THE SOCIAL NEUROSCIENCE OF EDUCATION

BY LOUIS COZOLINO
The brain is a complex organ but operates on one simple rule - survival. Consequently, a lot of decisions are made quickly and based on a previous adaptation or “training”.
TODAY’S CONVERSATION

1. The evolution and development of the social brain
   a. Evolution
   b. Learning
2. How to turn the brain on and off
3. Neuroscience in school and classroom
I. WHAT IS A SOCIAL BRAIN?

• Evolution shaped our brain into social organ because being communal, living in a community, enhances our survival.

• Living in a community resulted in an expansion of the cortex.

• Larger brains could process more information

• More complex brains required longer periods of development – prolonged periods of child dependency and the necessity of caretaking specialization
Cortex is a thin layer of cells on the surface of the brain, divided into functional lobes.
Survival of the nurtured

Extended time of caretaking had impact on relationships
TWO WEEKS AGO GUY ASKED HOW TO APPROACH A DISAGREEMENT, AND MAKE PEOPLE CHANGE OPINIONS?

One conversation does not change anything. The message has to come from many sources to bring change. If the message is consistence and comes from many places, then the person has to adapt to a new situation.

The same happened with the neural connections. One event does not change anything. Persistent messages result in the building of neural connections. But if you don’t use it you lose it.
OUR PRIMARY ENVIRONMENTS ARE OTHER PEOPLE

Secure relationships not only trigger brain growth, but also serve emotional regulation that enhances learning.

A teacher’s supportive encouragement balanced with challenge activates: DOPAMINE, SEROTONIN, NOREPINEPHRINE and ENDORPHINE production
Dopamine
Alertness
- Working Memory (Hyper)
- Motivation *(Compulsion)
- Clarity *(Foggy)

Appetite

Serotonin
Satisfaction
- Learning Memory (Confusion)
- Pleasure/Pain (Anxiety)
- Relaxation (Restlessness)

Norepinephrine
Attention
- Execution (Hesitation)
- Perseverance *(Obsession)
- Recall Memory *(Doubt)

Concentration
- Execution (Hesitation)
- Perseverance *(Obsession)
- Recall Memory *(Doubt)

Intuition
*(Distractibility)
SUMMARY

• The first few years of life are a period of FAST brain development, providing early experiences with a disproportional impact on neural development.

• We also know that the brain is capable of change at any time and that social interactions are a primary trigger of neural plasticity.

• Close connection with caregivers, friends, teachers, spouses – in fact any meaningful relationship – can activate the neuroplasticity process and change the structure of the brain, for better or for worse.

• Due to the interdependence of interpersonal experiences and biological growth - attachment is important in brain development.
Your brain is a self-organizing creative system. Every skill and ability you have was self-constructed in a specific region of your brain, as a result of practice and application over long periods of time.
EARLY CHILDHOOD

YES ELMO, I SEE YOUR POINT

3 DOES COME AFTER 2
THE DEVELOPING CORTEX ENABLES CONTROL OF:

- Reflexes
- Spontaneous Movement
- Emotions
- Impulses
- Inappropriate Behaviors
SENSITIVE PERIODS

What are Sensitive Periods?
The fast neural growth and learning during sensitive periods result in
EARLY EXPERIENCES HAVING A DISSPROPORTIONAL IMPACT ON THE SHAPING
OF OUR BRAINS

FIRST YEAR is about ATTACHMENT
SECOND YEAR is about LANGUAGE

The right hemisphere has a relatively higher rate of growth during our first two
years: attachment, emotional regulation, self-esteem.

Around the third year the higher rate of growth shifts to the left hemisphere –
language

Later BILATERAL INTEGRATION and CORPUS CALLOSUM
Before we move to adolescence let’s talk about attachment

The ADULT ATTACHMENT INTERVIEW (AAI)

• “I’d like to try to describe your relationship with your parents as a young child….if you could start from as far back as you can remember.”

• “Choose adjective that reflect your relationship with your mother, father, etc.”

• “Which of your parents did you feel closest to and why?”
COHERENCE ANALYSIS IS BASED ON GRICE’s MAXIMS and INCLUDES AN EXAMINATION of both the LOGIC and understandability of the NARRATIVES by using 4 principles:

**Quality** – be truthful and have evidence for what you say

**Quantity** – be succinct, and yet complete

**Relevance** – stick to the topic at hand

**Manner** – be clear, orderly, and brief.
RESULTS

FOUR CATEGORIES EMERGED FROM THE AAI ANALYSIS

**THE AUTONOMOUS GROUP** was associated with secure attachment – they demonstrated an integration of cognitive and emotional memories, had process their early negative experiences, and as a result they were more fully available for their children.

**THE DISMISSIVE GROUP** was associated with avoidant attachment – demonstrated a lack of recall for childhood events and large gaps in memory for their childhoods. They demonstrated a DISMISSIING attitude towards the importance of their early relationships, just as they were dismissive of their own children in the present.
RESULTS

THE ENMESHERD or PREOCCUPIED GROUP - associated with anxious and ambivalently attachment. They appeared preoccupied and pressured, and had difficulty keeping the perspective and knowledge of the listener in mind.

THE UNRESOLVED/DISORGANZED GROUP – associated with disorganized attachment. They had highly incoherent narratives disrupted by emotional intrusions and by missing or fragmented information.

IT MEANS THAT PARENTS’ CAPABILITIES FOR ATTACHMENT TO THEIR INFANTS BEGIN TO SHAPE IN THEIR OWN CHILDHOODS.
ADOLESCENT BRAIN

“Adolescence is no picnic for them either.”
Cozolino
During adolescence, the brain is on its way to peak performance in areas of motor coordination, sensory acuity, and reaction time.
II. HOW TO TURN BRAIN ON AND OFF?
Brain is an organ of adaptation, and serves survival in three fundamental ways:

1. Friend or foe (safe/not safe)
2. Navigation/choice
3. Learning/memory
HOW STRESS AFFECTS PEOPLE?

• Chronically stressed children and adults have a smaller hippocampal volume, which correlates with deficits of short-term memory, learning, and increased vulnerability to future stress and trauma.

• The amygdala - our central fear-processing hub – is located beneath the cortex of each side of the brain – when activated – focuses on danger while inhibiting learning.
The students need to be both motivate and free from fear in order to learn. They have to have a bit of anxiety about grades to push them along, but not so much that they are frozen with fear.
LET’S TRY HUMOR

• Using positive humor in the learning environment has been found to correlate with increased memory for semantic information, resulting from increases in arousal, attention, rehearsal, enjoyment, and surprise.

• One reason that humor and laughter feel so good is because they stimulate the brain’s dopamine reward system.
MIRROR NEURONS

Implications

Response is similar for:
- Performing the action
- Witnessing the action
- Hearing about the action

Mirror Neurons enable:
- Empathy
- Skill building through mimicry
- Vicarious experience
Day 37: They still do not suspect I am a mere cat.
SECONDARY ATTACHMENT
ACADEMIC SELF-CONCEPT
A single conversation with a wise person is better than 10 years of study.

Chinese proverb
LEARNING CAN BE ENHANCED

Lessons from cognitive psychology
- Learn in brief intervals
- Practice and repetition
- Multichannel processing
- Hypothesis testing in feedback
BUILDING TRIBAL CLASSROOM

Secure attachment in the context of natural learning environments.

Physical safety

Emotional security