware of them and having feelings about what we are doing

Facial Expressions





Neurobiological Evidence

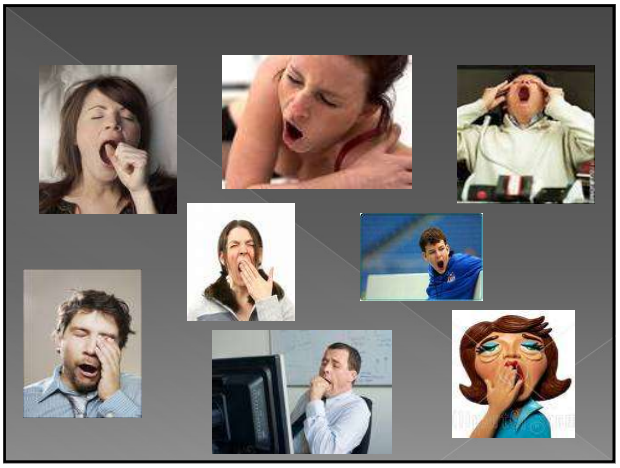
Attachment System

Mirror Neuron Systems

Social Engagement System

Attachment System

- Affective Regulation via Proximity
- Experiencing the other as a part of the self
- Shaping neural structure via experience



Mirror Neuron Systems

Sensory-Motor Link-up for Simulation
- Imitation & Skill Building
- Resonance & Coordination

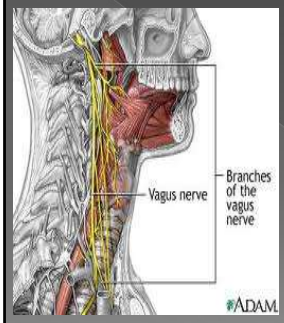
Sensory-Affective Link-up for Attunement
- Shared Emotion / Emotional Contagion
- Sympathy
- Empathy

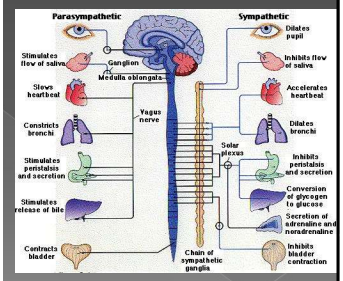
Social Engagement System

Tenth Cranial Nerve Network

Allows finer tuning of arousal than sympathetic – parasympathetic balance.

Allows us to stay connected and matching emotional response
to the social situation





Sociostatic Regulation

Beta chimps using infants

The Death of the Matriarch

The Epigenetics of Maternal Attention

Present:

Enhanced brain metabolism
More synapses , longer dendrites, increased survival rates
Increased mRNA activation in frontal and limbic areas
Increased NMDA & BDNF expression
Increased # of benzo receptors in amygdala & LC

Absent:

Increased neuronal and glial death
Decreased neurotrophins
Decreased glial density
Decreased hippocampal glucocorticoid receptors

Applications to Aging

- The lifespan development of the brain based on changing social roles
  - Menopause
  - OMPFC - Amygdala maturation
  - Impulse toward storytelling

Application in the Classroom

- Teaching the Unteachable
- Creating the Tribe
- Tapping into primitive social neuroplastic processes