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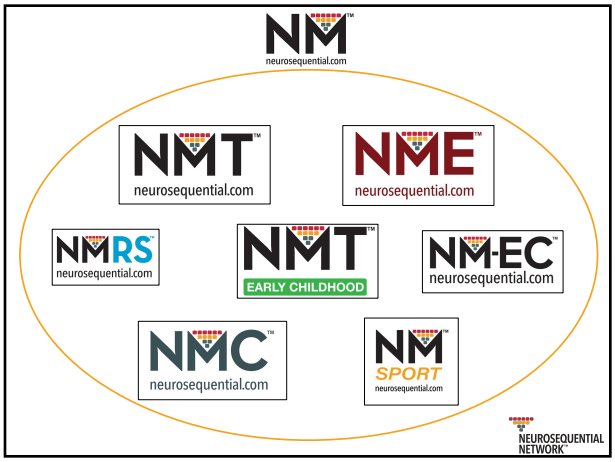

1

WHAT IS NMT?

The Neurosequential Model of Therapeutics is a neuroscience-informed, developmentally-sensitive, approach to the clinical problem solving process.

It is not a therapy – and does not specifically imply, endorse or require – any single therapeutic technique or method.

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The Neurosequential Model

The brain mediates our thoughts, feelings, actions and connections to others and the world.

Understanding core principles of neuroscience, including neuroplasticity and neurodevelopment, can help us better understand ourselves and others.

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Neurons	86,000,000,000	86 Billion
Glia	111,800,000,000	111 Billion
Synaptic boutons	430,000,000,000,000	420 TRILLION
Synaptic proteins	8,603,956,000,000,000,000	8.4 QUADRILLION
Polarizations/minute	2,581,186,800,000,000,000	2.5 QUADRILLION/minute

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The NMT is both an 'evidence-based' and an 'evidence-generating' practice.

The web-based, standardized assessment elements allow the collection of aggregate data to facilitate the ongoing monitoring of a range of individual and program outcomes.

The model is designed to allow iterative modifications to improve program and treatment plan elements.

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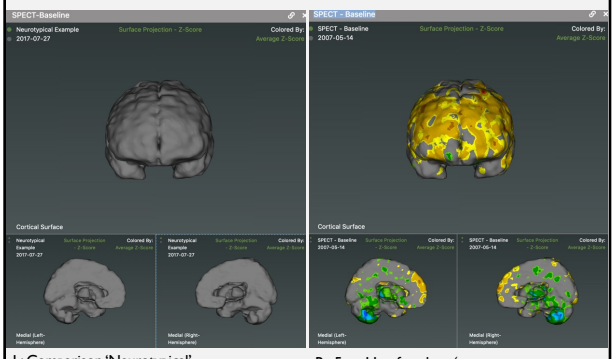
5 yo M with Hx of neglect and abuse in first year prior to adoption.
Profound and pervasive emotional, social and cognitive symptoms



L: Comparison 'Neurotypical' (*n > 10,000*)

R: 5 yo Hx of neglect (*color indicates 1-3 SD diff. from comparison*

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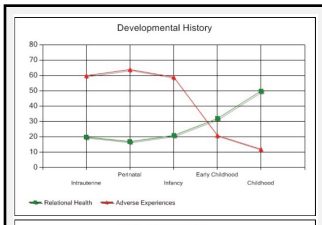

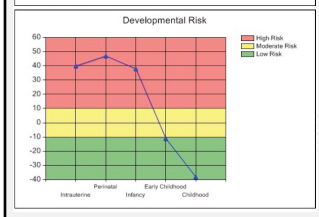

M.; 6 yo M

Hx intrauterine SA/EtOH; severe neglect and abuse; removed at 12 mos; multiple placements; adopted at age 2

DSM IV Dx at time of eval:

Oppositional-Defiant Disorder, ADHD, r/o Bipolar Disorder

SPECT scan (top) and NMT functional map of a six-year-old boy, M follow. He experienced severe neglect and abuse in the first two years of his life and then was adopted. He continues to have problems with impulse control, attention, sleep, age-appropriate social interactions and other functions.

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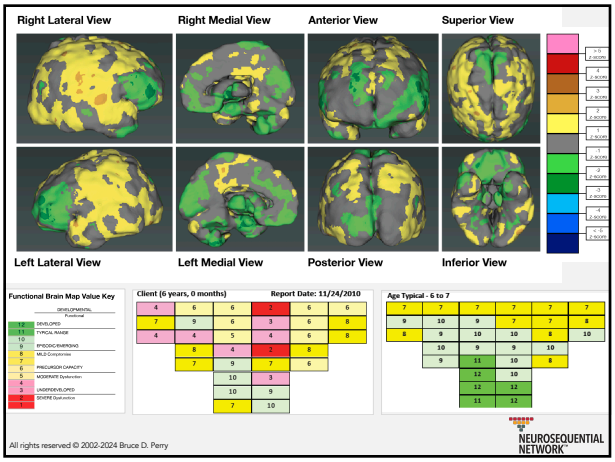

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Activity-dependence & Neuroplasticity

The more a neural network is "***activated***" the more that network changes to reflect that pattern of activation. This '***activity-dependence***' is a core mechanism underlying development, memory and learning.

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Equifinality & Multifinality

Equifinality is the understanding that many different pathways, or risk factors, may result in the same outcome. Multifinality is the understanding that a specific risk factor may result in a multitude of developmental outcomes (Cichetti & Rogosch, 1996).

As any good clinician knows, a specific symptom (e.g., inattention, irritability, anxiety) can be caused by many different mechanisms (equifinality) and that a specific experience (e.g., traumatic event) can cause a host of different clinical outcomes (multifinality).

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The Neuroarcheaology of Experience and the Neurosequential Model

- The age at which an experience (e.g., an adverse event) takes place will determine the neurodevelopmental impact and the resulting functional consequences
- Therefore, a developmental history of the timing of adverse experiences (*as well as positive, attenuating experiences)* is crucial to understanding current functioning
- The NMT includes a developmental review of adverse experiences *and* the buffering effects of relational health ('connectedness').

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"You never change things by fighting the existing reality. To change something, build a new model that makes the existing model obsolete."

- Buckminster Fuller

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CORE CONCEPTS IN THE NEUROSEQUENTIAL MODEL

The Power of Rhythm and Relationship

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A model uses familiar images to represent unfamiliar things.

This helps us visualize and better understand something that is complex or difficult to grasp. Models facilitate communication of ideas, processes, principles and concepts.

All models have two key features: *1) a simplified way of representing an idea or object & 2) a way to provide explanations that will allow testable predictions.* There are many 'types' of models – but ***remember*** -

Essentially, all models are wrong, but some are useful.

- George E. P. Box

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How Flexible is the Heuristic ?

A major challenge in translational medicine is to summarize, distill and simplify to allow effective communication without too much distortion or omission.

Many heuristics are ***over-simplified*** to the point where they cannot accurately capture or explain more advanced concepts. Others are filled with factoids, jargon and are ***overly-complex*** (and equally inaccurate).

Can a heuristic be simple enough to convey key concepts to a child yet have the flexibility to capture complexity for an advanced learner?

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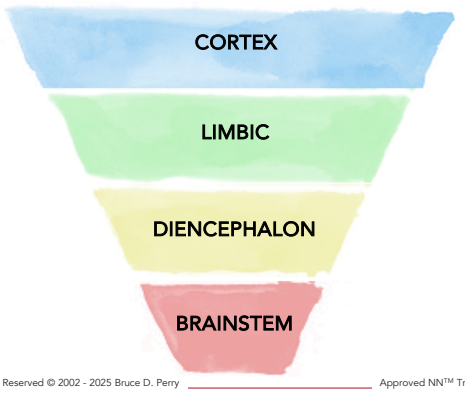
Central Nervous System (CNS) Heuristic



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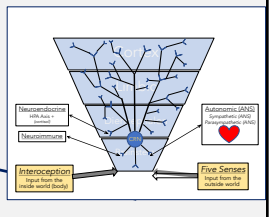
In Depth Study vs Practical Application



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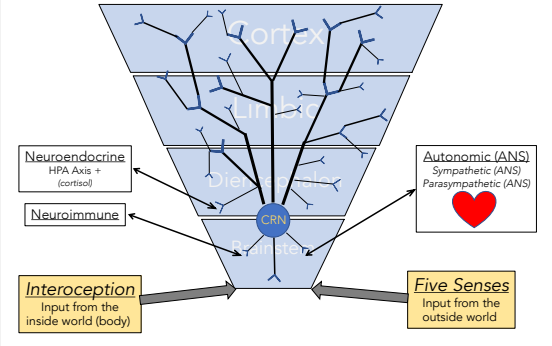
The Core Regulatory Network



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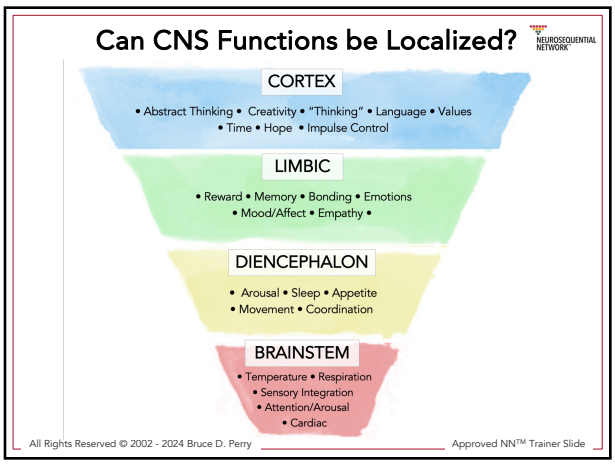

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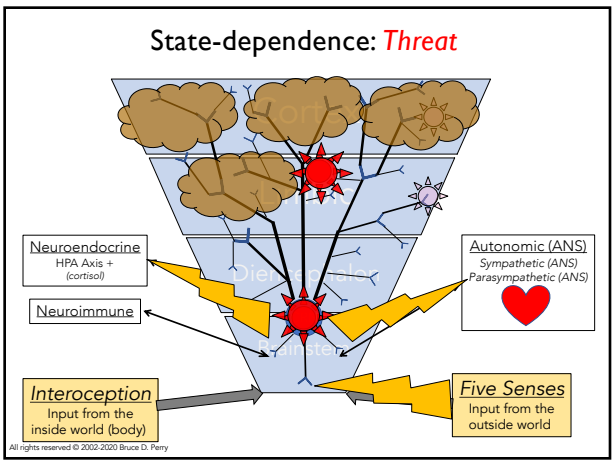

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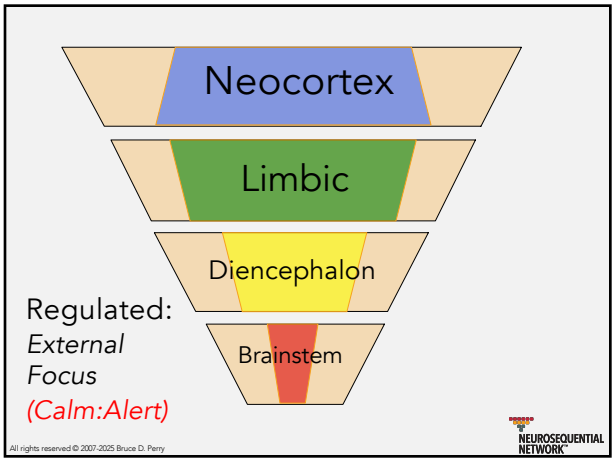

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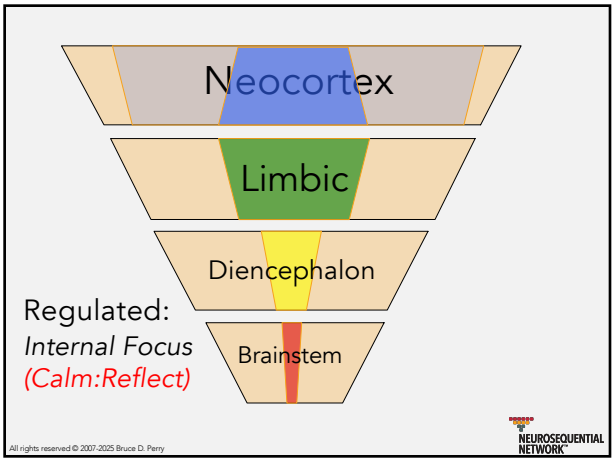

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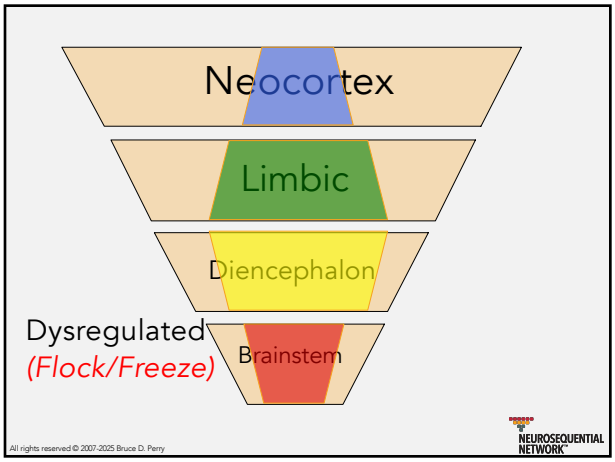

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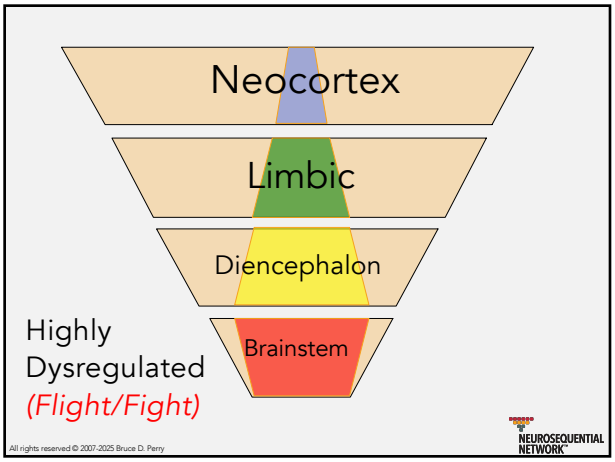

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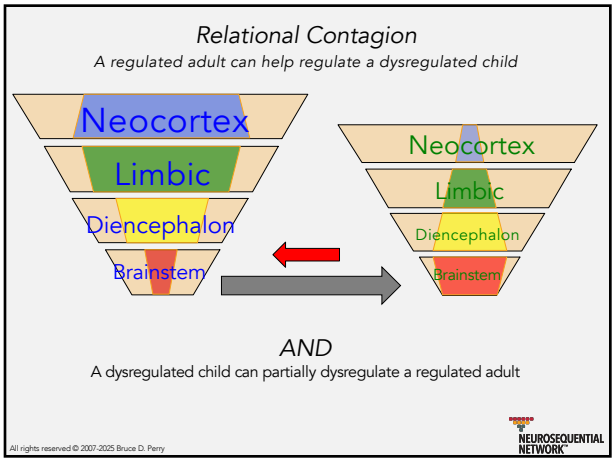

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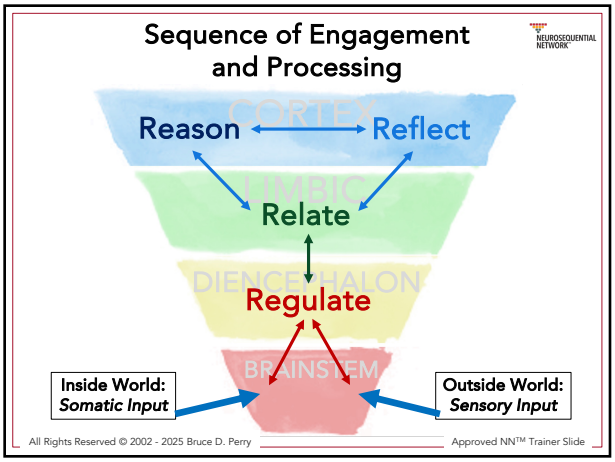

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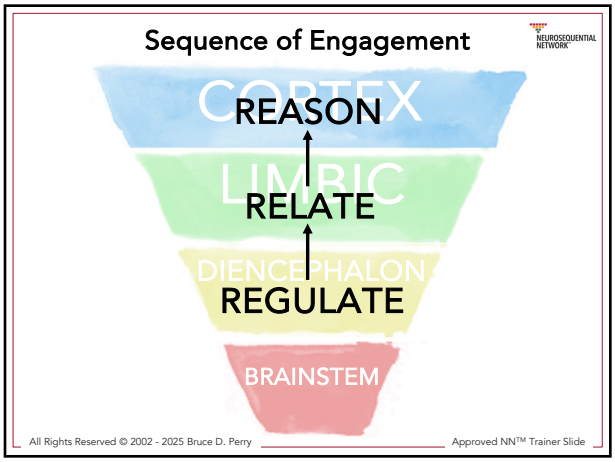

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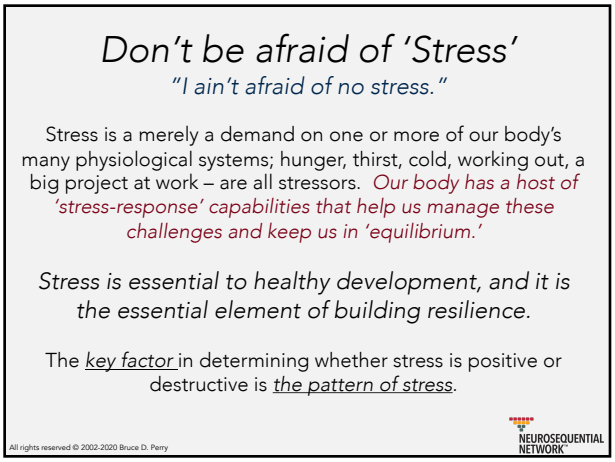

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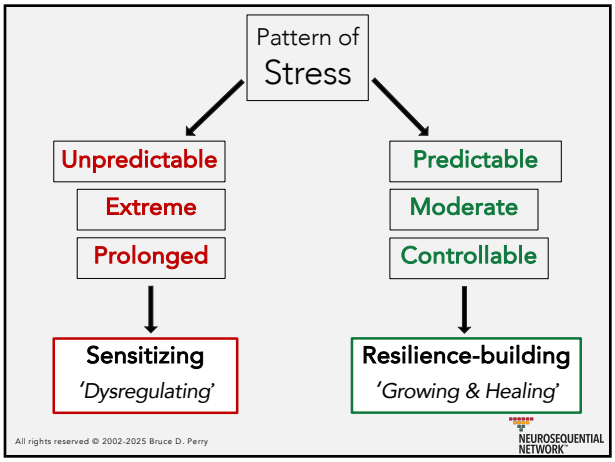

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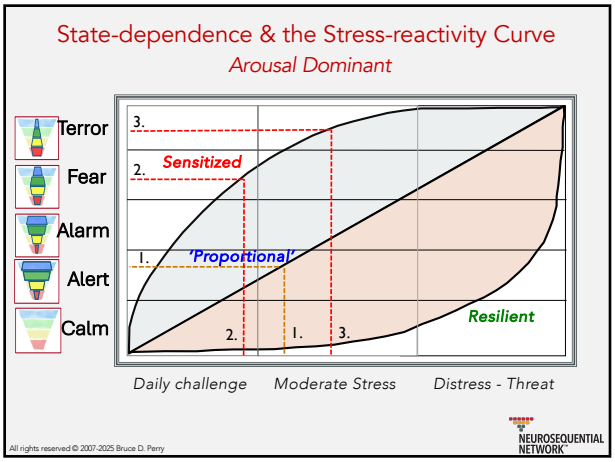

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State Dependent Cognition

State	Calm	Alert	Alarm	Fear	Terror
Cognition	Abstract	Concrete	Emotional	Reactive	Reflexive
Accessibility to Cortical Functions		Routine and Familiar Functions	Necessary and Immediately Contextual		Survival Fxns only
State Dependent Behaviors	Reflect and Create	Record and Retrieve	Performance-based (default) Rehearsed and Performed	Defensive and Protective Behaviors	Primitive, ingrained Survival Behaviors

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State Dependent Cognition & Behavior

State	Calm	Alert	Alarm	Fear	Terror
State Dependent Behaviors	Reflection & Creation	Recording & Retrieving Information	Performance-based (default) Rehearsed & Performed	Defensive & Protective Behaviors	Primitive, Ingrained Survival Behaviors
Ability to Access Cortical Functions	Access to cortical functions is excellent	Routine & familiar functions are most accessible	Necessary & immediate functions are most accessible	Reactive functions are most accessible	Only survival functions are accessible
(E.g. The top, most cognitive parts of the brain)	MOST ACCESS ←				LITTLE TO NO ACCESS
Cognition	Abstract	Concrete	Emotional	Reactive	Reflexive

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Factors involved in Risk and Resilience

Pattern of STRESS

Chaotic Severe, prolonged Uncontrollable

Predictable Moderate Controllable

'Adversity'
Poverty
Homelessness
Unemployment
Racism
Cultural marginalization
Community fragmentation
Community violence
Domestic violence
Maltreatment
Children in care

Vulnerability — Resilience

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Factors involved in Risk and Resilience

Pattern of STRESS

Chaotic Severe, prolonged Uncontrollable

Predictable Moderate Controllable

'Connectedness'
Meaningful work
Secure income
Secure housing
Cultural connections
Mainstream culture & ethnicity
Safe & stable family
Safe & stable community

Vulnerability — Resilience

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Factors involved in Risk and Resilience

Pattern of STRESS

Chaotic Severe, prolonged Uncontrollable

Predictable Moderate Controllable

Developmental Opportunity & the Privilege of Resilience

'Connectedness'
Meaningful work
Secure income
Secure housing
Cultural connections
Mainstream culture & ethnicity
Safe & stable family
Safe & stable community

Vulnerability — Resilience

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Disruptors of *CRN* Development & Functioning

Causing a 'cascade' of vulnerability for global (pervasive) health problems

1. Intrauterine insults
   1. EtOH, methamphetamine, malnutrition, maternal distress
2. Bonding & attachment disruptions
   1. Domestic violence
   2. Maternal isolation, Post-partum depression
   3. Maternal history of attachment/bonding issues
3. Sensitizing pattern of stress response activation
   1. Chaos, unpredictability, 'splinter' neglect
   2. "Out-group" experience – e.g., racism, gender, identity
   3. Exposure to violence, physical, sexual abuse
   4. Emotional humiliation, shaming,

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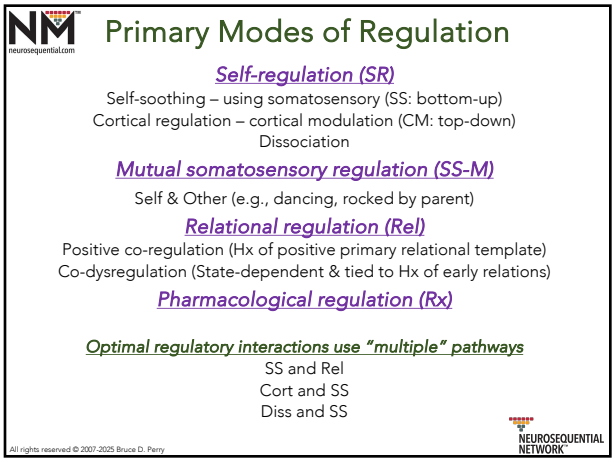

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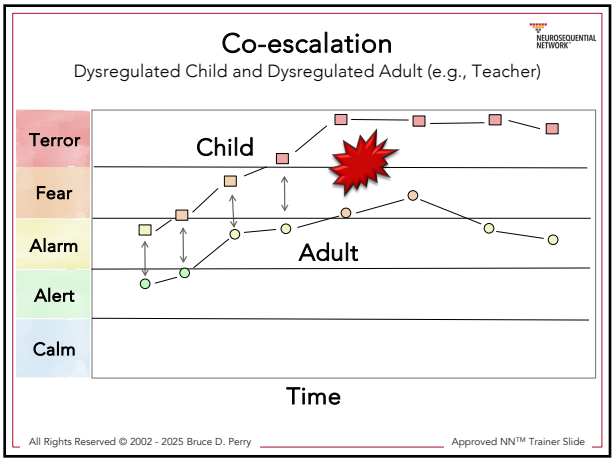

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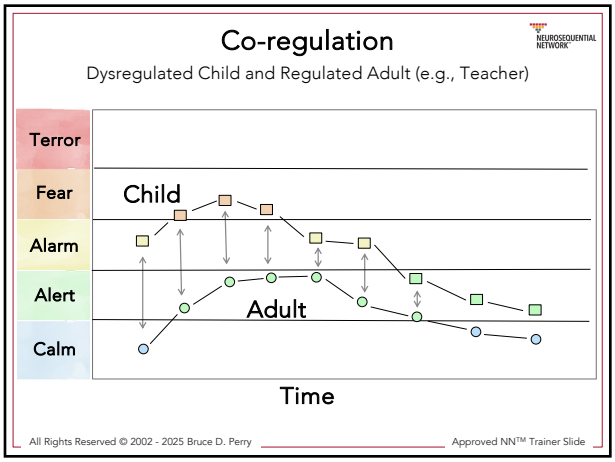

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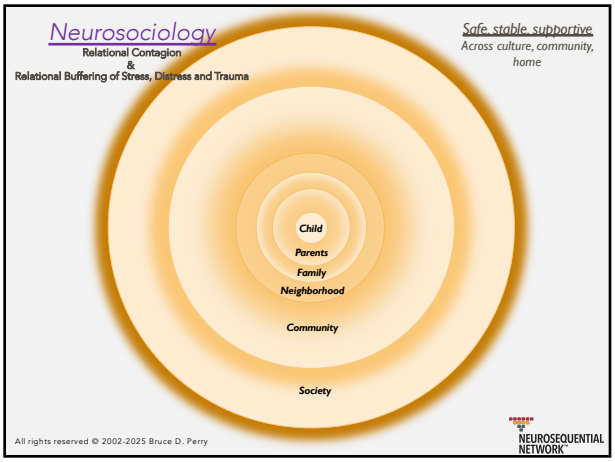

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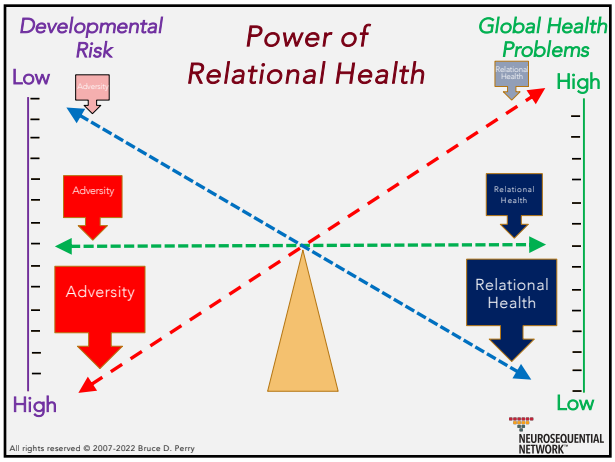

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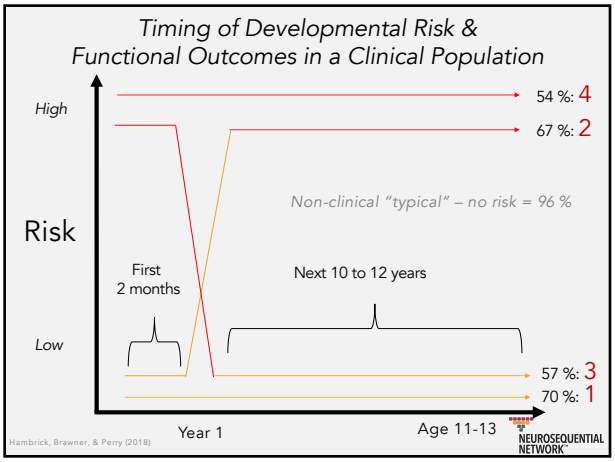

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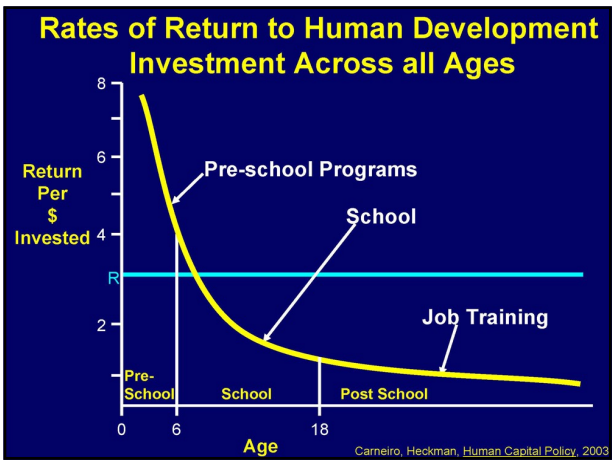

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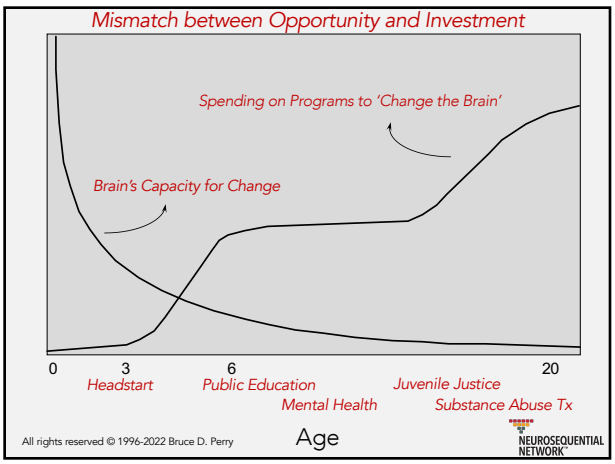

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THE NEUROSEQUENTIAL MODEL

Humans are complex – individually, in families, communities, cultures and across generations.

Overly simple constructs – including the Neurosequential Model – do not capture the depth and breadth of the human experience.

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The Neurosequential Model

Each person has a unique pathway to the present and deserves individualized care.

"One-size fits all" approaches rarely meet the needs of the individual – more often they meet a need of the provider (or system).

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Semi-structured, quantitative assessment process:
NMT Clinical Practice Tools (Metrics)

- Developmental History
  - Genetic
  - Epigenetic
  - Adverse Experiences
    - Developmental Timing
      - Nature, Severity, Pattern
  - Relational Health
    - Developmental Timing
      - Bonding and attachment
      - Family supports
      - Community supports
- Current Functioning
  - Individual CNS
    - Brainstem
    - Diencephalon/CBL
    - Limbic
    - Cortex/F TCTX
  - Relational
    - Family
    - Peers
    - School
    - Community

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NMT CLINICAL PRACTICE TOOLS

1. Demographics
2. History – Developmental
   - a. Genetic
   - b. Epigenetic
   - c. Part A. Adverse Events measure
   - d. Part B. Relational Health measure
3. Current Status
   - a. Part C. Central Nervous System (CNS) Functional Status Measure
     - i. Brainstem
     - ii. Diencephalon/CBL
     - iii. Limbic
     - iv. Cortex/Frontal Cortex
   - b. Part D. Relational Health measure
4. Recommendations
   - a. Therapeutic Web
   - b. Family
   - c. Client
     - i. Sensory Integration
     - ii. Self Regulation
     - iii. Relational
     - iv. Cognitive
5. Caregiving Challenge Estimator
   - a. Caregiving resources
     - i. Internal resources/demands
     - ii. External resources/demands
   - b. Caregiving demand
     - i. Children (number)
     - ii. Children (challenge)
   - c. Caregiving reserve

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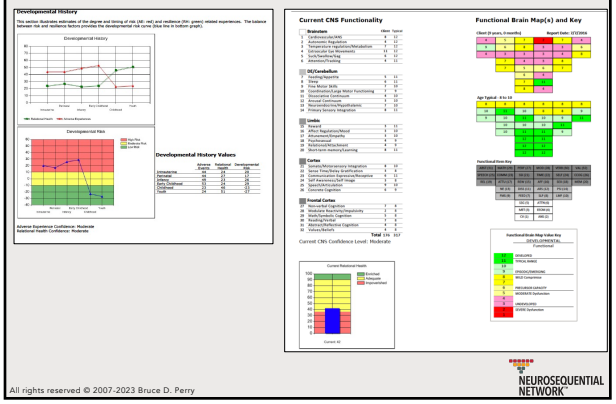
NMT METRIC REPORTS



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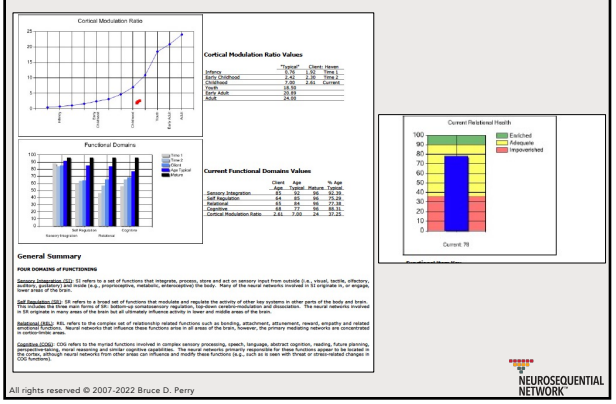

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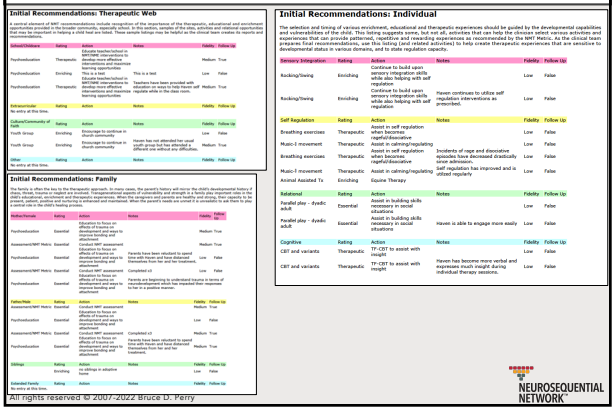
NMT-GUIDED TREATMENT PLANNING



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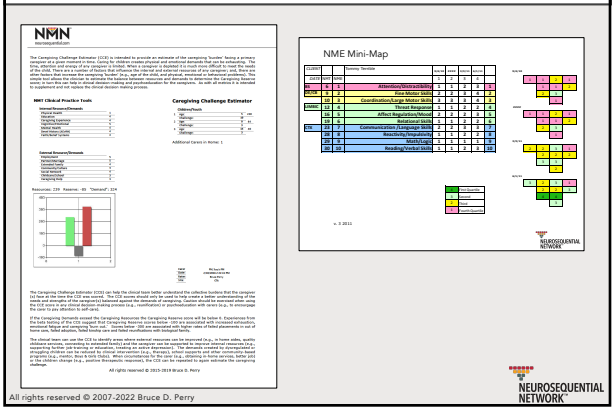
ADDITIONAL NM WEB-BASED TOOLS



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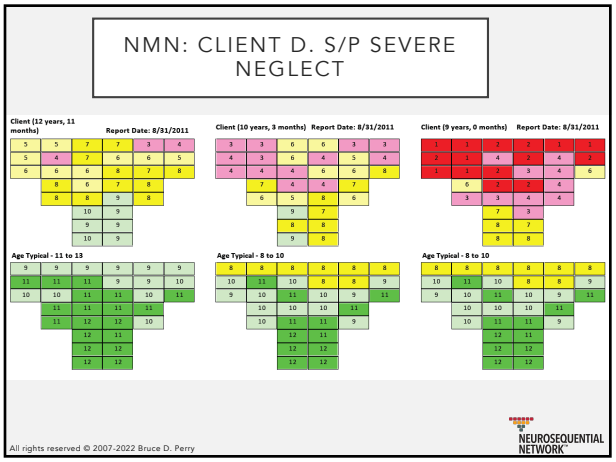
NMN: CLIENT D. S/P SEVERE NEGLECT



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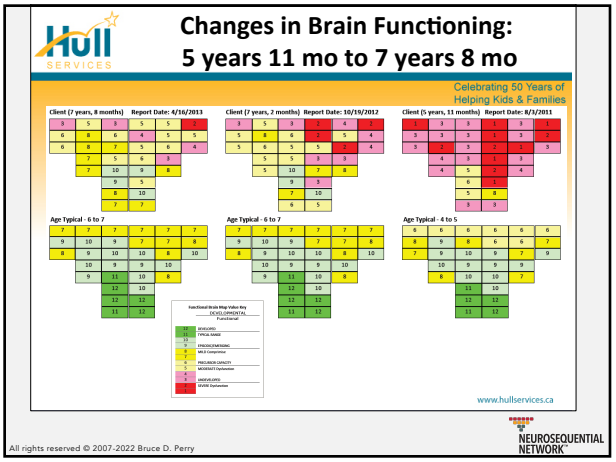

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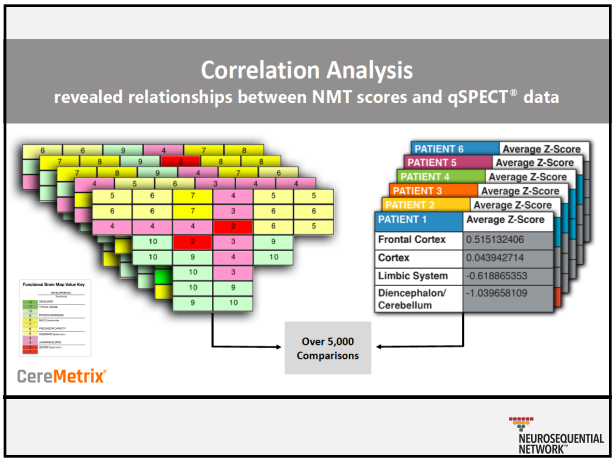

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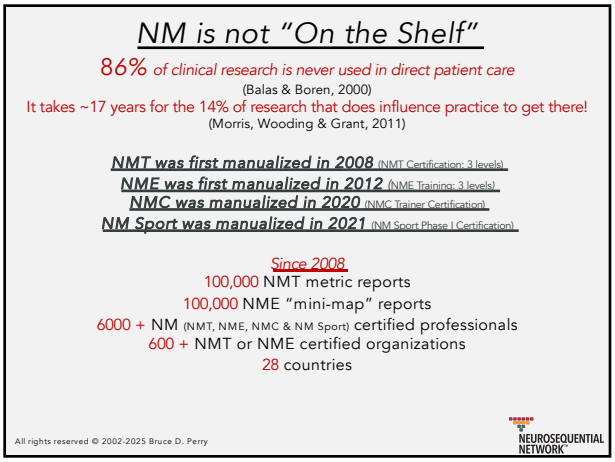

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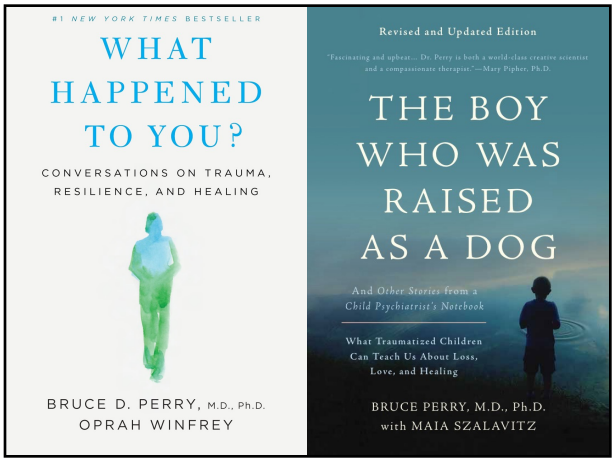

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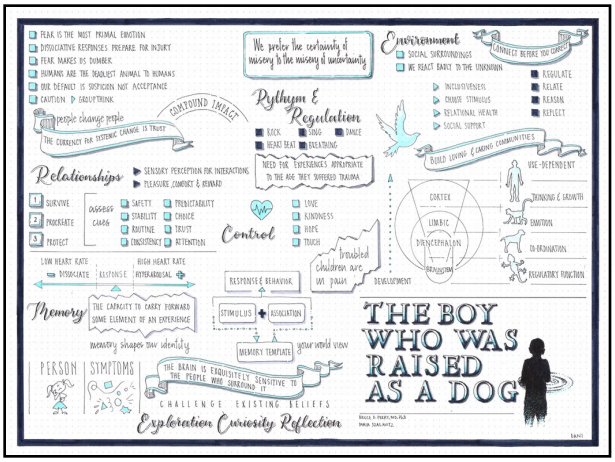

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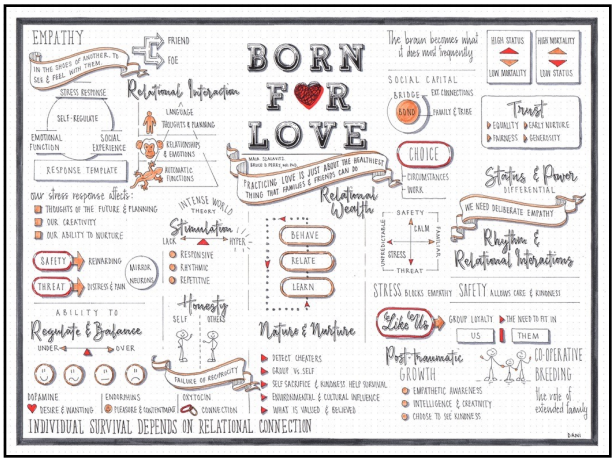

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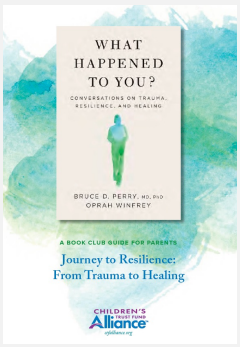

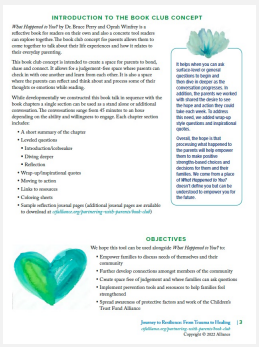

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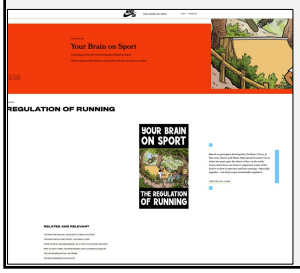
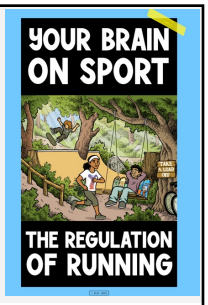
Landing page for Your Brain on Sport:
https://ybos.nikesb.com/

Our Skaters-meet-Runners Story:
https://ybos.nikesb.com/ybos-running

Why So Sad? Nike Project:
https://www.nikesb.com/whysosad

Why So Sad? Video Comic on YouTube:
https://youtu.be/U1FaU9fBj9c





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