

***Honoring the Attuned Caregiver!***

***Celebrate Babies by Embracing  
the Essential Role of the Caregiver!***

***In Recognition of Celebrate Babies Week!***



**Gerard Costa, Ph.D.**

Director, Center for Autism and Early Childhood Mental Health

Professor, Department of Teaching and Learning

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# Plan

- The Nature of Human Interaction
- Interpersonal Neurobiology and the “Co-Constructed” Brain
- “Connectedness” and “Safety” as “Biological Imperatives” for the Infant/Adult Brain
- From Co- to Self- Regulation
- The “Triune Brain” and the Effects of Stress and Trauma on the Caregiving System and the Brain
- Implications for Policy: FOCUS ON FORMATION!!!
- Implications for Development and Intervention

Imagine.....

# A 6 week old baby awakening....



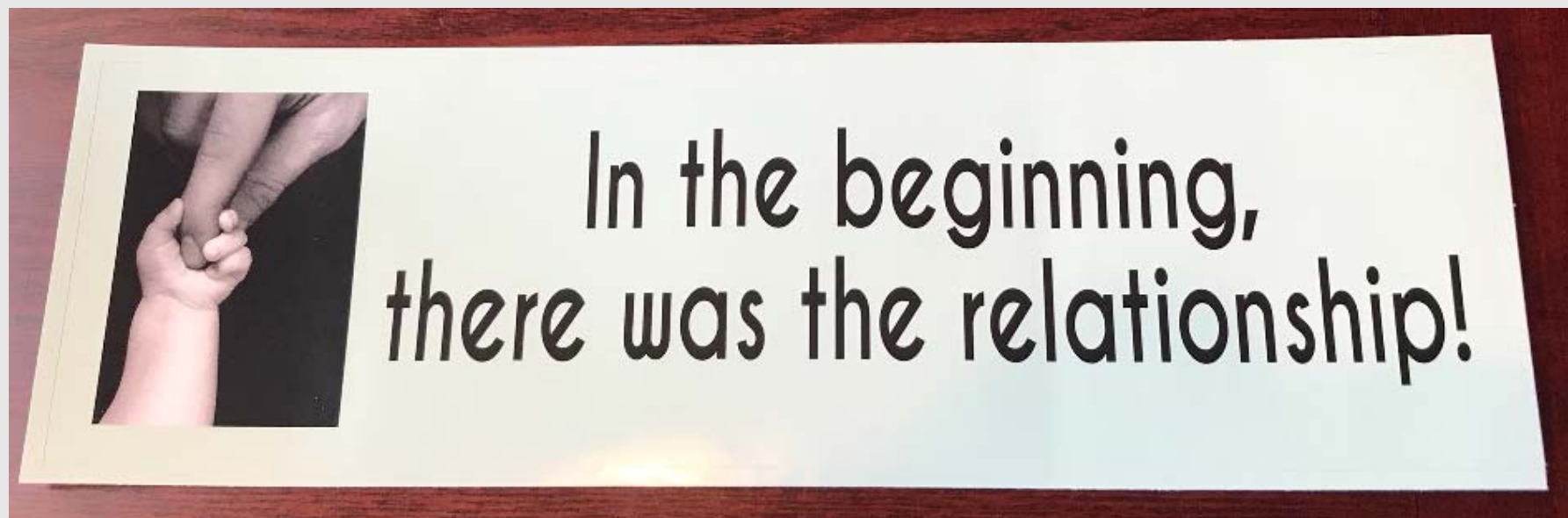
Source: <https://www.youtube.com/watch?v=Kcp6xw1qNZA>

## *Secondary Altriciality*

In biology, **altricial** species are those in which the young are incapable of moving around on their own soon after hatching or being born. The word is derived from the Latin root *alere*, **meaning** "to nurse, to rear, or to nourish" and indicates the need for young to be fed and taken care of for a long duration.

*Humans are born helpless relative to other mammals, and require extended care- A “second” womb, if you will, that is psychological, (social/interpersonal and emotional) for an extended period of time.*

# My bumper sticker!



Or as we would now want to say:  
*"The operations of interpersonal neurobiology!"*

# Relationships and the Brain

1. Stress Regulation
2. Engagement – attunement and contingency
3. Reciprocity – “Serve and Return”
4. Emergency shared representational thinking- mentalization
5. Textured communications and “growth of the mind”

Consider this MOMENT

*The  
“Jack in the Box”  
moment*



# Consider this MOMENT



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Source: [https://www.youtube.com/watch?v=G\\_TrD7F1FXc](https://www.youtube.com/watch?v=G_TrD7F1FXc)

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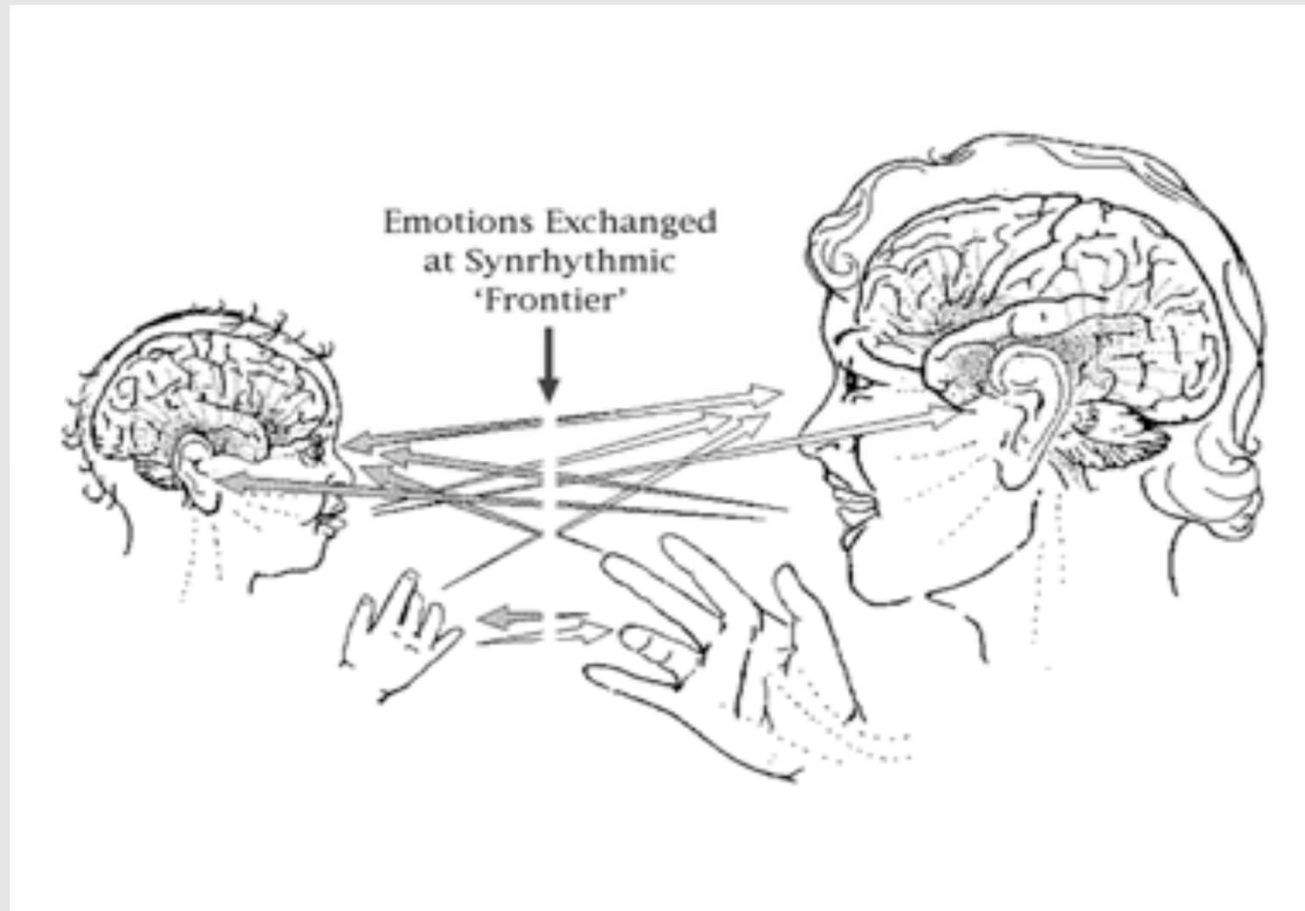












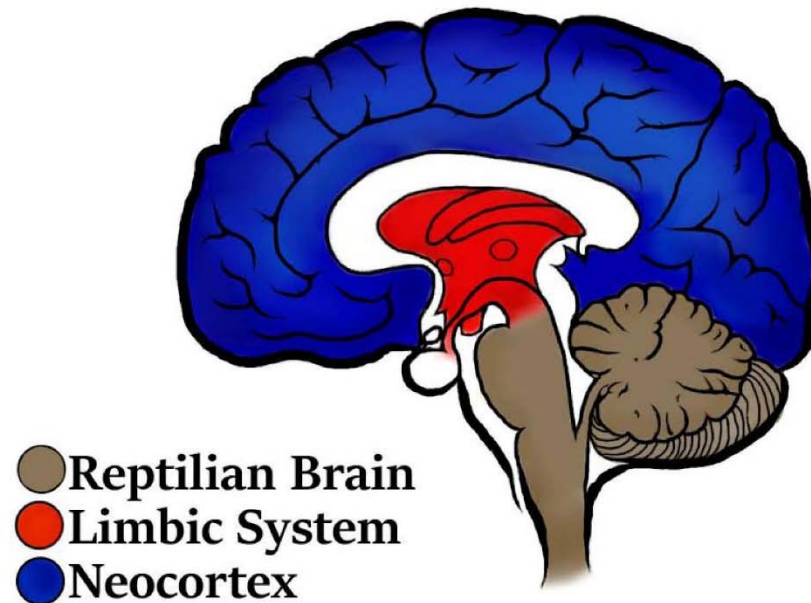


While the ways in which the brain forms from conception are organized by genes, the brain is fundamentally.....

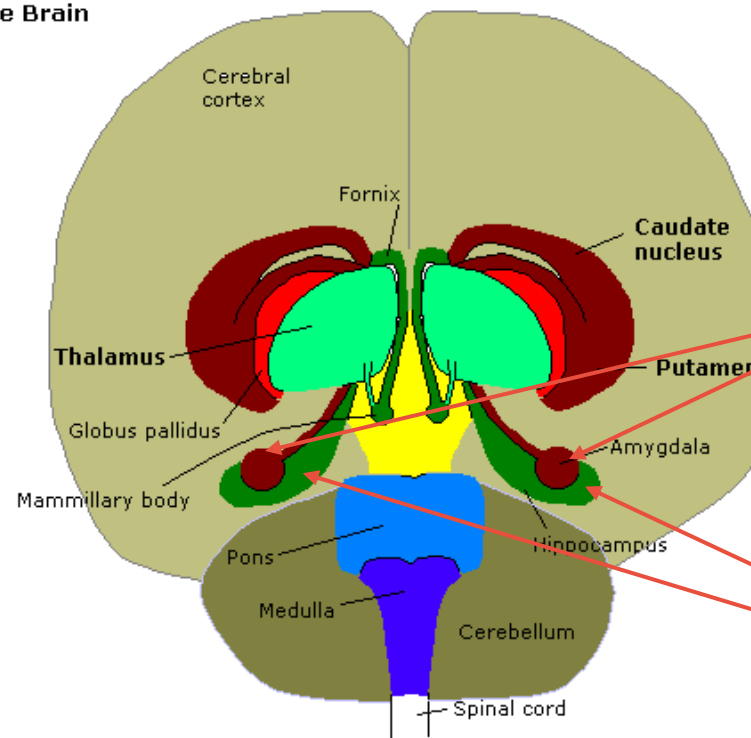
*A social organism that is  
developed through  
interactions and  
relationships!*

# The Triune Brain

## The Evolution-Designed Brain

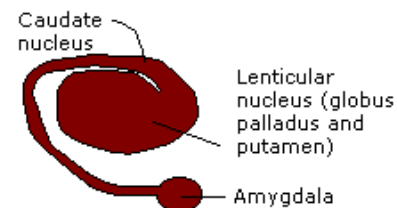


## The Brain



The brain as viewed from the underside and front. The thalamus and Corpus Striatum (Putamen, caudate and amygdala) have been splayed out to show detail.

### Corpus Striatum



Amygdala  
Social Processor

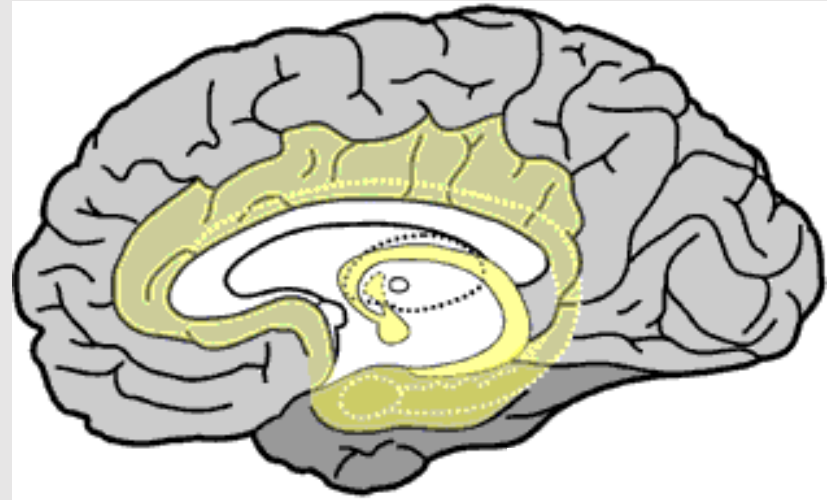
Next to

Hippocampus  
Memory  
Processor

Source: Anatomy only  
[https://www.google.com/url?sa=i&rct=j&q=&esrc=s&source=images&cd=&cad=rja&uact=8&ved=2ahUKEwiBv7XpqobeAhXxQd8KHSxqDXgQjRx6BAgBEAU&url=https%3A%2F%2Fen.wikibooks.org%2Fwiki%2FConsciousness\\_Studies%2FThe\\_Neuroscience\\_Of\\_Consciousness&psig=AOvVaw21Yxhbeosgeg6HpGLJlanQ&ust=1539620331481051](https://www.google.com/url?sa=i&rct=j&q=&esrc=s&source=images&cd=&cad=rja&uact=8&ved=2ahUKEwiBv7XpqobeAhXxQd8KHSxqDXgQjRx6BAgBEAU&url=https%3A%2F%2Fen.wikibooks.org%2Fwiki%2FConsciousness_Studies%2FThe_Neuroscience_Of_Consciousness&psig=AOvVaw21Yxhbeosgeg6HpGLJlanQ&ust=1539620331481051)

# Limbic System

## “Emotion”

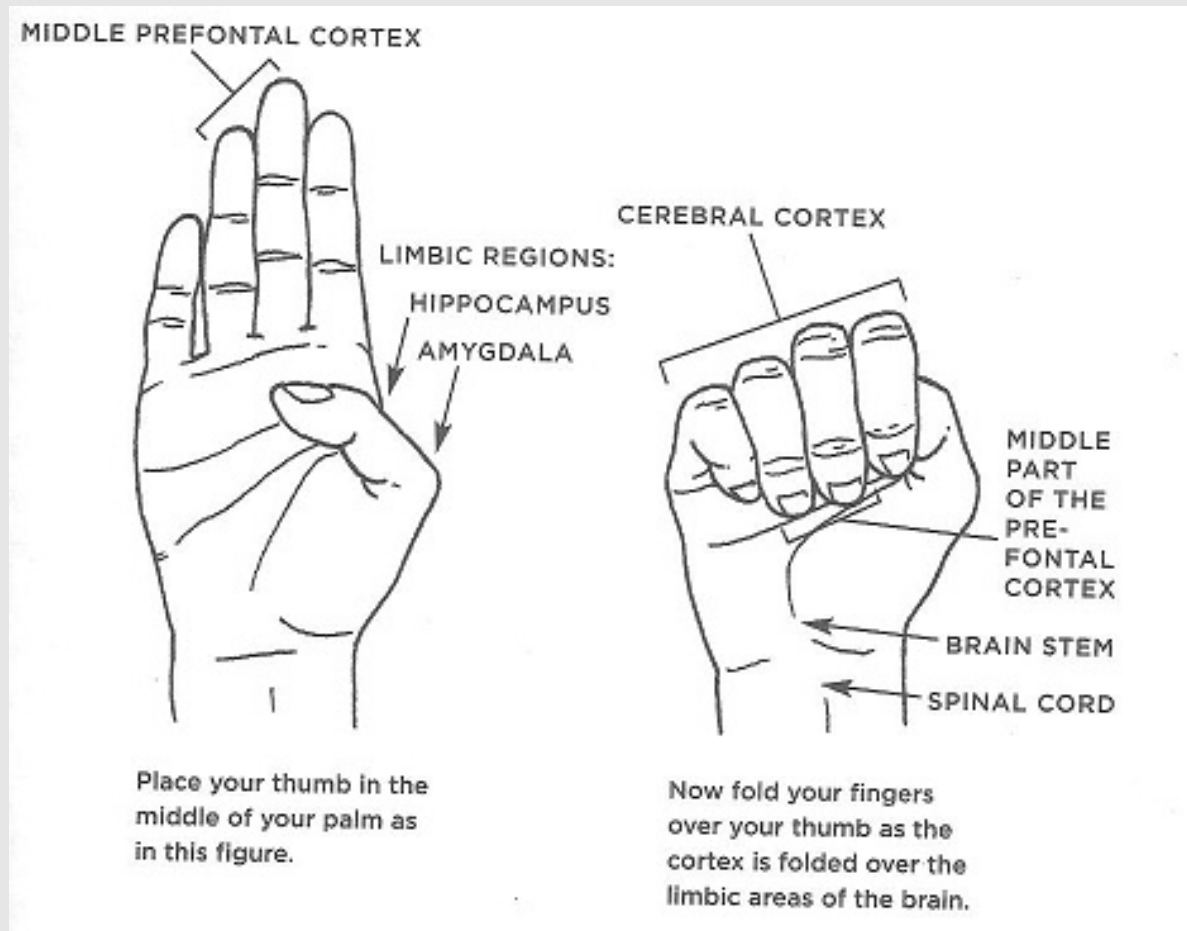


<https://brainconnection.brainhq.com/2016/12/09/your-amazing-brain/>

# Amygdala

This structure is part of the Limbic System- and in the development of brains in babies, this structure (based on real experiences with caregivers and the world) begins to get “wired” to “process” (interpret the meaning of) new experiences. Because the amygdala is connected to other brain regions, what happens in the amygdala affects the entire brain!

# Dan Siegel – “Hand Model of the Brain” (Mindsight, 2010)





# Daniel Siegel

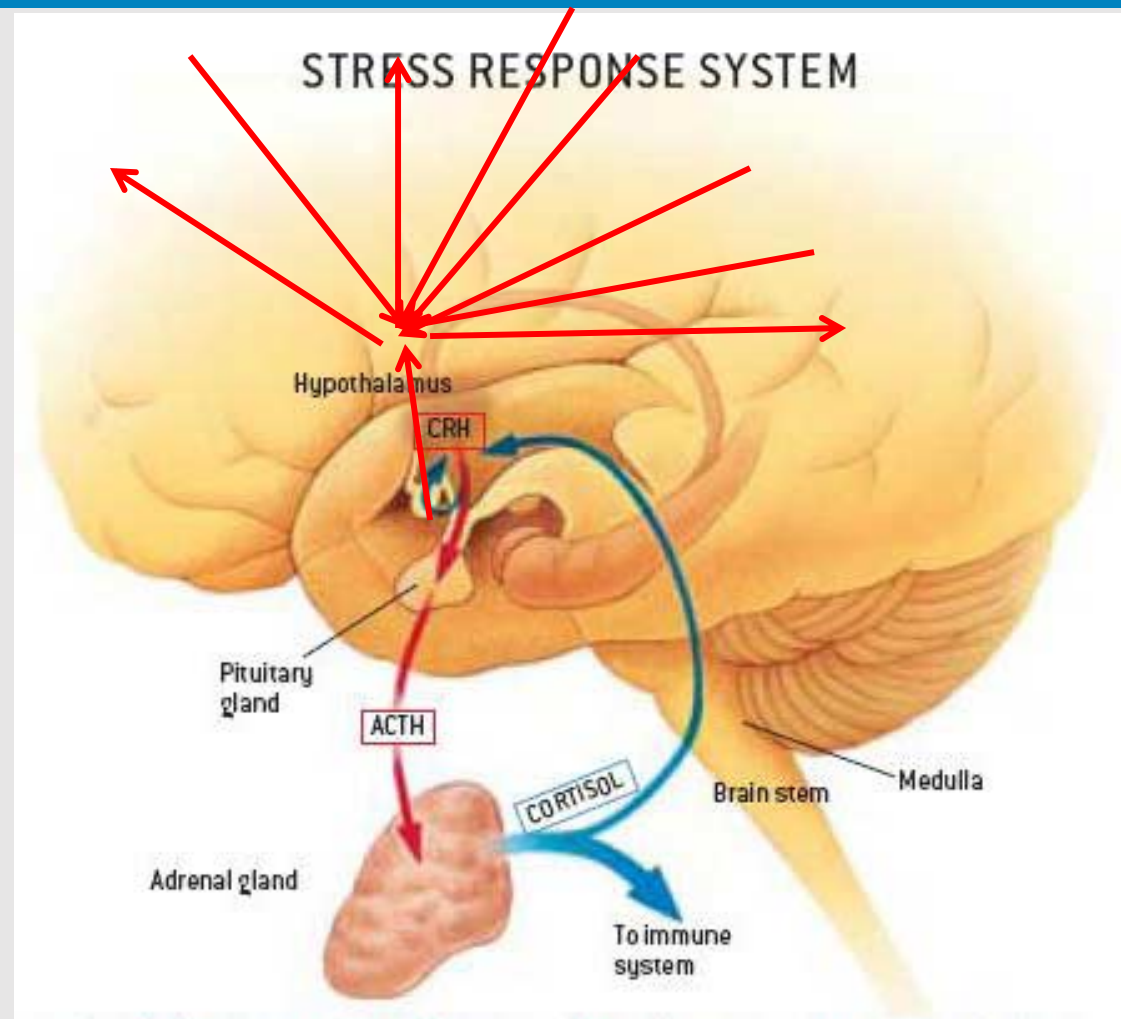
## The “Hand Model of the Brain”

*“....Lift up your fingers and you ’ll have an image of how we ‘flip our lids ’ and head down the ‘low road ’ in our interaction with others.”*

*Mindsight* (2010), p. 22

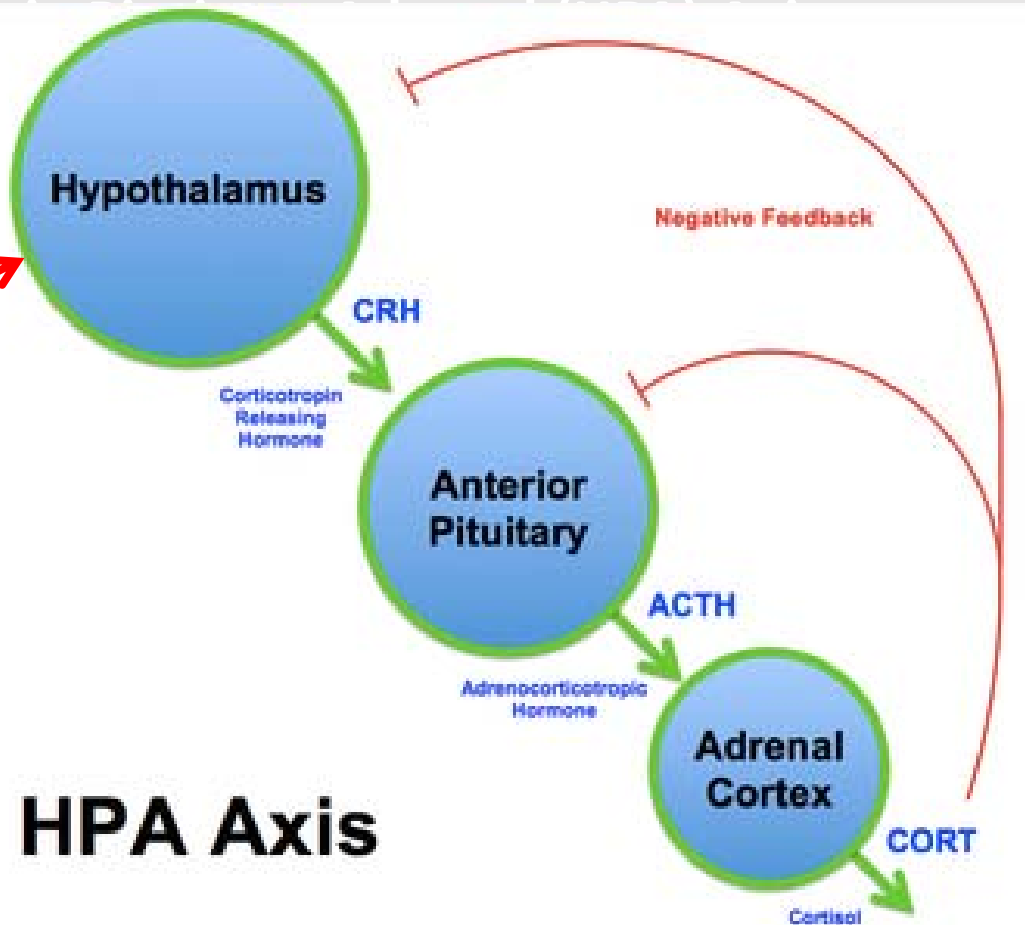
Unlike Las Vegas....

*What happens in the  
amygdala does **NOT**  
stay in the amygdala!*



## Hypothalamus

Fear  
Trauma  
Danger



**BUT....**

Allan Schore (1994)

*The mother's limbic  
system communicates  
directly to the infant's  
limbic system!*



# Growth and Development THROUGH RELATIONSHIPS!



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# Growth and Development THROUGH RELATIONSHIPS!



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Source: <https://www.youtube.com/watch?v=wi-sDcNfvzo>



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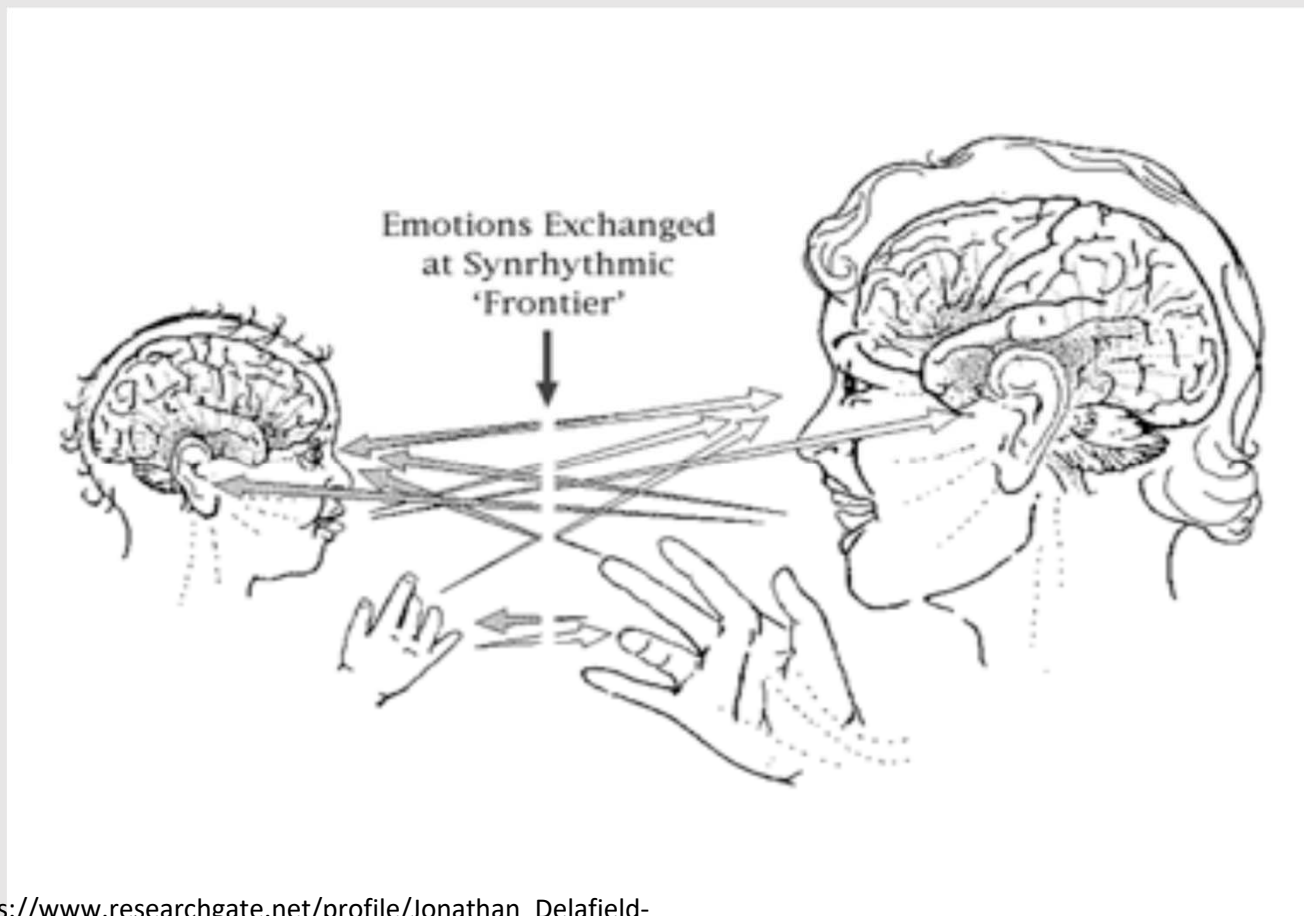


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# Colwyn Trevarthen



Source: [https://www.researchgate.net/profile/Jonathan\\_Delafeld-Butt/publication/262450020/figure/fig9/AS:392398912933896@1470566599720/Figure-Twelve-Protoconversation-between-mother-and-infant-Synrhythmic-regulation-of.png](https://www.researchgate.net/profile/Jonathan_Delafeld-Butt/publication/262450020/figure/fig9/AS:392398912933896@1470566599720/Figure-Twelve-Protoconversation-between-mother-and-infant-Synrhythmic-regulation-of.png)

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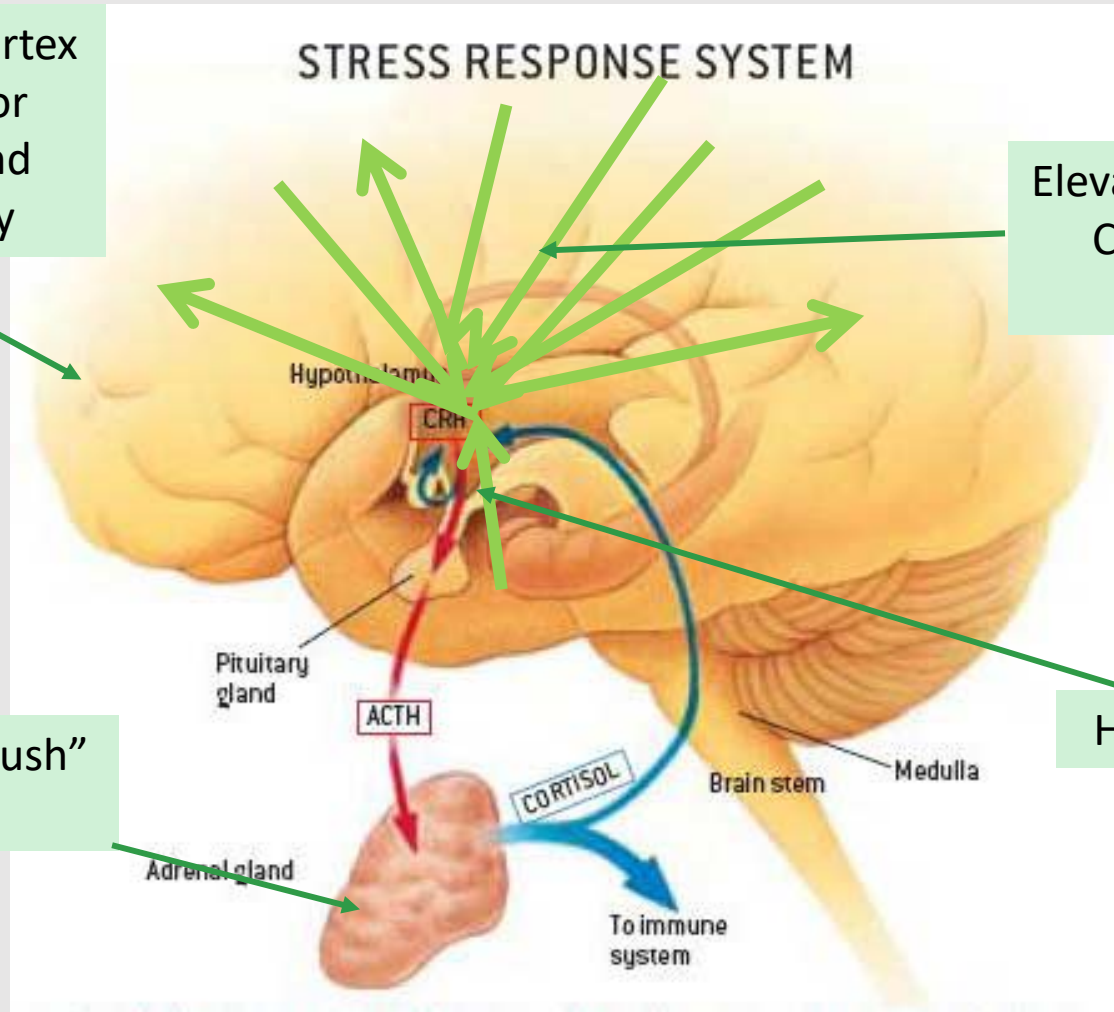
Prefrontal Cortex  
engaged for  
thought and  
reciprocity

## STRESS RESPONSE SYSTEM

Elevated Positive Mood  
Centers in Cortex  
Activated

HPA Not Activated

Adrenaline “rush”  
not activated



*So consider the interpersonal experiences  
of “Millions of Moments”*

*From: The musical “Rent”*

*“Five hundred and twenty-  
five thousand, six hundred  
minutes, what does it take  
to measure a year?”*

# Based on Dan Stern

Our “lived experiences” are fused, integrated, dynamic unfoldings of:

***Somato-psychologic-ideational-  
affective - interpersonal bundles***

**We develop representations, “anticipations” and  
affective-neurological- behavioral responses to  
ourselves and others.**

Repeated patterns become “procedural memories” for “good” or “for bad”.  
“Neural signatures”/“schema-of-being with”

# BUT

in Tronick's Paradigm- Mom as "Still-face"

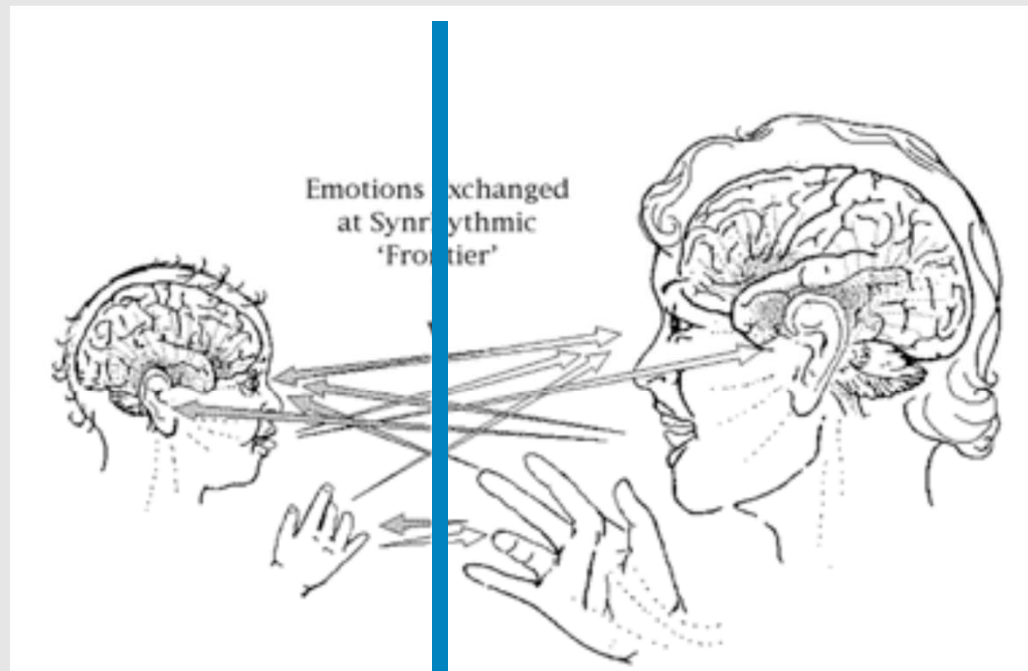


# A Rupture Occurs!



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# The “INTERBRAIN” is lost!



# Ah! REPAIR!



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# The Brain and Numbers to Know!



PARIETAL	Intelligence, language, reading, sensation
FRONTAL	Behaviour, intelligence, memory, movement
OCCIPITAL	Lobe, vision
TEMPORAL	Behaviour, hearing, speech, vision, memory
CEREBELLUM	Balance, coordination
BRAIN STEM	Blood pressure, breathing, heartbeat, swallowing

- By 5 months gestation, the fetus has 100 billion neurons – the amount of the adult cortex, and the number of stars in the Milky Way
- 20% of the neurons are interconnected related to genetics and intrauterine life.
- 80% of the connections are formed through the nature of experiences and interpersonal relationships.
- Each neuron can form up to 10,000 connections!
- Connections (synapses) can occur at the rate of 700/second in the first years of life.

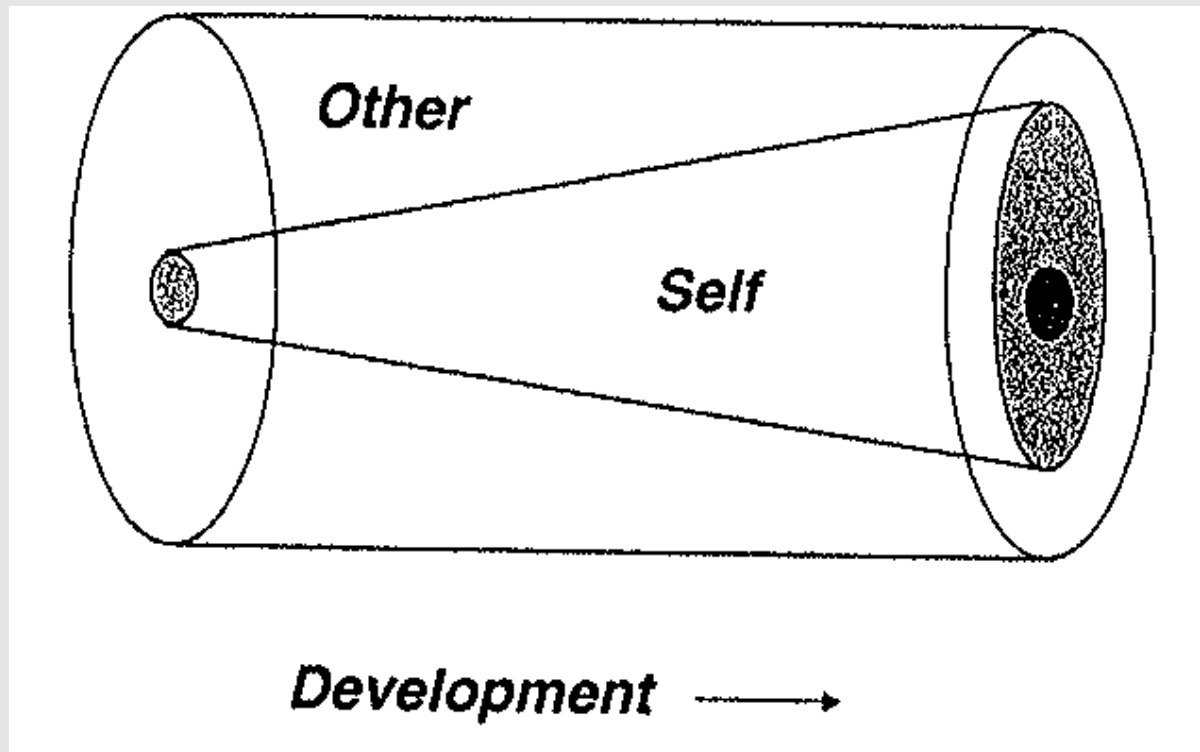
# What we now know about the brain in infants?

- The infant brain is organized through the nature of relationships.
- The brain grows from the “inside-out”, meaning that earlier and sub-cortical areas that are most responsible for regulation, attention and “fight or flight” responses are “wired” earlier than the higher brain centers. This occurs before language and symbol formation.
- Exposure to neglect, abuse, violence and dysregulation adversely changes the brain

# What we now know about the brain in infants?

- The right side of the brain (affect, rhythm, tonality) comes “on line” before the left brain!
- The sub-cortex – particularly the amygdala (LIMBIC SYSTEM)– is “wired” and interconnected, early in development through the nature of the earliest relationships (but there are individual differences).
- It also comes prepared to seek SAFETY!!!

## Samaroff (2004)



The Changing balance between other-regulation and self-regulation as a child develops into an adult

## Polyvagal Theory- Stephen Porges

- The vagus is a large **cranial nerve that originates in the brainstem and connects visceral organs with the brain.**
- In mammals, the vagal pathways originate from a part of the brainstem that regulates the heart ***but also regulates the striated muscles of the face and head – a face to heart connection, that forms an integrated SOCIAL ENGAGEMENT SYSTEM, that provides and senses signals of safety.***

## Polyvagal Theory- Stephen Porges

- Our nervous system needs to feel safe!
- Our nervous system expects features of safety to be present, such as caring face-to-face interactions with warmly modulated voices
- Our “safety” brain, when activated, deactivates our thinking brain, and these “defenses” limit learning, growth and *restoration*
- *Connectedness is a biological imperative!*

## Polyvagal Theory- Stephen Porges

*“...(H)umans are on a quest to calm neural defense systems by detecting features of safety. This quest is initiated at birth when an infant’s need to be soothed is dependent on the caregiver.” (Porges, 2015, p. 2)*



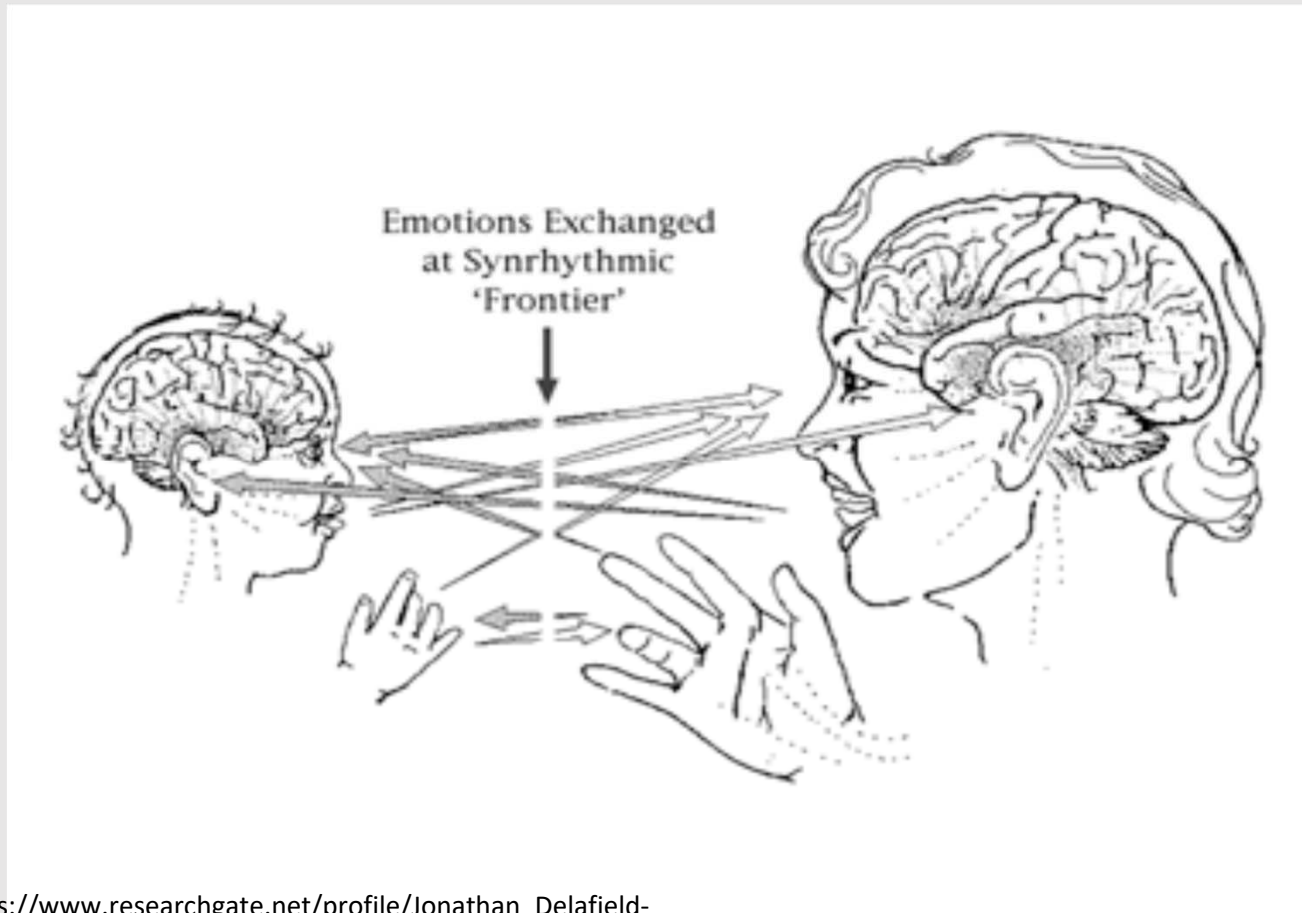
- This allows us to “share” our bodily state of excitement through facial expression and or tone of allowing us to use **facial expression and voice to calm our bodily state and others!**
- Physiological state is signaled by changes in the face an voice.
- This happens often below our level of awareness That’s called “NEUROCEPTION” vs. perception – as if our “nerve” (brain) is perceiving danger of safety without our awareness!

“Thus, the neuroception of familiar individuals and ***individuals with the appropriately prosodic voices and warm expressive faces*** translates into a social interaction that down-regulates defense and enables feelings of safety.”

(Porges, 2015. p. 6)

In the evolutionary transition from reptiles to mammals, ***social behavior emerged as the prepotent regulator of physiology!***

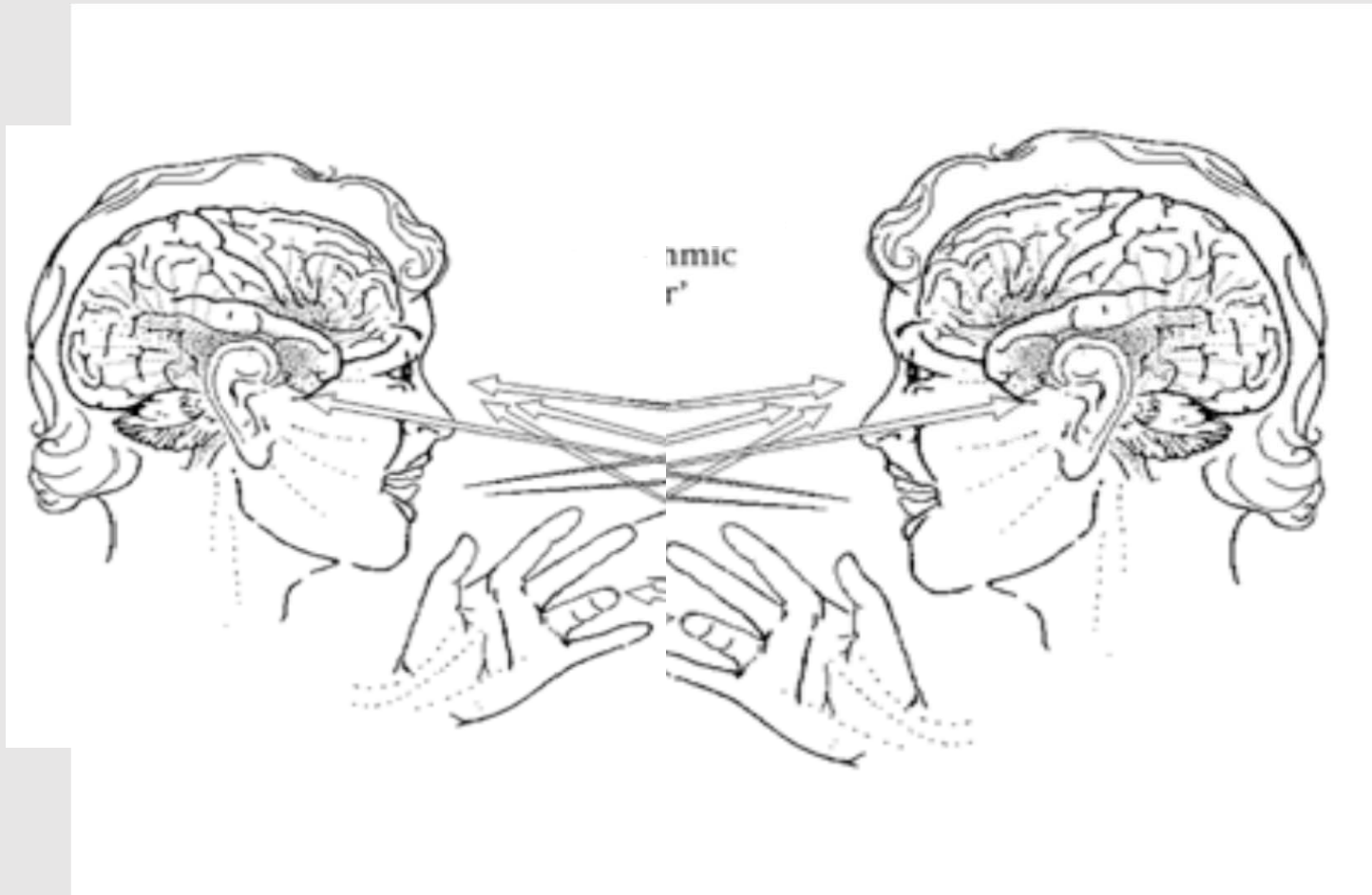
## From the beginning



Source: [https://www.researchgate.net/profile/Jonathan\\_Delafeld-Butt/publication/262450020/figure/fig9/AS:392398912933896@1470566599720/Figure-Twelve-Protoconversation-between-mother-and-infant-Synrhythmic-regulation-of.png](https://www.researchgate.net/profile/Jonathan_Delafeld-Butt/publication/262450020/figure/fig9/AS:392398912933896@1470566599720/Figure-Twelve-Protoconversation-between-mother-and-infant-Synrhythmic-regulation-of.png)

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# Throughout life!



Half of my problems  
are because of the  
tone of my voice.  
Everyone thinks  
that I'm arguing  
WHILE I'M  
ACTUALLY  
JUST TALKING!

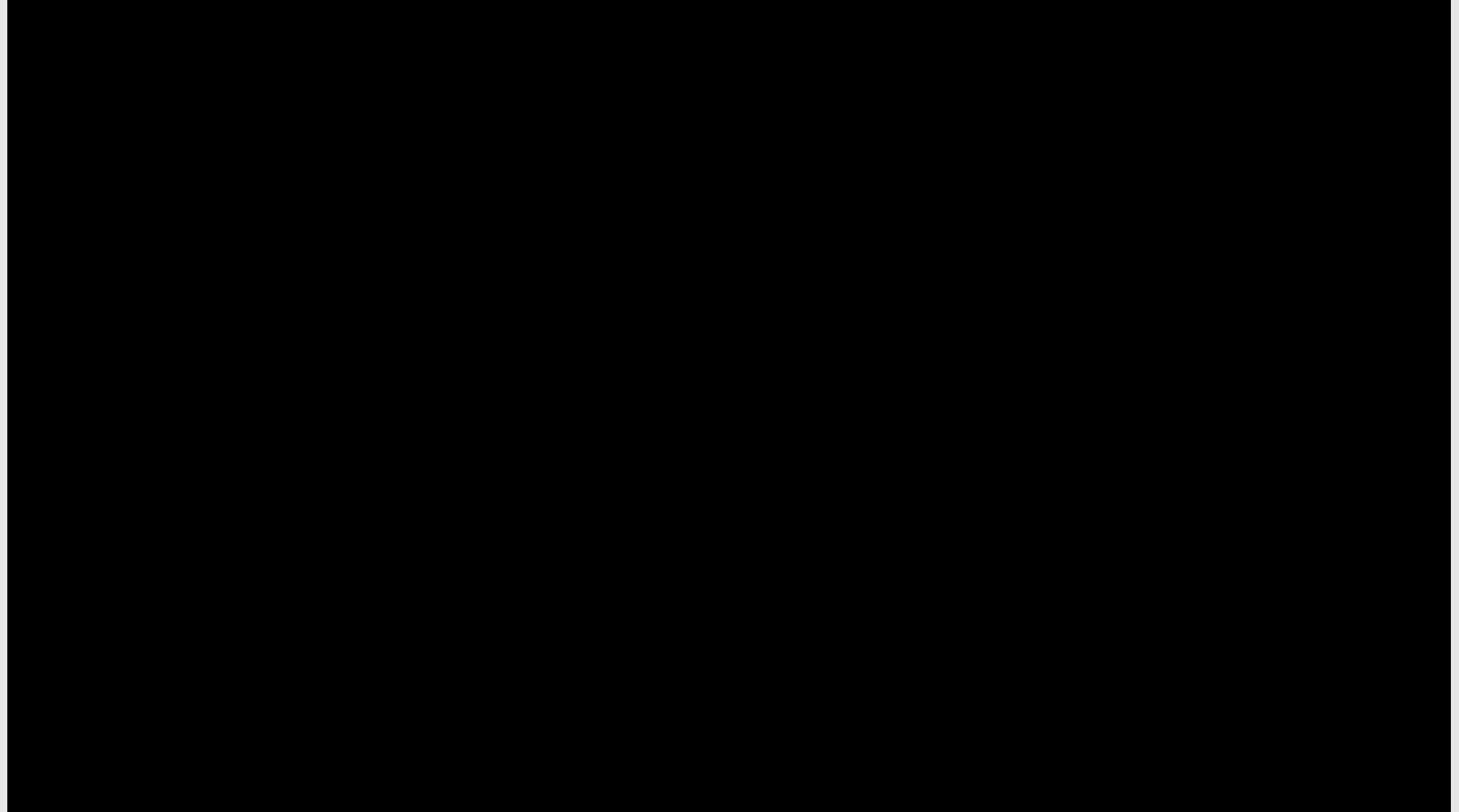


In all cultures, prosodic acoustical stimulation (moving up and down voices, singing, music, etc.) whether vocal or instrumental, is an effective strategy for signaling safety and calming infants

Adults too!

And Even NEWBORNS!

# Michael Jr.



# What we know about babies, brains and relationships!



## What we now know about the brain in infants?

- The right side of the brain (affect, rhythm, tonality) comes “on line” before the left brain!
- The sub-cortex – particularly the amygdala – is “wired” and interconnected, early in development through the nature of the earliest relationships.

## What we now know about the brain in infants?

- Children in securely attached relationships have brains that are more efficiently organized!
- The baby's brain is more sensitive to affective, gestural and intonational cues (“musicality”) than the words themselves!

## What we now know about the brain in infants?

- The infant brain is organized through the nature of relationships.
- The brain grows from the “inside-out”, meaning that earlier and sub-cortical areas that are most responsible for regulation, attention and “fight or flight” responses are “wired” earlier than the higher brain centers. This occurs before language and symbol formation.
- Exposure to neglect, abuse, violence and dysregulation adversely changes the brain

# So.....

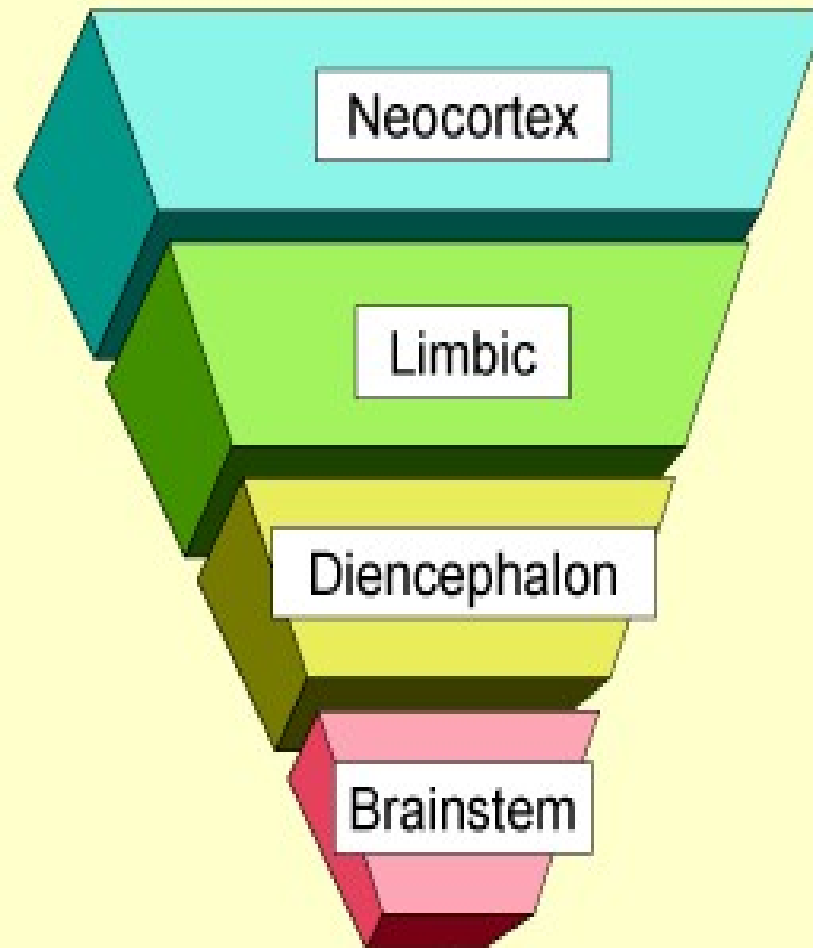
Your facial expressions, tone of voice, movement and gestures are more powerful than your words! When you speak with an infant and young child, move to their eye level (monitoring how they “take you in”), keep a respectful distance to be sure he/she “is in control”, convey in all of your “body language”, calmness, interest and willingness to “follow the child’s lead”.

# Trauma and brain development

# The Neurodevelopmental Context of Exposure to Violence

Bruce D. Perry, MD, Ph.D.

- Trauma adversely effects the infant and child brain by causing abnormal organization and function of important neural systems in the brain.
- Timing of trauma effects emerging brain systems and an understanding of these systems will influence the assessment process and selection of therapeutic interventions.
- Proper therapeutics are effective!



Abstract thought  
Concrete Thought  
Affiliation  
"Attachment"  
Sexual Behavior  
Emotional Reactivity  
Motor Regulation  
"Arousal"  
Appetite/Satiety  
Sleep  
Blood Pressure  
Heart Rate  
Body Temperature

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Bruce Perry: The ChildTrauma Academy,  
5161 San Felipe, Suite 320, Houston, Texas 77056

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Imagining the world through  
the eyes of the child.





Source:

<https://www.google.com/url?sa=i&rct=j&q=&esrc=s&source=images&cd=&cad=rja&uact=8&ved=2ahUKewjnqvyNsobeAhUDVd8KHYERDFcQjRx6BAgBEAU&url=https%3A%2F%2Fwww.rebelcircus.com%2Fblog%2Fhow-child-abuse-affects-people-later-in-life-according-to-study%2F2%2F&psig=AOvVaw2vLzQ5jVuTEqIS2noAWYwK&ust=1539622287102747>

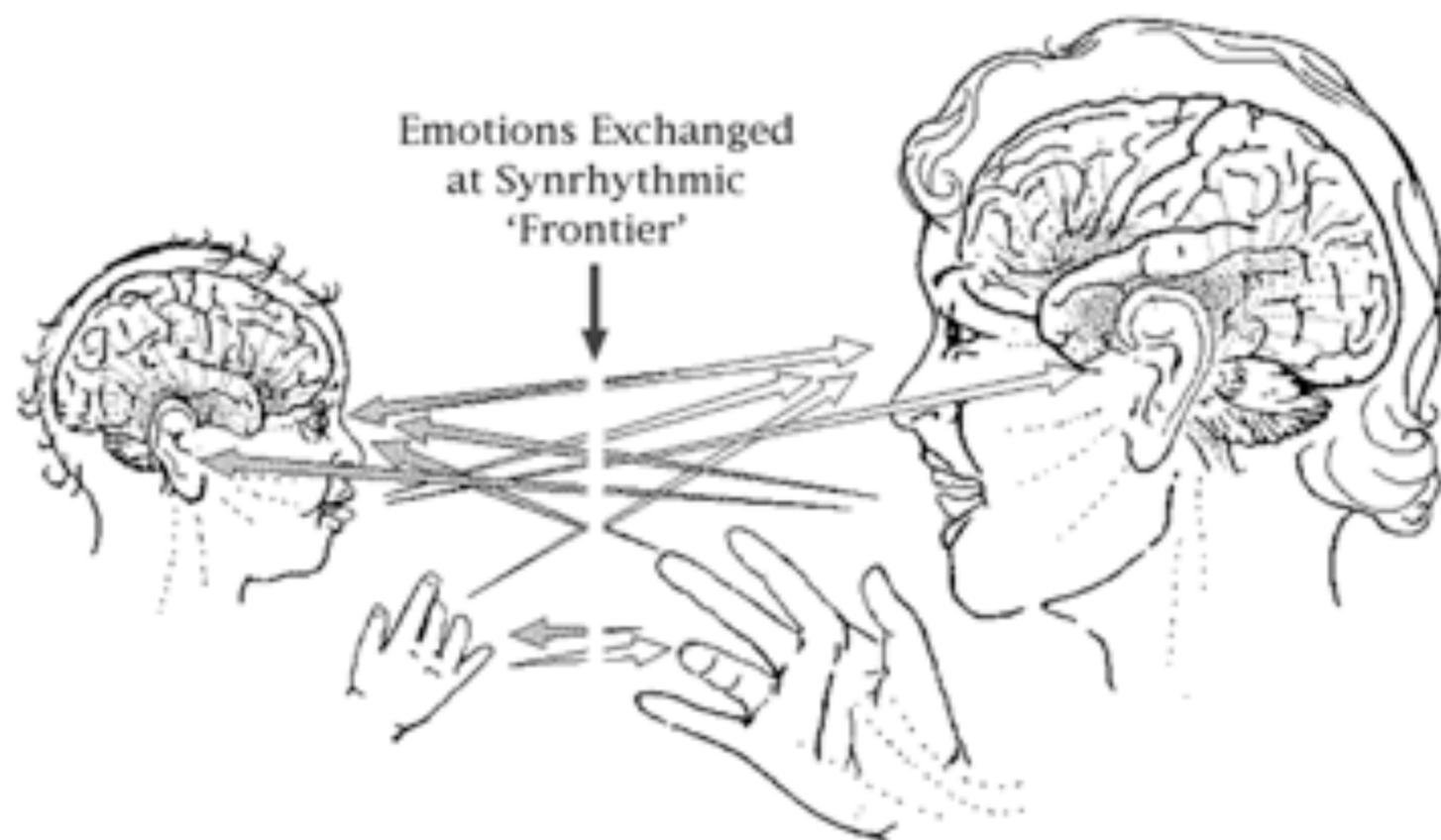
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Source: <https://www.google.com/url?sa=i&rct=j&q=&esrc=s&source=images&cd=&cad=rja&uact=8&ved=2ahUKEwi-1pL4r4beAhVmUd8KHbm4AUoQjRx6BAGBEAU&url=https%3A%2F%2Foldroadapples.wordpress.com%2Fpage%2F88%2F&psig=AOvVaw2xvkRuh-2hIMDjNHCm3ltF&ust=1539621704355104>

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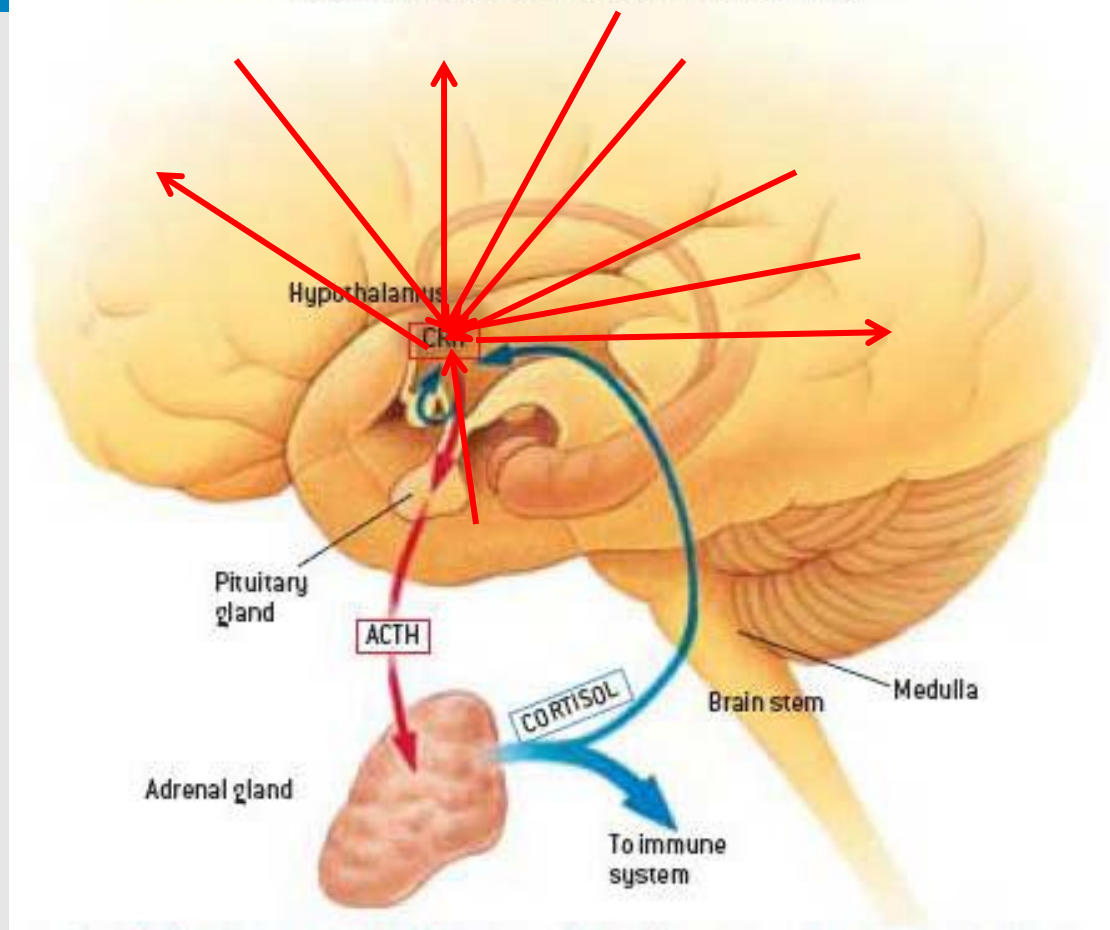
Source: <https://i.pinimg.com/originals/df/f7/5e/dff75e4c19ccab80932e393b3870839f.jpg>

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## STRESS RESPONSE SYSTEM



## Impact on child.....

- Child internalizes a core of negative affect, distrusts the caregiver and his/her own actions as effective.
- Child less interactive with people and objects
- Gender effects: boys receive more negative affect and appear to need more regulatory input

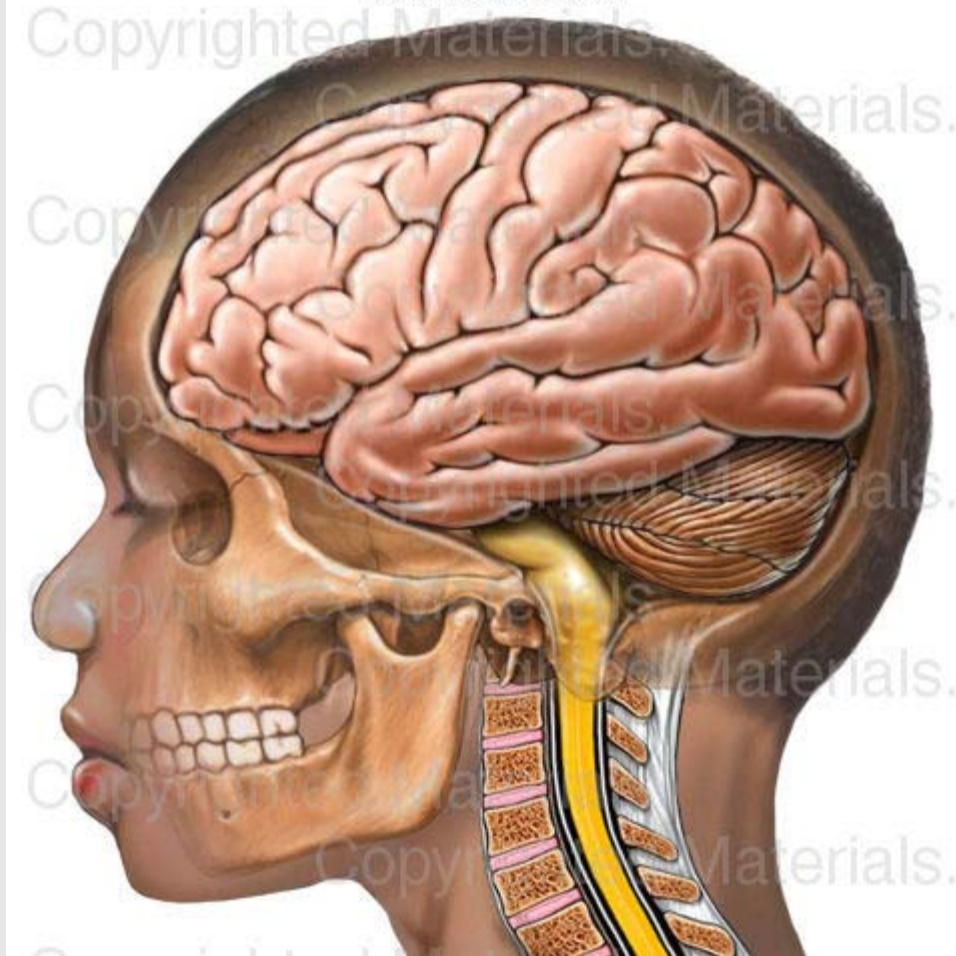




Source: <http://www.bkhush.com/dev/content/parenting-babies-toddlers-how-stop-making-your-child-scared>

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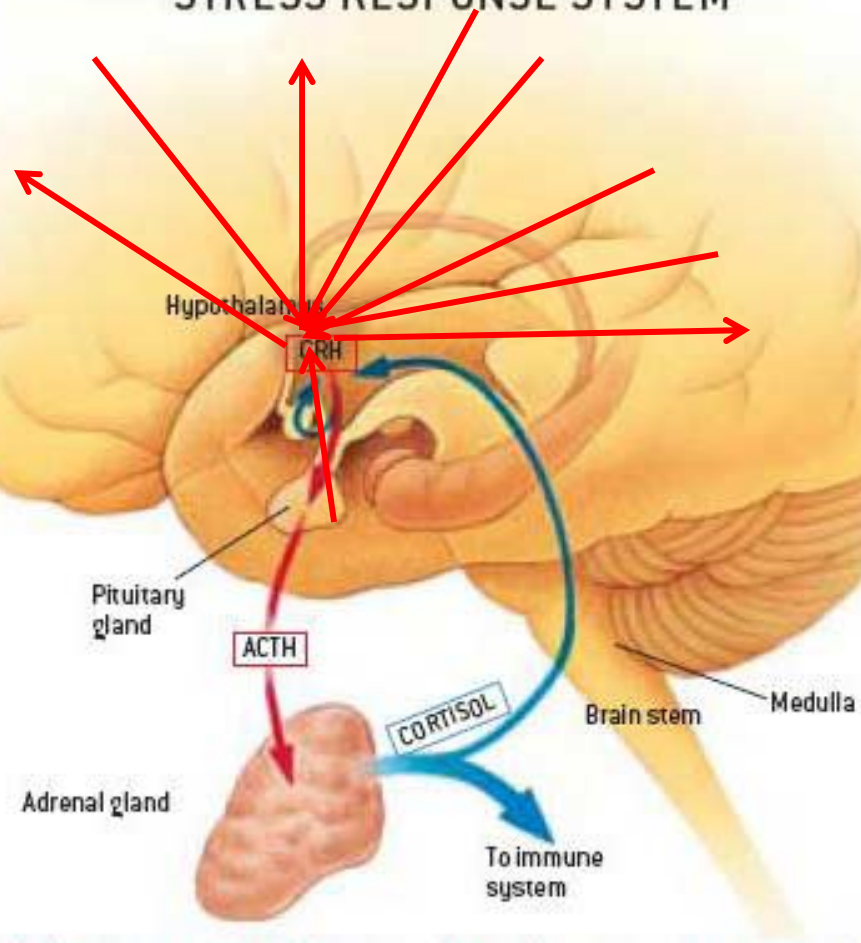
Brain in Child's Skull



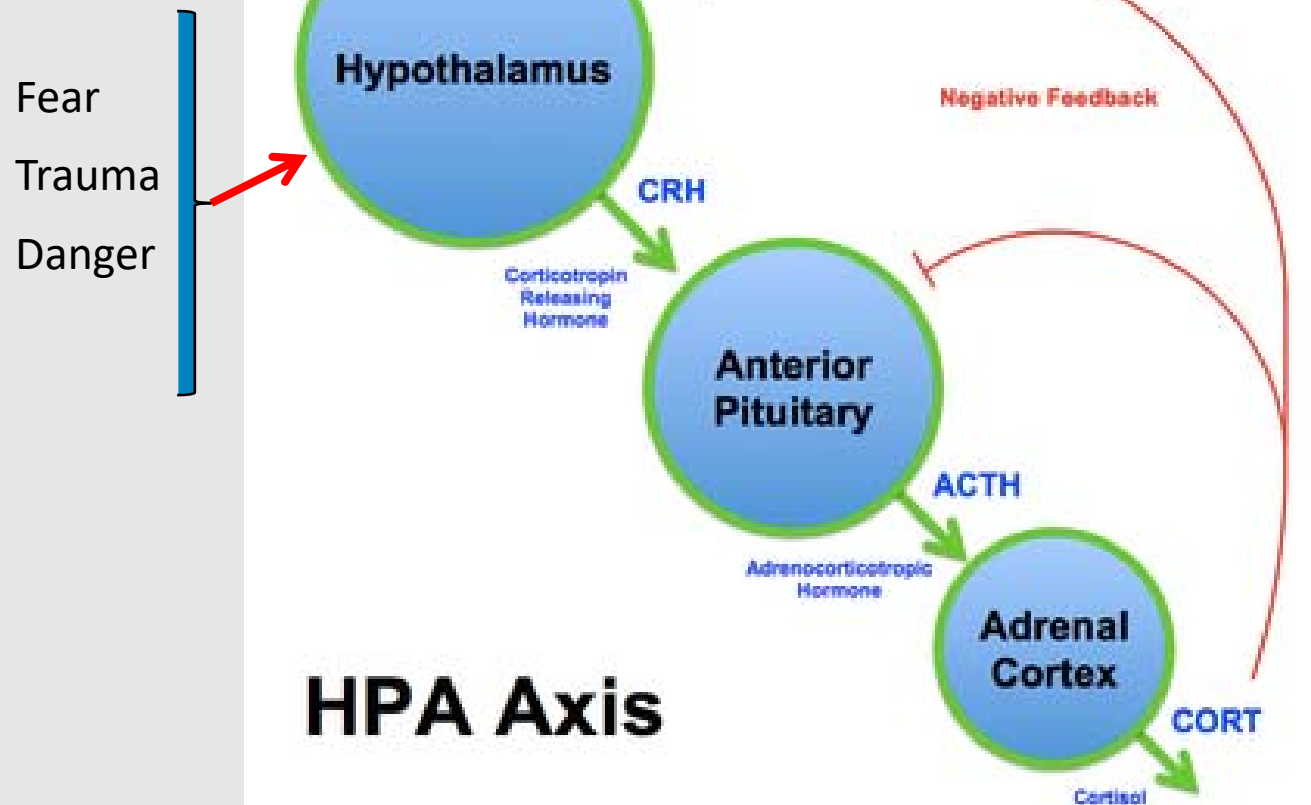
Source; <http://getreadygrossvalley.org/normal-brain-anatomy/normal-brain-anatomy-awesome-spinal-cord-segments-arkivbilder-bilder-og-fotografier/>

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## STRESS RESPONSE SYSTEM



## Hypothalamic-Pituitary-Adrenal Axis



Source:

[https://www.google.com/url?sa=i&rct=j&q=&esrc=s&source=imgres&cd=&cad=rja&uact=8&ved=2ahUKEwjAvcWmpobeAhUDhOAKHc7ZCB0QjRx6BAgBEAU&url=https%3A%2F%2Fes.wikipedia.org%2Fwiki%2FArchivo%3ABasic\\_HPA\\_Axis.jpeg&psig=AOvVaw3aspoPSE8rK-WhLxwMwILt&ust=1539619099399167](https://www.google.com/url?sa=i&rct=j&q=&esrc=s&source=imgres&cd=&cad=rja&uact=8&ved=2ahUKEwjAvcWmpobeAhUDhOAKHc7ZCB0QjRx6BAgBEAU&url=https%3A%2F%2Fes.wikipedia.org%2Fwiki%2FArchivo%3ABasic_HPA_Axis.jpeg&psig=AOvVaw3aspoPSE8rK-WhLxwMwILt&ust=1539619099399167)

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Source:

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## German Proverb

*“Don’t let fear make  
the wolf bigger  
than it is.”*

# The “firehouse” effect!

The result of a chronic activation of the HPA system, and the **prefrontal cortex** is most affected!

- **What suffers?** Executive Functioning!
- **What happens?** The “air-traffic” control system of our brain is derailed.(Shonkoff)

# Two states of brain/mind

- Open receptive state (lid intact)
- Closed, reactive state (lid flipped)



Which “side” will win and grow?

The one you  
feed the most.



Source: [https://www.google.com/imgres?imgurl=https://image.shutterstock.com/image-photo/beautiful-mom-toddler-girl-playing-260nw-4206994.jpg&imgrefurl=https://www.shutterstock.com/image-photo/toddler-girl-feeling-unsure-sitting-on-4281058&h=280&w=390&tbnid=xDDY3GBsn6niKM&tbnh=190&tbnw=265&usg=\\_\\_pLxG3mvZKJyKHQPmHuS4EODJIA=&hl=en&docid=df6uuLk3sXfTpM&itg=1](https://www.google.com/imgres?imgurl=https://image.shutterstock.com/image-photo/beautiful-mom-toddler-girl-playing-260nw-4206994.jpg&imgrefurl=https://www.shutterstock.com/image-photo/toddler-girl-feeling-unsure-sitting-on-4281058&h=280&w=390&tbnid=xDDY3GBsn6niKM&tbnh=190&tbnw=265&usg=__pLxG3mvZKJyKHQPmHuS4EODJIA=&hl=en&docid=df6uuLk3sXfTpM&itg=1)

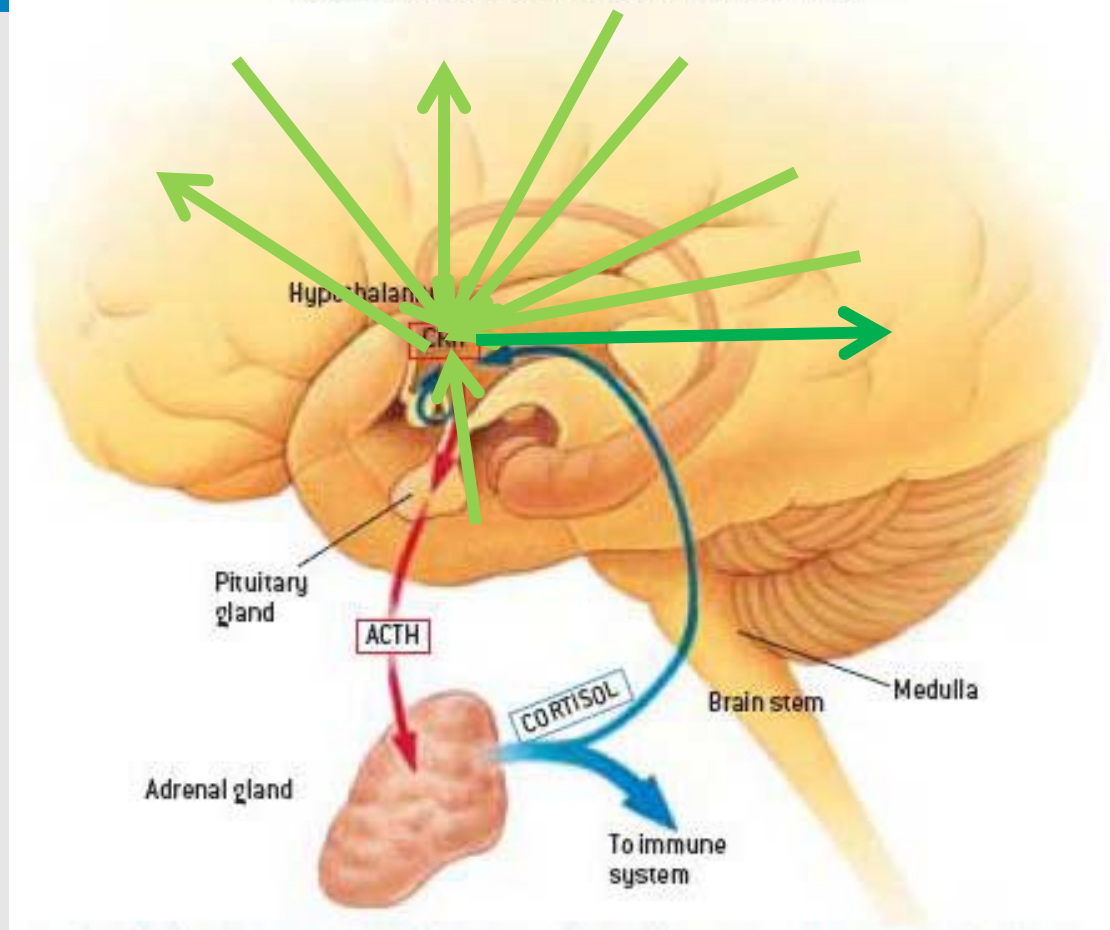
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Source: [https://www.google.com/imgres?imgurl=https://i1.wp.com/1.bp.blogspot.com/-zPtRrLqCXcA/U0lCayrI8zl/AAAAAAAABC8/Y7EvaH7RJsg/s1600/mom-and-baby-closeup.jpg&imgrefurl=http://www.zengatehealingarts.com/post-pregnancy-massage-good-for-mom-and-baby/&h=854&w=1280&tbnid=LfchmwU1NT09YM&tbnh=183&tbnw=275&usg=K\\_dZA9HVCWm51twyBIQlfzPaW6FaY=&hl=en&docid=wZM1SxHpHTX5BM](https://www.google.com/imgres?imgurl=https://i1.wp.com/1.bp.blogspot.com/-zPtRrLqCXcA/U0lCayrI8zl/AAAAAAAABC8/Y7EvaH7RJsg/s1600/mom-and-baby-closeup.jpg&imgrefurl=http://www.zengatehealingarts.com/post-pregnancy-massage-good-for-mom-and-baby/&h=854&w=1280&tbnid=LfchmwU1NT09YM&tbnh=183&tbnw=275&usg=K_dZA9HVCWm51twyBIQlfzPaW6FaY=&hl=en&docid=wZM1SxHpHTX5BM)

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## STRESS RESPONSE SYSTEM



# The way we must feed.....

- Never speak to your babies in rage.
- When you make a mistake with your infant and child, apologize to the children.

!

# The way we must feed.....

- Always be conscious of you affect, your gestures, your movements, **intonation and pacing as these are the things that are most powerful in what your child feels and learns from you.**
- **Your infant and children are ALWAYS “watching” you. Behave in ways that create “models” of what it is like to “be” with someone. They WILL be the world you create!**

## The way we must feed.....

- The ability for self-regulation, and to experience and express ALL emotions, is developed through loving, attuned and co-regulating relationships! These are the ***thousands of moments*** we spend in all areas of life with our children!

# The way we must feed.....

- It is NOT just parents who form these abilities, the brain systems and the “inner life” of the child- but **ALL** those who form relationships with the infant, child and family – Infant and child care staff, EHS and Head Start, EI providers, teachers, home visitors, friends, family, neighbors.

***ALL MEMBERS OF THE VILLAGE matter!***



# AHA! & AGILE!

## *IMH Informed Framework for Responding to Children*

# First

- **A- Assess** - Consider bio-psycho-social influences
- **H- Hypothesize** – wonder about ways to support regulation through affect and interaction
- **A- Act** – Act and evaluate the hypothesis and modulate as needed, using the AGILE guidelines

# Consider these elements in “how” you respond

- **A- Affect** – This is what a child experiences first and most!
- **G- Gesture** – Modulate and be attuned in facial expressions, hands, movement, posture and pacing
- **I- Intonation** – Modulate the tone of your voice as this conveys affect and social/emotional meaning
- **L- Latency (Wait)** – Wait and allow the child time to “take you in”
- **E- Engagement** – Before you continue, be sure you have engaged the child

# CO-REGULATE

A		Affect	expression
G		Gesture	movements
I		Intonation	voice
L		Latency	pacing
E		Engagement	

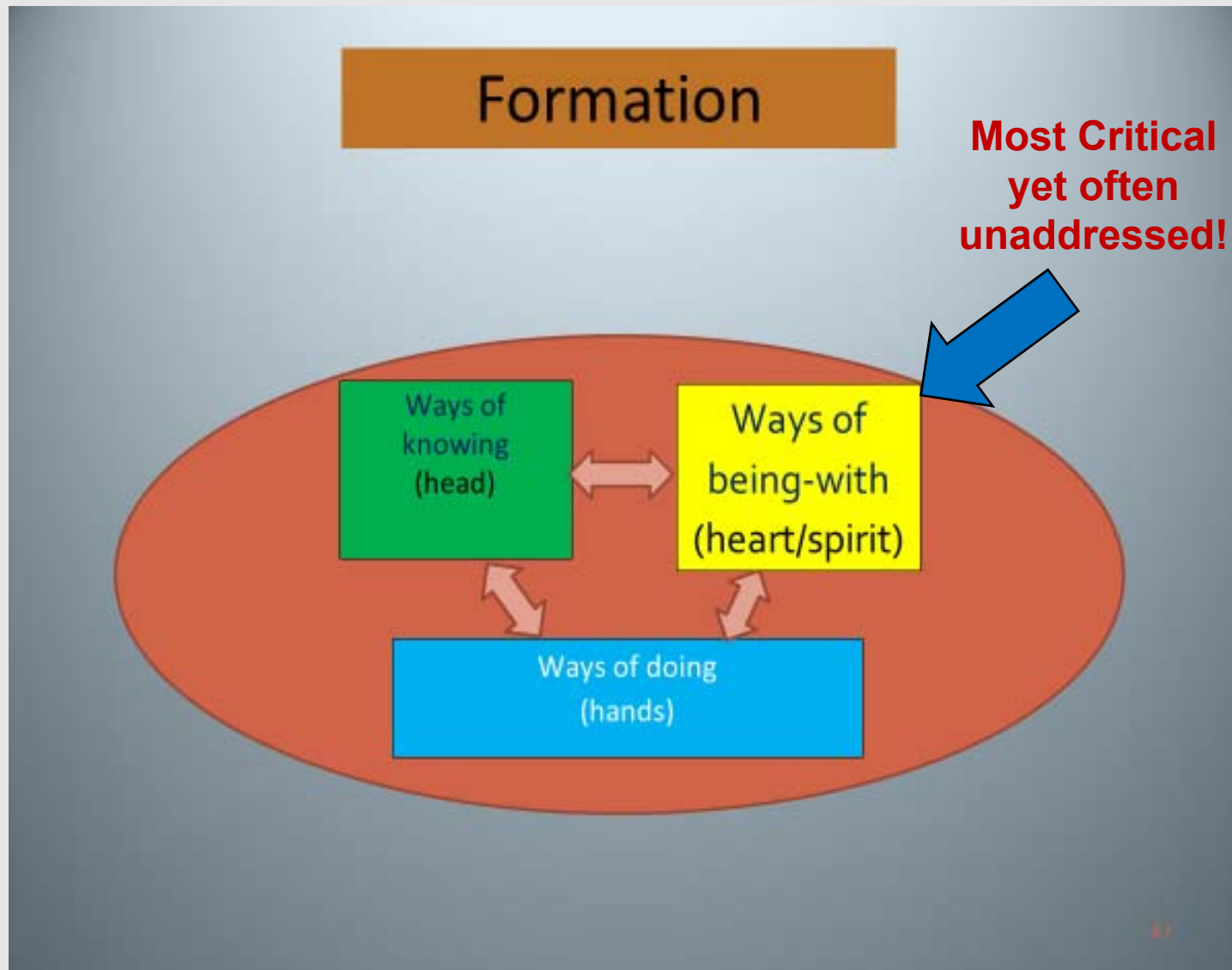
LEND YOUR CALM.

Gerard Costa, Ph.D., 2018

Ph.D., 2020

# A CALL FOR FORMATION!

Not just “training” or “skills”





## What is the *Center for Autism and Early Childhood Mental Health*

The MSU Center for Autism and Early Childhood Mental Health (CAECMH) is a thought-leading center focused on infant and early childhood mental health and developmental differences. Our Mission includes:

- ✓ **Professional Formation and Development**
- ✓ **Academic and Continuing Education**
- ✓ **Consultation and Research**
- ✓ **Clinical and Support Services**

### Among the Center's Programs are:

- ✓ Funded by the NJ Dept. of Children and Families in 2013, the ***Keeping Babies and Children in Mind (KBCM)*** training series was developed in response to Hurricane Sandy. Over 5,000 multidisciplinary staff have attended.
- ✓ Funded by the NJ Dept. of Human Services since 2015, the **Socio-Emotional Formation Initiative (SEFI)** supports ***Grow NJ Kids***, NJ's quality improvement initiative for early childhood care. SEFI provides technical assistance in promoting socio-emotional development and inclusion & provides oversight of the ***Pyramid Model*** in NJ.
- ✓ Funded by the NJ Dept. of Education in 2020 and in partnership with the New Jersey Coalition for Inclusive Education, the **NJ Inclusive Education Technical Assistance Project (NJIETA)** is a 5 ½ year project seeking to support systemic change towards full inclusion of students with disabilities alongside their same-age peers.

# Programs and Services

- 1. Community Clinical Services:** Infant and early childhood mental health services, from pregnancy to age 10+, including comprehensive assessments and interventions, and provision of developmental/parental guidance, systems' advocacy and psychotherapy for infants and children with any developmental, emotional or mental health concern, including autism spectrum.
- 2. Community Presence and Partnership Programs:** Programs for the community including childbirth education, infant/pediatric massage, and disaster/violence response.

# Community Presence and Partnership Programs

## Community Projects

- ***Zippy's Friends***
- ***Circle of Security***
- ***Brazelton Touchpoints Center***
- ***Northeast Regional Terrorism and Disaster Coalition***  

- ***Socio-Emotional Formation Initiative (SEFI) with Grow NJ KIDS***
  - ***Keeping Babies and Children in Mind (KBCM)***
  - ***Pyramid Model of New Jersey***  

- ***Giving Birth and Being Born – Maternal-Child and Lamaze***
- ***Infant and Pediatric Massage and Qigong Sensory Training***
- ***Todd Ouida Children's Foundation (TOCF) Annual Conference***



## Professional Formation Programs

- ❖ Intensive Infant and Early Childhood Mental Health - CE
- ❖ Advanced Certificate in Autism Spectrum Disorder SD-Certificate - CE

## New and Expanding (selective)

- Pilot IECMH Consultation to Early Care and Education- SEFI
- Through anticipated PDG- B-5 funding, creation of IECMH Consultation regional “Hubs” to expand throughout the state across systems.
- COVID-19- response, including:
  - Conversations for Connection, Comfort and Care (3 Cs)
  - Development of regional and national webinars.
  - Development of 15+ topical webinars (10-20 minutes) related to COVID-19 and IECMH themes.
  - DCP&P Supports.
  - Quality Initiative team to support Emergency EC programs for Essential Workers.
  - NJDOE Steering Committee on “reopening”

# New- January 2020



[www.njiet.org](http://www.njiet.org)

## **New Jersey Inclusive Education Technical Assistance Program**

- Funded with IDEA, through Office of Special Education, NJDOE - \$8 Million for 5.5. years!
- Partnership with New Jersey Coalition for Inclusive Education (NJCIE)
- Three-pronged supports:
  - **Inclusion Leadership Development Group:** Quarterly meetings and 2 Inclusion conferences annually
  - **Technical Assistance on Inclusive Education:** 60 - 5-session supports annually
  - **Systemic Change Facilitation:** 15 school sites/year: 6 Pre-School and 9 K-12. 75 over the course of the project

2020

*And remember:*



Source:

[https://www.google.com/imgres?imgurl=https://www.lakecumberlandhospital.com/Content/Uploads/Lake%2520Cumberland%2520Regional%2520Hospital/images/web\\_babies.jpg&imgrefurl=https://www.lakecumberlandhospital.com/patients-and-visitors/web-babies&h=214&w=300&tbnid=LlcDnUwH\\_\\_qd5M&tbnh=190&tbnw=266&usg=K\\_EkNjrKj\\_o939sVA8uMQVojB3raY=&hl=en&docid=HPeQiSUG1bl9wM](https://www.google.com/imgres?imgurl=https://www.lakecumberlandhospital.com/Content/Uploads/Lake%2520Cumberland%2520Regional%2520Hospital/images/web_babies.jpg&imgrefurl=https://www.lakecumberlandhospital.com/patients-and-visitors/web-babies&h=214&w=300&tbnid=LlcDnUwH__qd5M&tbnh=190&tbnw=266&usg=K_EkNjrKj_o939sVA8uMQVojB3raY=&hl=en&docid=HPeQiSUG1bl9wM)

Gerard Costa, Ph.D., 2020

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