







CEREBRAL HEM	ISPHERES
¥ <u>LEFT</u> Dorsolateral Prefrontal Cortex - Executor	¥ <u>RIGHT</u> Orbitofronal Cortex - Executor
¥ Linguistic	¥ Self soothing
¥ Logical	¥ Non-verbal – Non-linear
¥ Analytic	¥ Integrative
¥ Linear	¥ Self concept
¥ Verbal	¥ Somatosensorial
¥ Generally conscious	¥ Nonconscious/Unconscious







### Neural Networks

- ¥ Central Executive Network
- ¥ Default Mode Network
  - ¥ Salience Network

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## Default Mode Network Network



- ¥ Procedural self-referential affective memory
- ¥ Internal imaging
- ¥ Self representations/schemas
- ¥ Object representations
- ¥ Affective regulation
- ¥ Integration of affect & cognition
- ¥ Somatosensory representations
- ¥ Experience of an embodied sense of self



### PAG & COLLICULI

¥ The superior colliculi and inferior colliculi

¥ Collectively, referred to as the Tectum

¥ Producing raw/basic emotion

¥ The inferior colliculi mediate auditory & somatosensory information

¥ The superior colliculi, in conjunction with the PAG

 ${\bf Y}$  Mediate integration of sensory information  ${\bf B}$  affect





### Autonomic Nervous System

¥ Two branches of the ANS ¥ Act to maintain homeostatic balance. ¥ Sympathetic NS ¥ Parasympathetic NS...

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# Autonomic Nervous System

# ¥ Sympathetic Nervous System ¥ Energy Expanding - Arousal Mediating

- ¥ Mediating approach, fight or flight behavior
  - ¥ Catecholamine mediated
  - ¥ Norepinephrine/Noradrenaline
  - ¥ Epinephrine/Adrenaline
  - ¥ Dopamine...

















































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### RIGHT HEMISPHERE

 \* The inceptive stages of development represent a maturational period of specifically the early maturing right brain..
 \* which is dominant in the first three years of human life. ...

Schore, A. (2019). The Development of the Unconscious Mind

# RIGHT HEMISPHERE • The right brain is centrally involved in processing • Social-emotional information, • Attachment functions • Regulating bodily and affective states • Coping dynamically with stress ...





### NEURAL SYNCHRONIZATION

 ¥ The mother appears to provide an unconsciously mediated *neural synchronization* of her right hemisphere
 ¥ With the underdeveloped right hemisphere of her child.
 ¥ Self-organization of the developing brain must occur in the context of a relationship with another brain...

Schore, A. (2019). The Development of the Unconscious Mind

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### ATTACHMENT, PLAY & INTERSUBJECTIVITY

### ¥ Robert Emde, 2009

 "The Evolution driven intersubjectivity between child and caretaker makes it very clear that the *ego* can only develop from an intersubjective sense of *we-go*"
 Rhythmic behaviors, expressed in different sensorimotor modalities emerge in the interactive flow of infant and

caregiver.

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### ATTACHMENT, PLAY & INTERSUBJECTINTY

¥ Ammaniti & Gallese (2014)
 ¥ 2 Decades of research have shown clearly
 ¥ Neural synchrony and resonance are rooted in the body
 The rhythmic structure of interactions reflects the infant's and
 caregivers biological rhythms
 The patterns of expressive movements in proto-conversation
 (preverbal/prosodic)
 ¥ Are clearly influenced by rhythmic, melodic, and harmonic
 phenomena.

### ATTACHMENT, PLAY & INTERSUBJECTIVITY

¥ Ammaniti & Gallese (2014)

 Infants are selectively attracted to the emotional prosody and melody of maternal speech
 As they engage with synchronous rhythms of vocalizations

¥ Body movements

¥ And gestures to match the musical expression of the caretaker.

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INTERNAL IMAGING
¥ By the end of the first year,
¥ Growth, development and stabilization
¥ Neural connections between the memory-mediating anterior temporal lobe and the OFC.
¥ Schore, 1994
With this linkage, a visuo-limbic pathway is establishedas a result, the infant creates a schema of the attachment objectthis internal affect-associated image can be accessed even in the mother's absence."

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¥ It is the experience-driven maturation of the orbitofrontal cortex that is responsible for the development of the temperamental dispositions that underlie our personality styles.

<sup>¥</sup> Our biologically organized emotional core is biased (or conditioned) toward certain emotional responses, which are mediated by the neural templates (emotions, cognitions/beliefs, and memories) of our early attachment experiences.

Bechara, A., Damasia, H., Tranel, D., B Damasia, A. R. (1997). Deciding advantageously before knowing the advantageous stratagy. Science, 275 (283-1285.













### Mark Buchanan – Physicist (2009)

¥ In explaining the brain's "secret signals"

\* "A person's responses can often be explained by "nonlinguistic behaviors of other people... without any recourse to conscious cognition. This "second channel" of human communication acts in parallel with that based on rational thinking and verbal communication, and it is much more important in human affairs than most people like to think... It is incredibly naïve... to take conscious verbal communications as the primary way that people respond to each other. (528-529)"

Buchanan, M. (2009). Secret signals. *Nature*, 457, 528- 530.















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### Paradigm Shift

 Due to the right hemisphere's greater white matter
 Hence, greater degree of myelination
 Facilitation of swift transfer of information
 Between the cortex and regions below the cortex
 Limbic, midbrain, and brainstem
 Enhanced integration of a greater variety of increased types of information
 As compared to the more focally organized left hemisphere

Allen, Damasio, Grabowski, Bruss, & Zhang (2003)







### Paradigm Shift

"If it is the right hemisphere that is vigilant for whatever it is that exists out there, it alanc can bring us something ather than what we already know. The left hemisphere deals with what it knows, and therefore prioritizes the expected - it's process is predictive. It positively prefers what it knows. This makes it more efficient in routine situations... But less efficient than the right wherever one's initial assumptions have to be revised, or when there is a need to distinguish add information from new material."

McGilchrist, I. (2009). The mester and his emissary. Yale University Press

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### Intersubjectivity & Embodied Simulation

### ¥ Ammaniti & Gallese (2014)

Developmental and neurobiological research has shown clearly
 We possess the ability, when encountering others
 Y To conceive of and experience them as bodily selves

¥ In the same way that we experience our own self as the owner of our body and the author of our actions.





Intersubjectivity, Mirror Neurons & Embodied Simulation \* Ammaniti & Gallese (2014) \* These modalities all share a constitutive somatosensory bodily foundation \* These modalities all share a constitutive somatosensory bodily foundation \* These modalities and specifically functioning brain circuits and neural mechanisms \* These neural modalities constitute a language \* A way to communicate at a fundamental, implicitly somatosensory bodily level













Intersubjectivity
 Intersubjectivity attuned therapist
 Intersubjectivity traks and matches the patterns of moment basis
 Insplicity traks and matches the patterns of also regulated autonomic nervous system
 Instantion and undersubjective field
 Instantion and intersubjective field

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### Intersubjectivity

- ¥ Intersubjectivity...
- ¥ Is more than just an interaction of two minds...
  - ¥ Also, an interaction of two bodies ¥ Which are in affective resonance
- ¥ Allowing for the *resonance* and *modulation of*
- ¥ Sympathetic high arousal anxiety/terror
  - ¥ Parasympathetic low arousal shame

Schore, A. (2012). The science of the art of psychotherapy. W.W.Worton & Company



### Implications for Treatment

 How can an appreciation of the above-mentioned data and ideas help us to understand exactly how the brain and mind change during psychotherapy?
 How do we utilize this knowledge regarding the neurobiology of consciousness and human development to enhance our therapeutic techniques?

¥ Is the unconscious/implicit mind important?

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### Implications for Treatment

- ¥ Should the emphasis on verbal and symbolic, lefthemispheric processing that dominates our field continue?
- Y Are transference and countertransference phenomena important?
   Y Is the relational field or vortex that surrounds therapists and patients important?

# KELATIONAL MATRIX AS A CATALYST \* We need a catalyst to render EMOR more robust in these disorders of the self. \* Since human development occurs in a mutually affect regulating matrix, \* Can we produce that in our treatment? \* How can we reproduce such an environment?

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¥ Daniel Siegel, 1999

\* "A patient and therapist enter into a resonance of states of mind, which allows for the creation of a co-regulating dyadic system...In this way, there is a direct resonance between the primary emotional, psychobiological state of the patient and that of the therapist. These nonverbal expressions are mediated by the right hemisphere of one person and perceived by the right hemisphere of the other"







therapist. ¥ Rids client of unwanted aspects of his/her-self. ¥ Allows therapist to know, empathically, the inner world of the client. ¥ Step 2 – Pressure is exerted to have the therapist behave accordingly to the projections. ¥ Step 3 – Therapist's behavior/demeanor is reinternalized. Hopefully, for growth.

Klein, M. (1945). Notes on some schizzid mechanism. International Journal of Psycho Analysis, 27, 95–10. Defan Themas (1987). Projective Mactification Psychotharamanic Technicus







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### GABRIELLA - BEGINNINGS

What was transacted between us was very similar to the interpersonal neurobiology that occurs in the infant-caregiver matrix.
 It was completely nonverbal and non-symbolic, but rather relationally somatosensorial.
 It was a cry for help, soothing and regulation, communicated in the original prototypic prosodic and somatosensory language of one right hemispheric

orbitofrontal cortex to another.





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### RELATIONAL MATRIX AS A CATALYST

We are constantly asking our patients to "just notice"
 We need to do the same. With continuous self body scans
 If we do, we'll notice feelings of
 Restlessness
 Abandonment
 Difficulty with attention or focus
 Sleepiness or fatigue
 Less clear, apparently meaningless sensations.
 Changes in our breath, or gasps.
 We don't need to understand cognitively...just notice.
 Dur DFC will understand...

### MIRROR NEURONS

Ustensibly, we are using a self-body-scan
Operating in the background
Using it as the receptive organ for the language of the right hemisphere.
Possibly, this resonance of states of mind, allows for the creation of a co-regulating dyadic system,
Becoming a matrix that mediates
Orienting attention
Felt meaning
And optimal arousal...





### ¥ Susan Sands, 1997

¥ " Our patients are motivated to communicate these unarticulated experiences to us, through projective identification, in order to have one's communication be <u>viscerally</u> received, contained, lived through, symbolized and given back in such a way that one knows the patient from the inside out."

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### Joseph LeDoux (2002)

<sup>4</sup> "Because emotional systems coordinate learning, the broader range of emotions that an individual experiences the broader will be the emotional range of the self that develops... And because more brein systems are typically active during emotional than during non-emotional states, and the intensity of arousal is greater, the opportunity for coordinated learning across brain systems is greater during emotional states. By coordinating parallel plasticity throughout the brain, emotional states promote the development and unification of the self."



LeDoux, J. (2002). The Synaptic Self: How our brains become who we are. New York: Viking





















