The Psychological Effects of Stress on the Fragile Infant

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Objectives

- Definition of Infant Mental Health (IMH)
- To discuss outcome for infants in the NICU
- To discuss brain research and how this affects what we know about regulation
- Introduction to NRF including Stress and Stress recovery
- To discuss rationale for collaboration of IMH and the NICU
- To discuss evolution of IMH in the NICU

What Is Infant Mental Health?

- Infancy 0 - 3, preschool 4 - 5 years
- Focus on facilitating the child's healthy social and emotional development in the context of a caregiving relationship

Infant and Early Childhood Mental Health

What do we do?

Assess and provide intervention for:

- Complex developmental challenges
- Social emotional development delays/disorder
- Parenting/family function challenges

In collaboration with community partners


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NICU Outcomes

- Exposures to stressors in NICU are associated with regional alterations in brain structure and functioning

NICU Outcomes

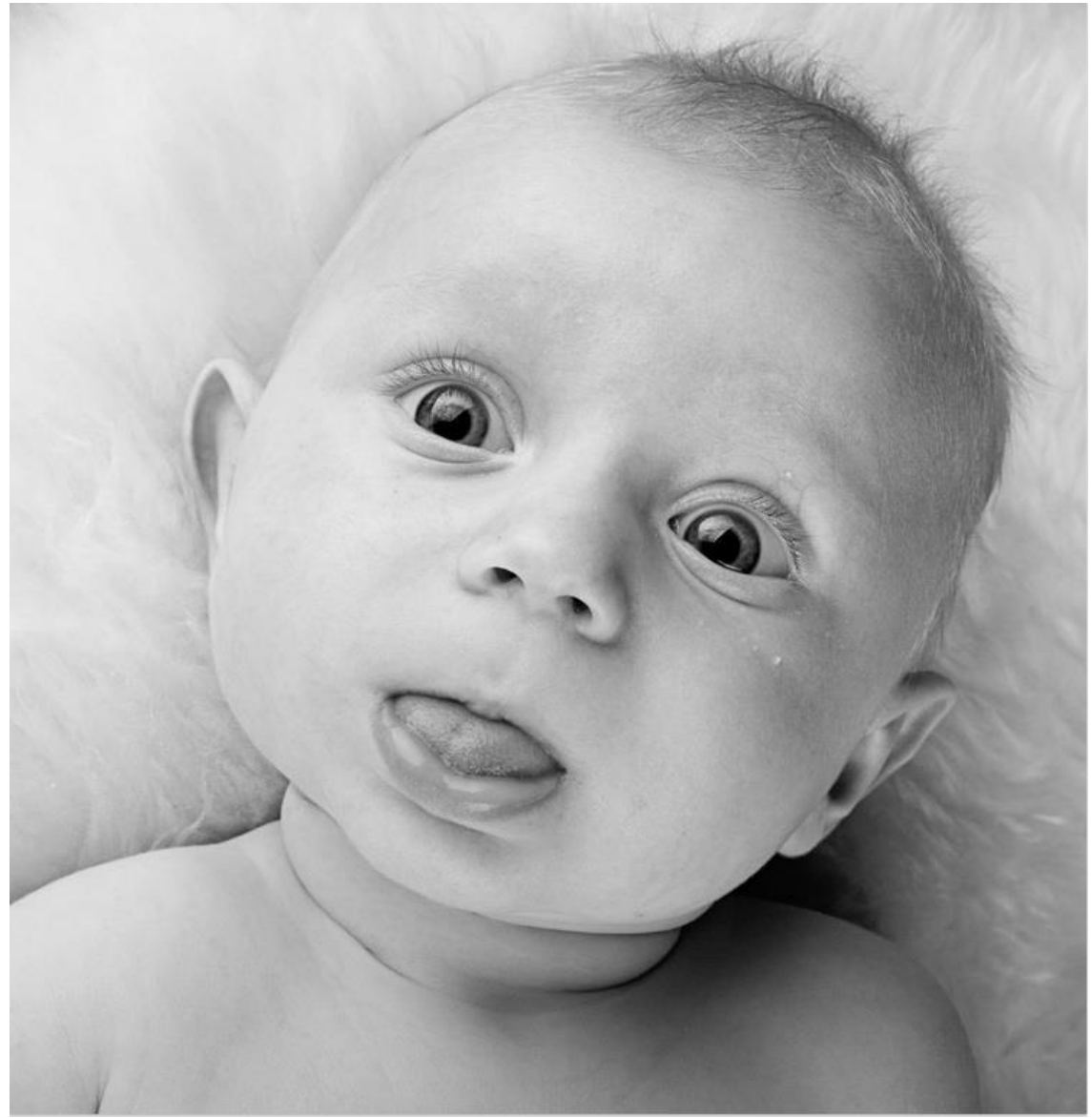
- EPICure study - England – 3 year olds
- 576 NICU babies
- Overall 13% severe ND impairment
- 12% moderate ND impairment
- IQ of 22 to 23 week gestation 80 at 3 years old

NICU Outcomes

- Adolescent Study – Norway
- VLBW – increased inattention, psychiatric diagnoses, and decreased psychosocial functioning
- If low Apgar 1 min – increased incidence of ASD
- If low Apgar 5 min – high internalizing disorders

NICU Outcomes

- Swedish Study by Nosarti - Adults
- <32 weeks – 60 to 80% ADHD
- 7X increase in Bipolar Disorder
- 3X increase in Depression
- 2.5X increase in Psychosis
- 32 to 36 weeks – still increased risk and also high risk for ADHD
- QOL 6 years old Decreased scores



Brain Research

The Core Story of Early Childhood Development

- www.frameworksinstitute.org
- www.albertafamilywellness.org
- www.developingchild.harvard.edu

Why Child Development Matters

- Interdependence – We can only succeed as a province if **all** children thrive
- Ingenuity - Innovative societies have designed high quality early childhood programs which have shown long term benefits for children

The Core Story: Early Childhood Development

- The basic architecture of the brain is constructed through an ongoing process that begins before birth and continues through life (Brain Architecture).
- Brains are built from the bottom up (Skill Begets Skill).
- Cognitive, emotional and social capacities are inextricably intertwined, and learning, behavior and physical and mental health are interrelated over the course of life (Can't do One Without the Others).

The Core Story

- Early learning is foundational to everything that follows. (Executive function – Air Traffic Control)
- Interactions of genes and experiences shape the developing brain (Epigenetics).
- Reciprocity in relationships is the active ingredient in this epigenetic process (Serve and Return).

The Core Story: Early Childhood Development

- Toxic stress damages the developing brain and leads to problems in learning, behavior and increased susceptibility to illness.
- We can prevent the effects of early adversity, Brain Faultlines, from derailing development.
- Promoting children's mental health helps children function. (Levelness)

The Core Story: Early Childhood Development

- Resilience is like having a scale that's tipped positive even when a lot of things are stacked on the negative side.
- Brain plasticity decreases over time so getting it right early is less costly than trying to fix it later

  (Pay now or Pay later).

The Neurorelational Framework:

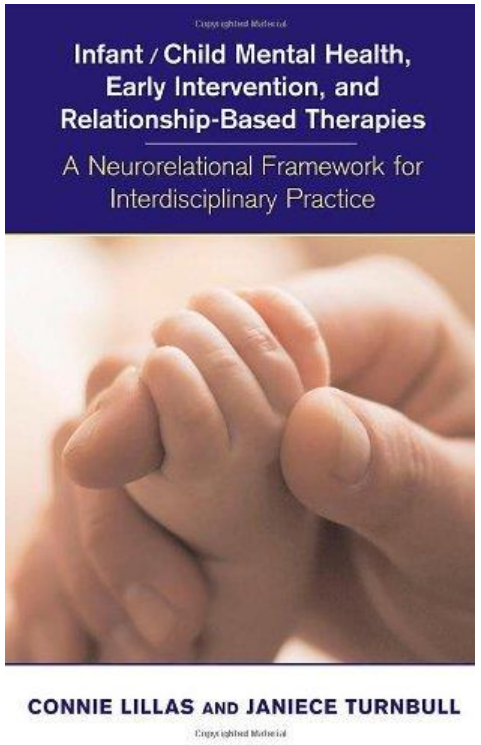
Infant/Child Mental Health, Early Intervention, and Relationship-Based Therapies

A Neurorelational Framework for Interdisciplinary Practice

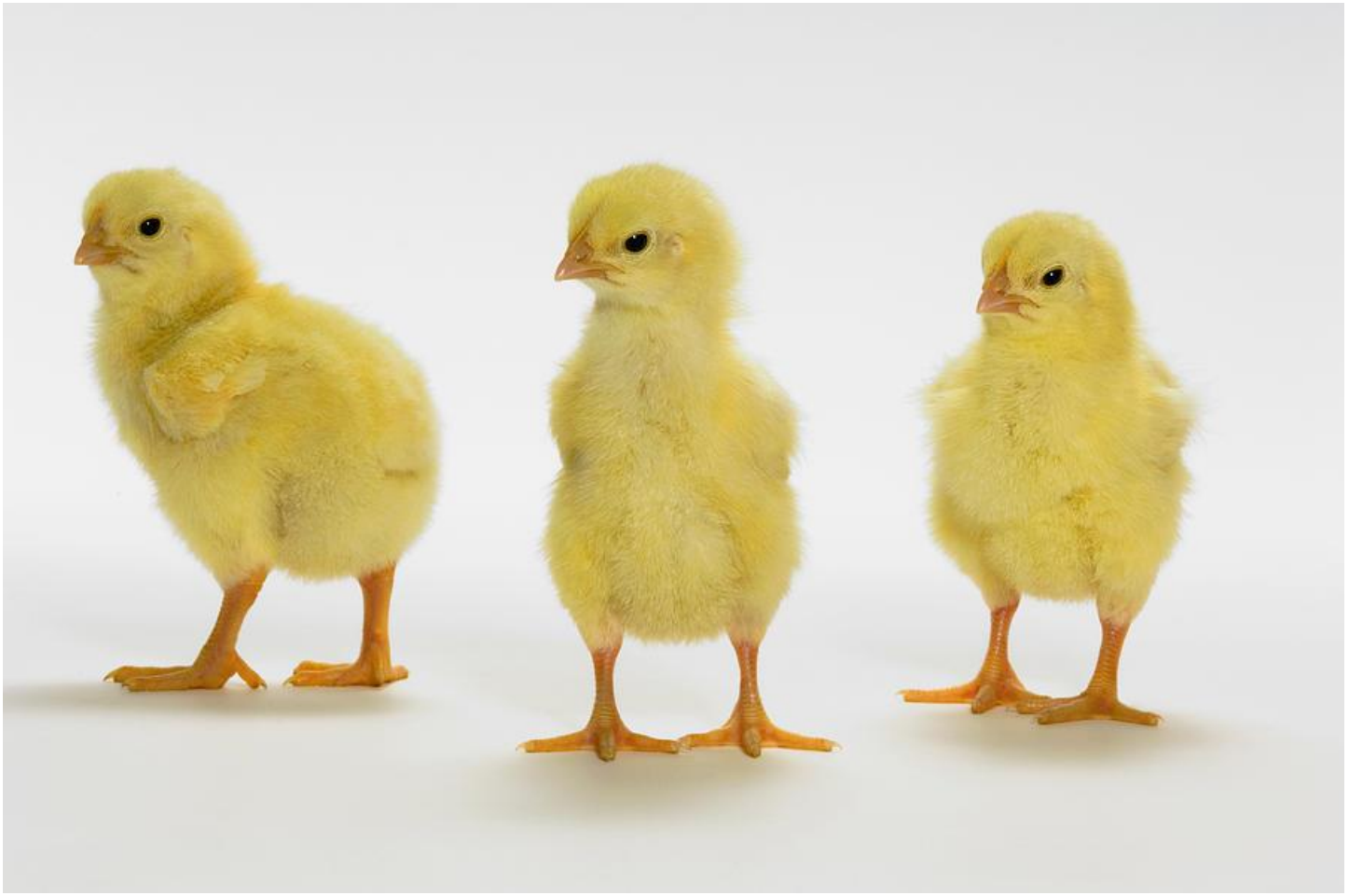
Connie Lillas and

Janiece Turnbull

W.W. Norton, New York, 2009



3 Key Concepts, 3 Key Steps



Key Concept 1:

The quality of our relational experiences set up adaptive or toxic stress patterns…

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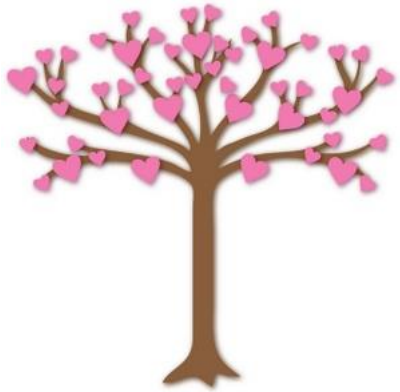
Key Concept 2a:

Early brain networks develop through serve & return experiences

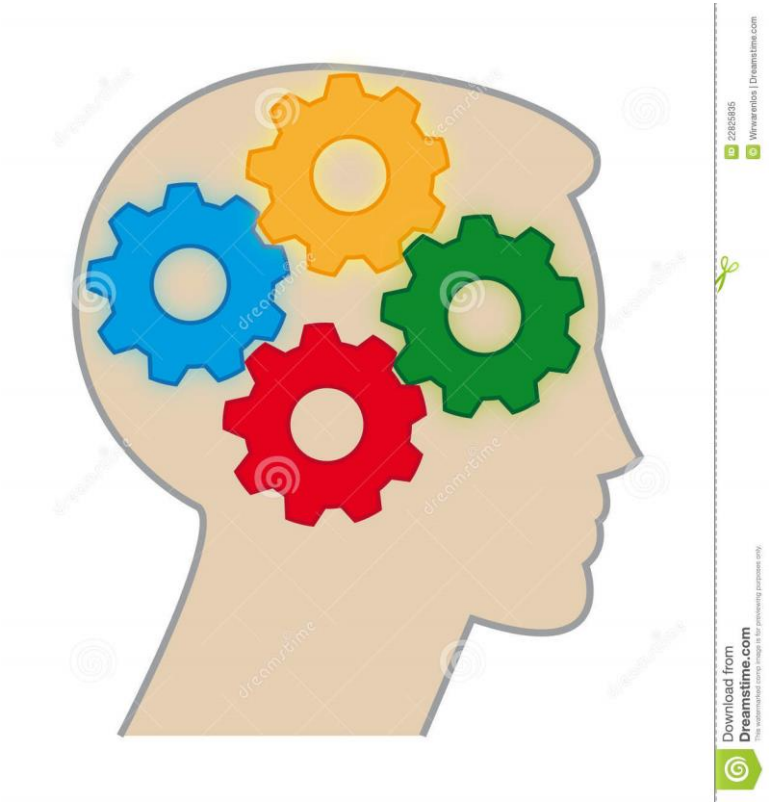
Key Concept 2b:

The quality of our serve & return experiences set up positive or negative lifelong expectations



Key concept 3:

Early brain architecture
is built through lived experiences



3 Key Concepts → 3 Key Steps

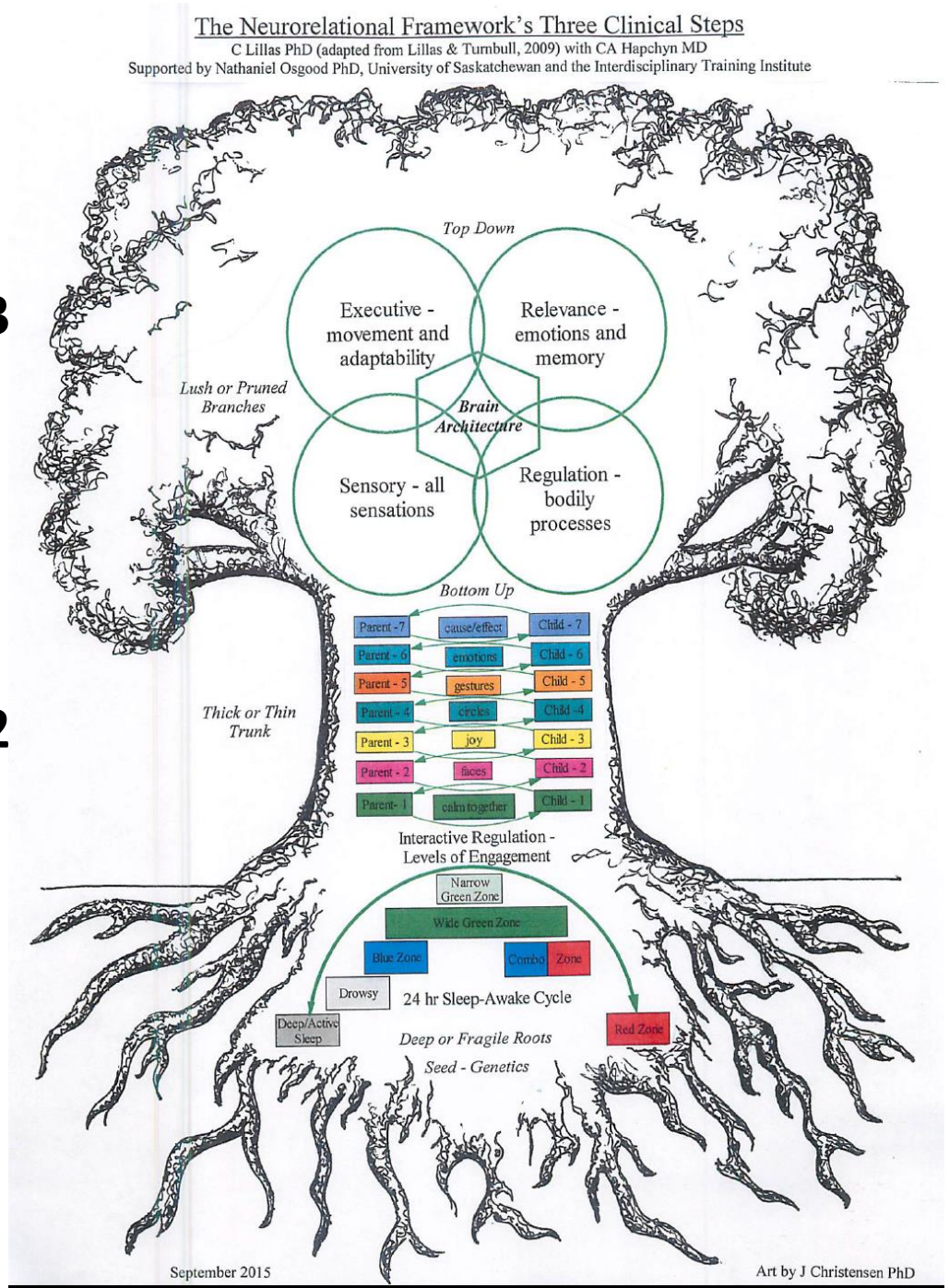
- Adaptive stress is healthy, toxic stress corrupts brain networks
- Positive or negative engagement influences lifelong expectations
- Brain networks develop with experience

- #1 Managing Stress
- #2 Quality of Relationships
- #3 Individual Differences

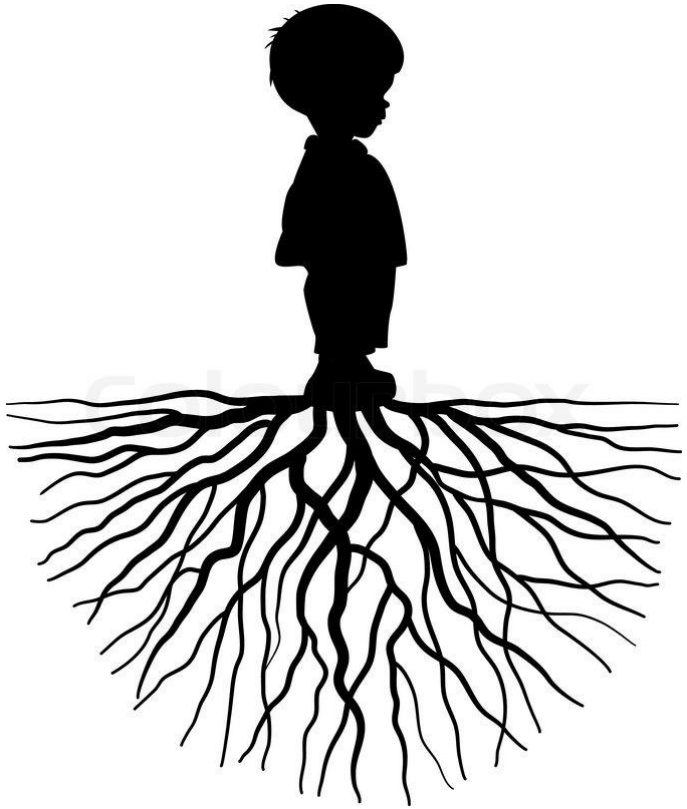
STEP 3

STEP 2

STEP 1



Step 1: Adaptive vs Toxic Stress



Step 1: The Roots of the Tree

How deep or fragile are the roots?

Step 1:
How do we identify stress & stress recovery ?

A. *Recognize what stress recovery looks like and who we are at our Best!*

B. Recognize 3 primary stress responses and who we are at our Worst!

C. Recognize 4 toxic stress patterns

Step 1A:
How do we identify stress recovery ?

Recognize what

stress recovery looks like:

- Deep sleep
- **Green** zone

Deep sleep is restorative…

Green Zone is ‘just right’…
for learning and relationships

Step 1B: How do we identify Stress Responses?

Awake States with Stress Responses — Step #1

GREEN ZONE — Just Right/Alert

EYES
- ☐ Bright, shiny eyes
- ☐ Looks directly at people, objects
- ☐ Looks away for breaks, then returns to eye contact
- ☐ Seems alert, takes in information

FACE
- ☐ Smiles, shows joy
- ☐ Neutral
- ☐ Can express all emotions

VOICE
- ☐ Laughing
- ☐ Tone changes

BODY
- ☐ Relaxed with good muscle tone
- ☐ Stable, balanced and coordinated movements
- ☐ Moves arms and legs toward centre of the body
- ☐ Molds body into a caring adult when held
- ☐ Moves faster or slower depending on environment

RHYTHM/RATE OF MOVEMENT
- ☐ Changes smoothly to respond to the environment
- ☐ Movements not too fast or too slow

RED ZONE — Too Fast/Gas Pedal

EYES
- ☐ Open, squinted or closed eyes
- ☐ May have direct, intense eye contact
- ☐ May avoid eye contact
- ☐ Eyes roll upward
- ☐ Eyes look quickly around the room

FACE
- ☐ Wide, open mouth
- ☐ Anger, disgust
- ☐ Frown
- ☐ Fake/forced smile
- ☐ Clenched jaw or teeth

VOICE
- ☐ High-pitched crying, yelling or screaming
- ☐ Loud
- ☐ Hostile or grumpy
- ☐ Sarcastic
- ☐ Out of control laughing

BODY
- ☐ Fingers spread out
- ☐ Arched back; tense body position
- ☐ Constant motion
- ☐ Demands space by pushing, shoving, and getting into others' space
- ☐ Biting, hitting, kicking, jumping, throwing
- ☐ Bumps into things, falls
- ☐ Threatening gestures (shakes finger or fist)

RHYTHM/RATE OF MOVEMENT
- ☐ Fast movements
- ☐ Impulsive movements

BLUE ZONE — Too Slow/Brake

EYES
- ☐ Glazed-glassy eyes (looks through rather than at)
- ☐ Looks away for a long time, looks down
- ☐ Seems drowsy/tired
- ☐ Does not look around the room for interesting items
- ☐ Looks at things more than people

FACE
- ☐ Flat/blank
- ☐ Mouth turned down, sad
- ☐ No smiles or hints of smiles
- ☐ Few emotions shown

VOICE
- ☐ Flat
- ☐ Makes few to no sounds
- ☐ Sounds cold, soft, sad, too quiet

BODY
- ☐ Slumped/slouching
- ☐ Low muscle tone
- ☐ Little or no exploring play or curiosity
- ☐ Wanders
- ☐ Frozen or slow-moving

RHYTHM/RATE OF MOVEMENT
- ☐ Slow movements
- ☐ Slow to start moving

COMBO ZONE — Fast & Jerky/Gas & Brake

EYES
- ☐ Wide open eyes
- ☐ Looks around as if worried or scared
- ☐ Stares at things
- ☐ Rolling of the eyes

FACE
- ☐ Raised eyebrows
- ☐ Furrowed brow
- ☐ Trembling lips or mouth
- ☐ Seems in pain
- ☐ Mouth wide open
- ☐ Startled expression

VOICE
- ☐ High-pitched, nasal, sing-song voice
- ☐ Moans or groans in pain
- ☐ Whimpers
- ☐ Wobbly/quivering voice or fast changes

BODY
- ☐ Tense or rigid posture
- ☐ Cowers or hides
- ☐ Fast, repetitive movements (wrings hands, shakes foot)
- ☐ Trembling hands
- ☐ Clings, grabs
- ☐ Flails around

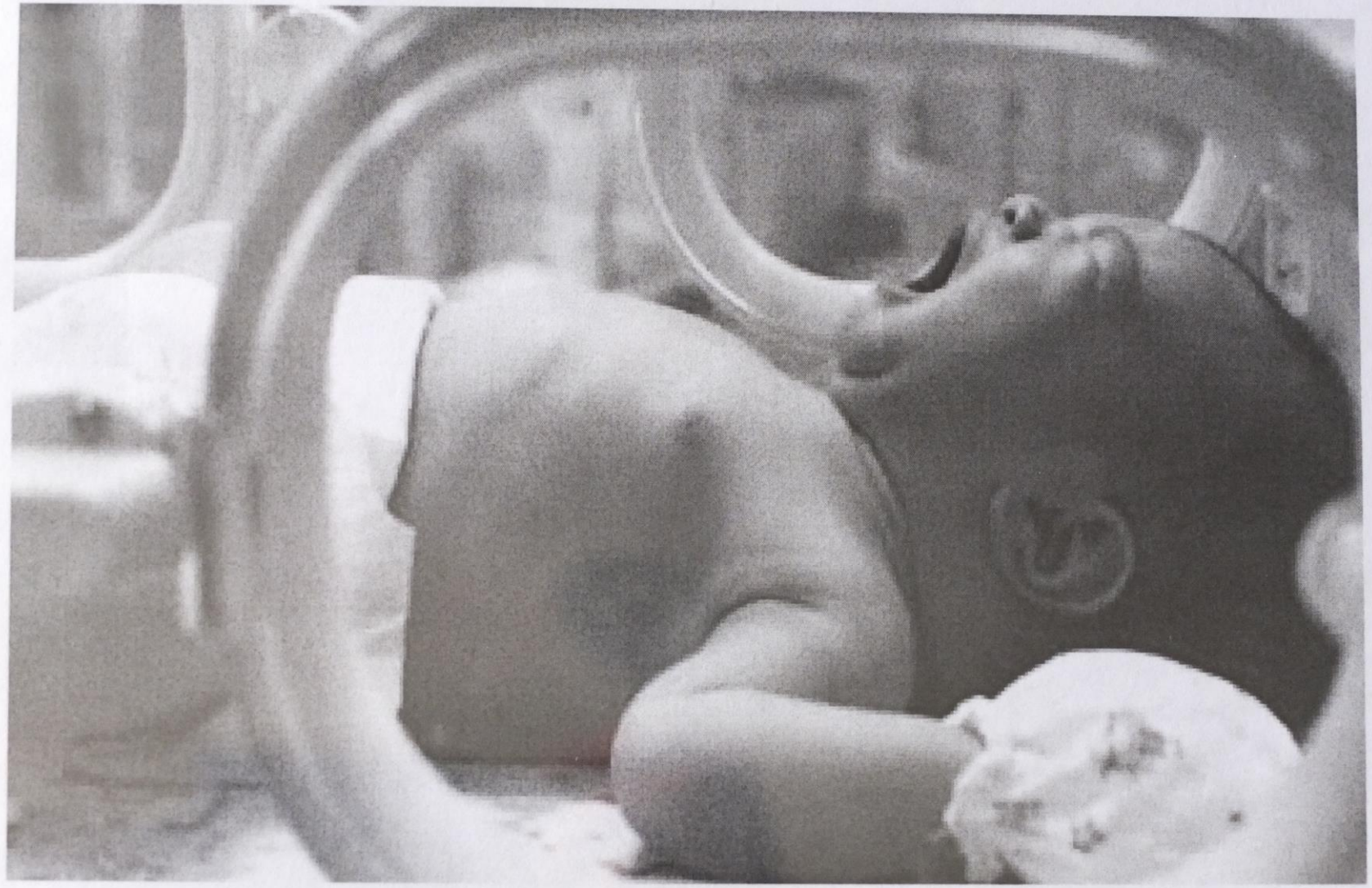
RHYTHM/RATE OF MOVEMENT
- ☐ Fast movements
- ☐ Jerky movements

From: *Infant/Child Mental Health, Early Intervention, and Relationship-Based Therapies: A Neurorelational Framework for Interdisciplinary Practice*, by Lillas & Turnbull. © 2009. New York, New York: W. W. Norton Revised 3-9-16

Reading Non-Verbal Cues:
Red Zone

A Baby's Flooded State

video



Reading Non-Verbal Cues:
Blue Zone

A Baby's Shut-Down State

Reading Non-Verbal Cues:
Combo Zone

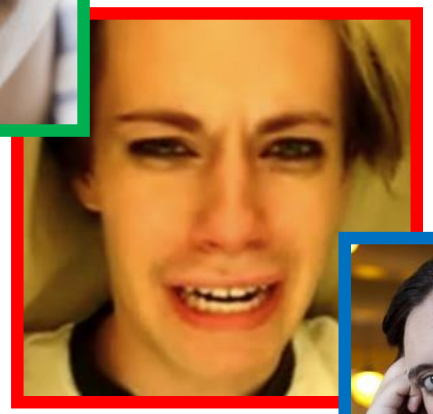
A Baby's Vigilant State

Video

Arousal Zones Across the Lifecycle

- **Green**
  - Calm, alert
- **Red**
  - Hyper-arousal
  - Flooded
- **Blue**
  - Hypo-arousal
  - Dissociate
- **Combo** (red/blue)
  - Hyper-vigilant
  - May look calm outside, but anxious inside

& Deep Sleep Cycling



EARLY BRAIN & BIOLOGICAL DEVELOPMENT A SCIENCE IN SOCIETY SYMPOSIUM

Three Levels of Stress

Positive

Brief increases in heart rate,
mild elevations in stress hormone levels.

Tolerable

Serious, temporary stress responses,
buffered by supportive relationships.

Toxic

Prolonged activation of stress response systems
in the absence of protective relationships.

Three Core Concepts in Early Development

3

Toxic Stress Derails Healthy Development

NATIONAL SCIENTIFIC COUNCIL ON THE DEVELOPING CHILD

Center on the Developing Child HARVARD UNIVERSITY

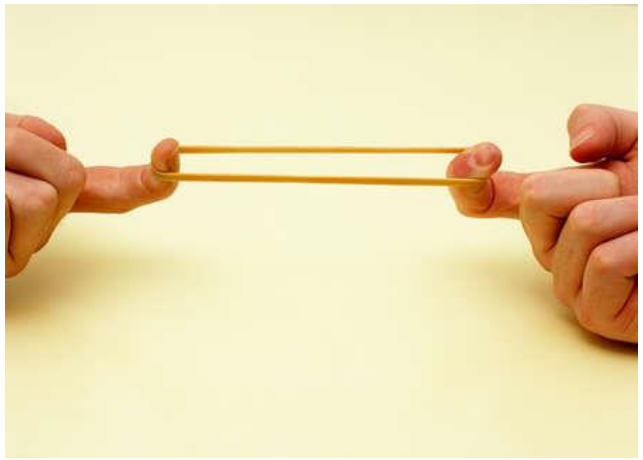
Step 1C: How do we identify toxic stress?

- Allostasis is defined as “flexibility” with “stability”.
  - ***Flexibility with stability*** is how the NRF defines “health.”
- Allostatic load = the wear and tear on the body
  - Loss of coordination with

    too much rigidity or too much chaos

Toxic Stress= Allostatic Load

Stretches out too frequently



Doesn’t bounce back

A Bad Day vs. A Hard Life

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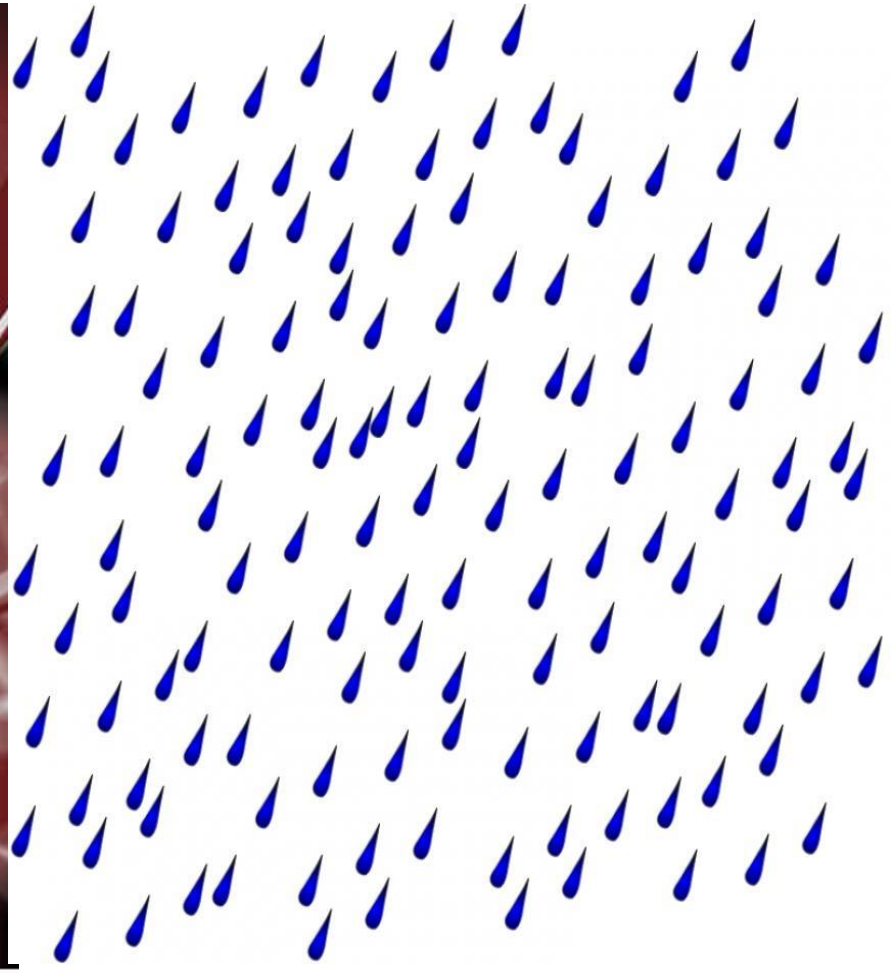


Frequency & Duration

Intensity

Toxic Stress

Four types of toxic stress or over-load:

- stress responses that occur *too frequently* and *too quickly*
- *can't adapt* to "normal" challenges and transitions
- prolonged stress responses that take too long to recover from (more than 10 to 20 minutes) even after the stressor is gone
- *can't recover* from stress responses back to ***baseline health*** (healthy sleep cycle and healthy green zone - calm and alert during the day)

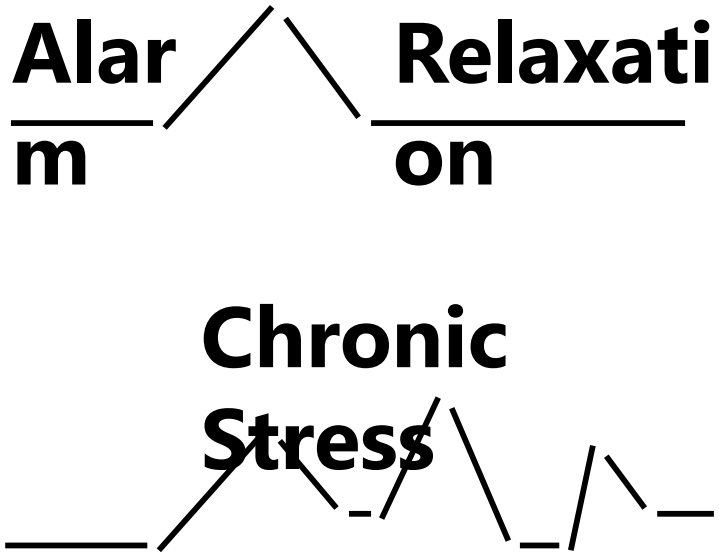
B McEwen (2002)

From: Infant/Child Mental Health, Early Intervention, and Relationship-Based Therapies:

A Neurorelational Framework for Interdisciplinary Practice, by Lillas and Turnbull, 2009, New York, New York: W.W. Norton

The Importance of The First 3 Years:
Experiences Lay Down Reactions to Stress

Normal and Long-term Stress:



Adverse Childhood Experiences

- Linear increase in negative health/mental health outcomes as number of adverse childhood experiences increase

Events include:

<u>Abuse</u>
Physical Abuse
Emotional Abuse
Sexual Abuse

<u>Neglect</u>
Physical Neglect
Emotional Neglect

<u>Household Dysfunction</u>
Family Violence
Parental Mental Illness
Separation or loss of a parent
Parental Criminality
Parental Substance Abuse

Adverse Childhood Experiences Score

Number of categories (not events) is summed:

ACE Score	*Prevalence*
0	33%
1	25%
2	15%
3	10%
4	6%
5 or more	11%*

- Two out of three experienced at least one *category* of ACE.
- Women are 50% more likely than men to have ACE Score >5.
- If any one ACE is present, there is an 87% chance *at least* one other ACE category is present, and a 50% chance of 3 others.

Adverse Childhood Experiences and their Relationship to Adult Health and Well-being: Vincent Felitti MD

Additional Adverse Childhood Experiences

- Natural disasters
- Human made trauma – war, neighborhood violence, social media/media, etc.
- Medical Trauma (NICU, Medical/Surgical Treatments)
- Very poorly responsive childcare/educational environments, including bullying
- Severe chronic pain, severe chronic sensory under/over stimulation
- Other examples?

ACE Score Higher Than 4

Poverty Clinic, March, 2011

Score 4 or more

- Twice as likely to smoke
- Twice as likely to have heart disease
- Twice as likely to be diagnosed with cancer
- Four times as likely to have emphysema or chronic bronchitis
- Six times as likely to have sex before age 15
- Seven times as likely to be alcoholics

Score 4 or more compared to 0

- Twelve times as likely to have attempted suicide

Men with a score of 6 or more compared to 0

- Forty-six times as likely to have injected drugs

Poverty Clinic Article, New Yorker, 2011

Stress Patterns & Associated Health Issues:

Disease does not begin at the onset of symptoms. Maladaptive stress related conditions are implicated in all of the following:

Toxic Stress Patterns #1 to 3

- Increase in heart attack & hypertension
- Melancholic depression
- Obsessive compulsive disorder
- Panic disorder
- Alcoholism
- Lowered immune system
- Decrease in memory functions
- Diabetes
- Malnutrition
- Hyperthyroidism
- Functional gastrointestinal disease

Toxic Stress Pattern #4

- Allergies
- Asthma
- Autoimmune diseases
- Chronic fatigue syndrome
- Rashes
- Rheumatoid arthritis
- Post Traumatic Stress Disorder

McEwen, prospective study (2002)

The Ripple Effect:
Trauma-Informed Shift

- Shift from , “What’s wrong with you?” (bad behavior)
- To a curious and kind attitude, “What happened to you?” J.Foderaro 1991, S. Bloom 1994

How Deep are the Roots of the Tree? Deep, Fragile, or Uprooted…

Green Zone Grows!

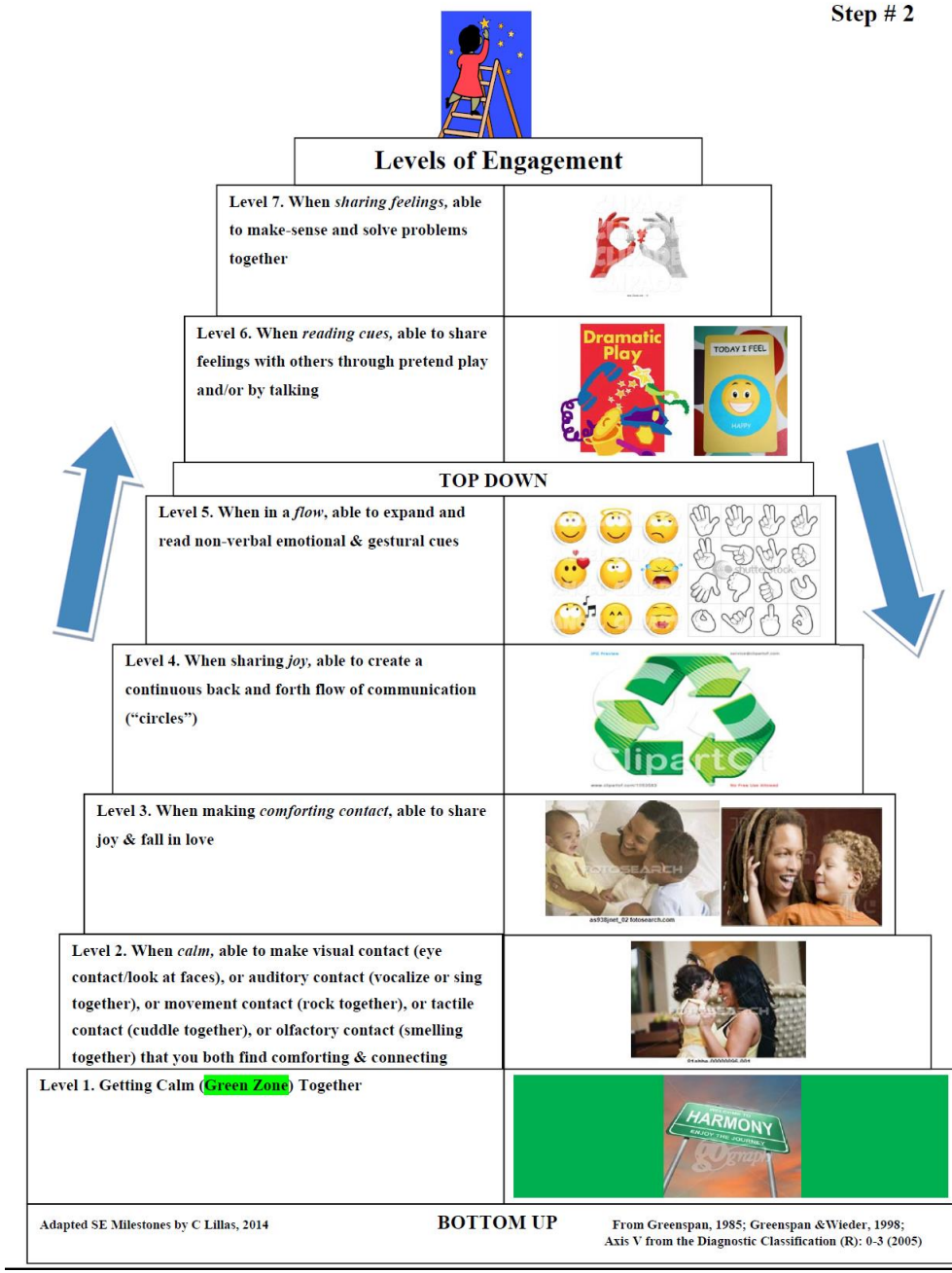
Step Two: Levels of Engagement

“serve & return”

How thin or thick is the relational trunk?

Step #2

- Assess the levels of engagement (dyadic engagement) through socio-emotional milestones



Step 2A:
Recognize "Bottom-up" Levels

Greenspan, 1985, 1992; Greenspan & Lourie, 1981; ZERO TO THREE, 1994, 2005

Bottom-Up (non-verbal capacities)

Level 1 Getting calm (green) together

Level 2 When *calm* able to make visual, auditory, tactile, movement or olfactory contact that both partners find comforting and connecting

Level 3 When making *comforting contact,* able to share joy & fall in love

Level 4 When sharing *joy,* able to create a continuous back-and-forth flow of communication ("circles")

Level 5 When in a *flow*, able to expand and read non-verbal emotional and gestural cues

SE Milestone Language Adapted by Connie Lillas

Step 2B:
Recognize “Top-down” Levels

<u>Top-Down (verbal capacities)</u>

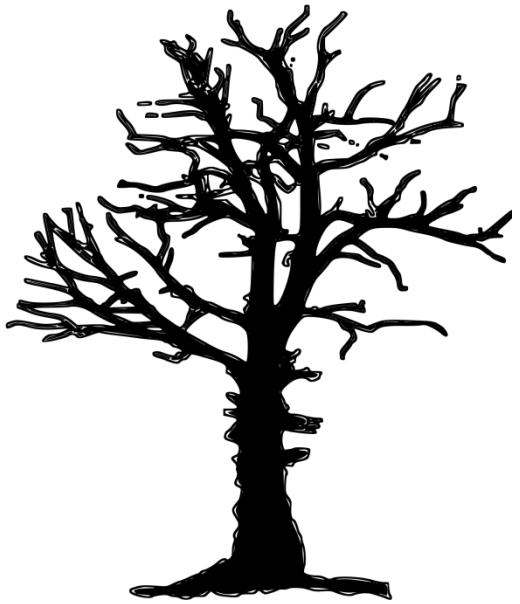
Level 6 When *reading cues*, able to share feelings with others in pretend play and by talking

Level 7 When *sharing feelings,* able to make-sense and to solve problems together

Step Two: Engagement with Others

Positive procedural memories?

Negative procedural memories?



Joy Lights up the Tree!

Step 3: Mapping Individual Differences in Brain Architecture

http://developingchild.harvard.edu/index.php/resources/multimedia/videos/three_core_concepts

Functional behaviors representing 4 brain systems

Lillas & Turnbull, © 2009

- Regulation
  - *when the body is calm inside*

  States of Arousal, sleep-awake cycle
- Sensory
  - take-in info from the *outside* world

  Reactions to all sources of sensory information (including vestibular, proprioception, pain, temperature)
- Relevance
  - these sensations get organized into an *inside* world

  Emotions, memories, & meanings
- Executive
  - read the context, adapt to the *outside* world

  Ability to *initiate* and *shift* as well as *inhibit* and *sustain* motor (includes attention) activity and behavior according to the context

What Are Your Triggers?

What Are Your Toolkits?

Facilitate Stress Recovery in Self and Others

Stress & Stress Recovery

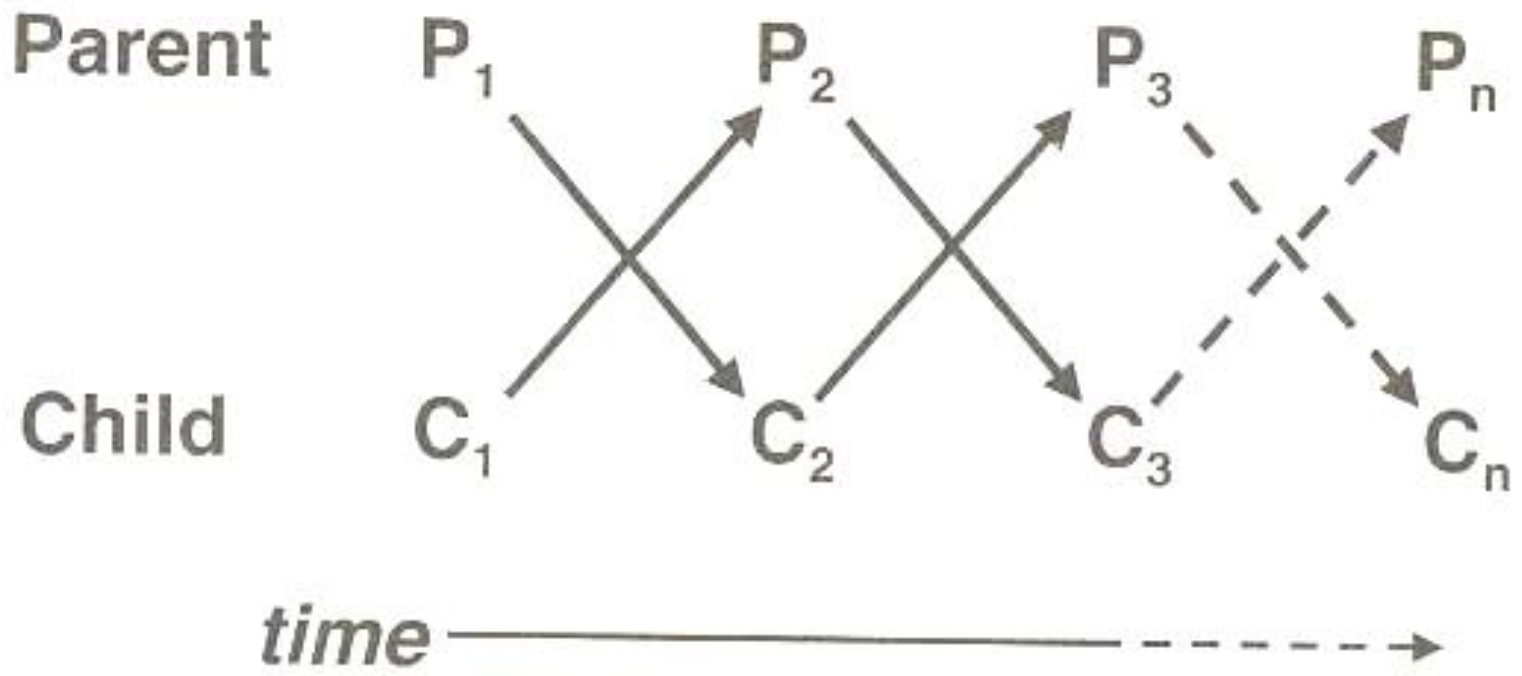
- 4 Trigger Points
  - Regulation
  - Sensory
  - Relevance
  - Executive
- 4 Prevention/Recovery Toolkits
  - Regulation
  - Sensory
  - Relevance
  - Executive

Facilitate Recovery in Self

Put Your Oxygen Mask on First, Then Help Others

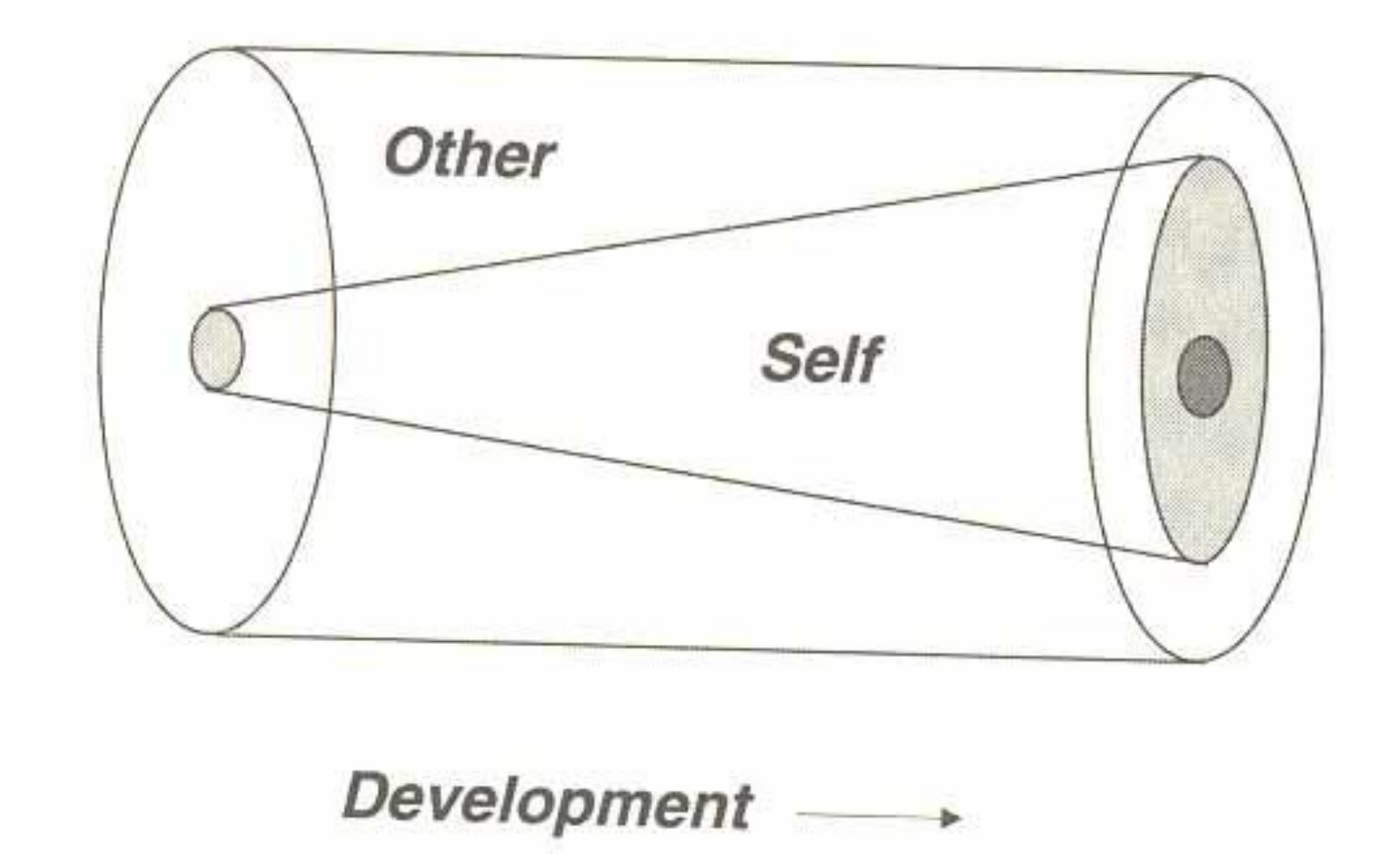
Self-Regulation & Co-Regulation (NRF)

- As staff and parents: First recognize your own stress responses, and get yourself calm
- Recognize the infant's states and figure out what they need, so you can …
- Help the infant get back to the **green zone** by organizing her feelings and settling her behaviours …



From: A. Sameroff, Treating Parent-Infant Relationship Problems, 2004

Co-regulation vs Self-regulation



Sameroff, 2004

Collaboration between NICU and Infant Mental Health Services – 3 Years later

INFANT MENTAL HEALTH IN THE NICU

- Treatment for dysfunction in the parent-infant relationship is rare in the NICU
- Mismatches in parent-infant interactions usually attributed to the infant's illness or prematurity
- Focus on the impact of the parent-infant interaction on the child's long-term outcome

Trauma & the Relationship

- The birth of a sick premature baby is a psychic trauma for parents
- → difficulties providing adequate or effective parenting
- Mourning may interfere with parental preoccupation
- Parents with unprocessed trauma and mourning are more likely to have children who are disorganized in their attachment

Infant Mental Health in the NICU

- “Whatever the origins of the difficulty, there is no doubt that actually getting to know a sick or premature baby is a difficult task for parents” (McFadyen 1994)

Infant Mental Health in the NICU

- Interaction influenced more by the severity of the infant's illness than by the status of the mother's psychological health
- Mothers of the smallest and most ill babies had the highest levels of depression and anxiety, however long term development of the infant is largely influenced by the nurturing environment

- There is consensus in the literature that having such a baby, whose life “hangs on a thread” makes for extremely difficult circumstances for the emerging relationship

- Who is attending to the baby's emotional needs while the medical team see to the baby's physical survival?" (Meltzer 1994)
- Society seems "blind" to the emotional pain of infants (Reid 1997)

- “The life of the little one has been saved, it is true but… there is little advance without the love of it’s mother”

Budin 1907- one of the inventors of the incubator

Primary roles for Dr. Lorrain

Reflective Peer Consultation

Developmental Care Parent Group

Consultation on the units

Brain Protection Team Rounds at the Stollery

Presentations at workshops and conferences

Bibliography

- Harvard Center for the Developing Child
- Infant/Child Mental Health, Early Intervention and Relationship-Based Therapies: A NEURORELATIONAL FRAMEWORK FOR INTERDISCIPLINARY PRACTICE – by Lillas and Turnbull
- Treating Parent-Infant Relationship Problems: Strategies for Intervention by Sameroff
- Work of Bruce Perry, Daniel Siegel and Daniel Stern

Questions and Comments

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