childtrauma.org

Neurosequential Model of Therapeutics ©

Clinical Practice Tools

Psychoeducational Materials

v 2.0

Neurosequential Model of Therapeutics ©

Psychoeducational Materials

Introduction

This collection of psychoeducational materials is intended to provide useful handouts and support content for communicating some of the most common concepts used in the NMT.

There are several single page handouts that can be printed out and given to parents, foster parents, caregivers, educators, CASA workers, and other adults involved in the life of the child or youth. We provide these to supplement the feedback and communication process in clinical work. These may even be helpful to give to clients.

Three multi-page handouts are also included. Each has a slightly different focus; one is a general handout about trauma; one is to help the senior clinician leading NMT staffings and the last is a policy-oriented handout that may be useful in communicating with policy makers and other non-clinical stakeholders.

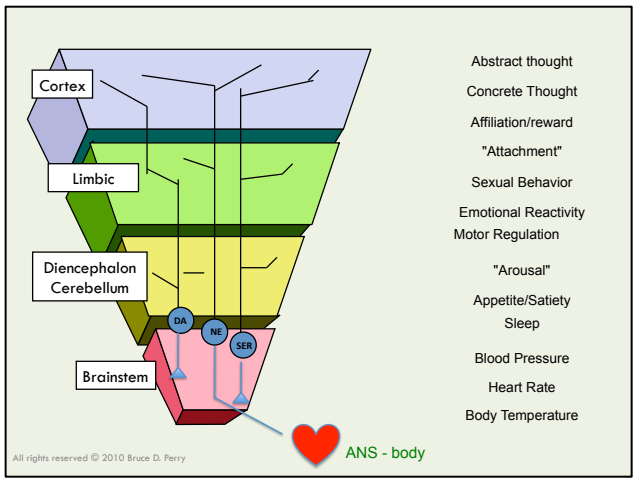
We hope that these materials will prove useful in your work and we certainly would appreciate any feedback about improving and adding to this set. We have many other handouts and supplemental materials in the works and this current Psychoeducational Packet will grow as we continue to create materials to support the NMT, NME and NMC.

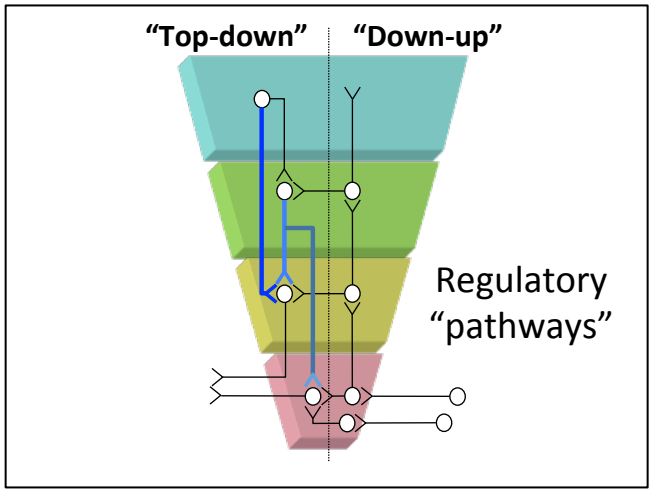
The ChildTrauma Academy Staff
September 26, 2011

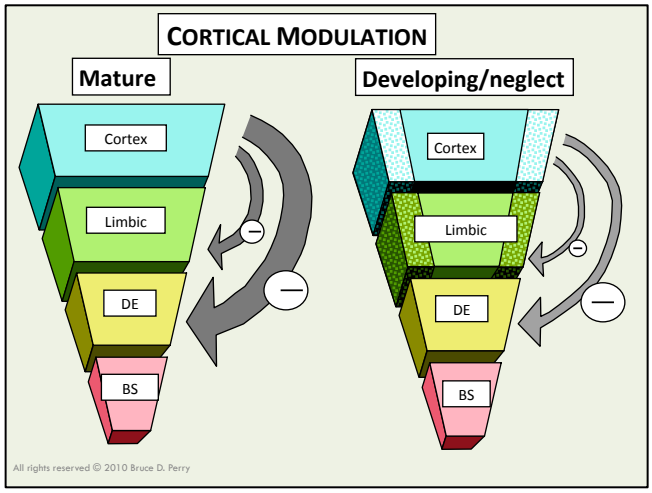
TABLE of CONTENTS

CTA Clinical Practice Tools: Education

Brain Organization: Key Neural Networks







Notes:

CTA Clinical Practice Tools

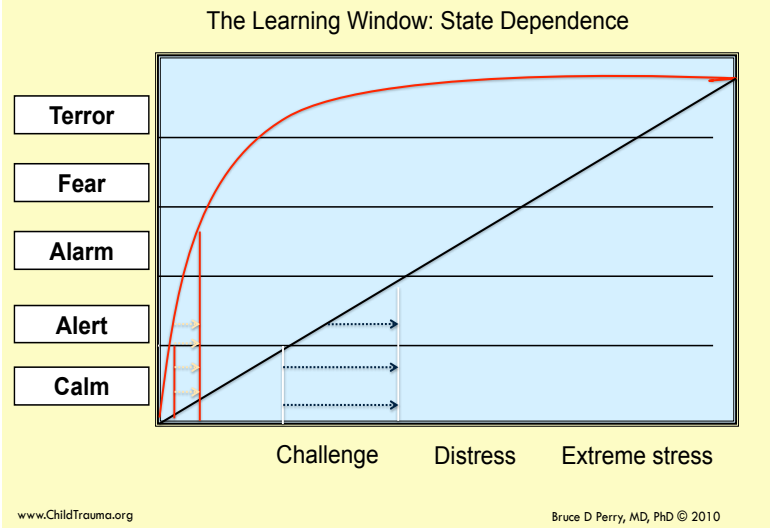
State-dependent Functioning

Hyperarousal Continuum	Rest *(M > F Child)*	Vigilance	Resistance	Defiance	Aggression
Dissociative Continuum	Rest *(F > M Child)*	Avoidance	Compliance	Dissociation	Fainting
Primary *secondary* Brain Areas	**NEOCORTEX** *Subcortex*	**SUBCORTEX** *Limbic*	**LIMBIC** *Midbrain*	**MIDBRAIN** *Brainstem*	**BRAINSTEM** *Autonomic*
Cognition	Abstract	Concrete	Emotional	Reactive	Reflexive
Mental State	CALM	ALERT	ALARM	FEAR	TERROR

www.ChildTrauma.org Bruce D Perry, MD, PhD © 2010

Adaptive Response	**REST**	**VIGILANCE**	**FREEZE**	**FLIGHT**	**FIGHT**
Predictable De-escalating Behaviors *(behaviors of the teacher or caregiver when a child is in various states of arousal)*	Presence Quiet Rocking	Quiet voice Eye contact Confidence Clear simple directives	Slow sure physical touch "Invited" touch Quiet melodic words Singing, humming music	Presence Quiet Confidence Disengage	Appropriate physical restraint Withdraw from class TIME!
Predictable Escalating Behaviors *(behaviors of the teacher or caregiver when a child is in various states of arousal)*	Talking Poking Noise Television	Frustration, anxiety Communicate from distance without eye contact Complex, compound directives Ultimatums	Raised voice Raised hand Shaking finger Tone of voice, yelling, threats Chaos in class	Increased or continued frustration More yelling Chaos Sense of fear	Inappropriate physical restraint Grabbing Shaking Screaming
Regulating Brain Region	**NEOCORTEX** Cortex	**CORTEX** Limbic	**LIMBIC** Midbrain	**MIDBRAIN** Brainstem	**BRAINSTEM** Autonomic
Cognition	**ABSTRACT**	**CONCRETE**	**EMOTIONAL**	**REACTIVE**	**REFLEXIVE**
STATE	**CALM**	**ALERT**	**ALARM**	**FEAR**	**TERROR**

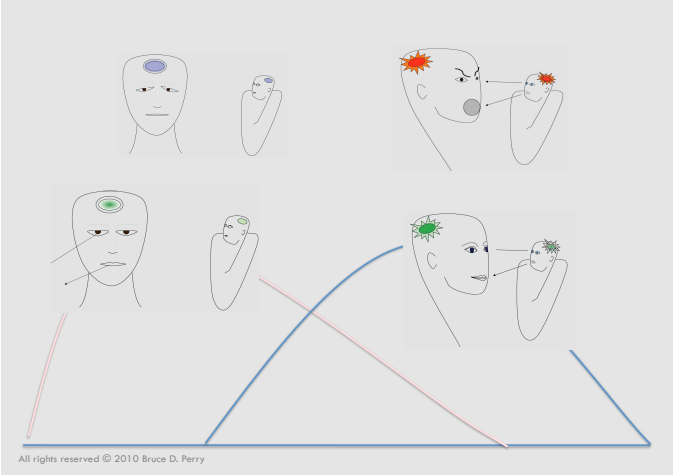
www.ChildTrauma.org Bruce D Perry, MD, PhD © 2010

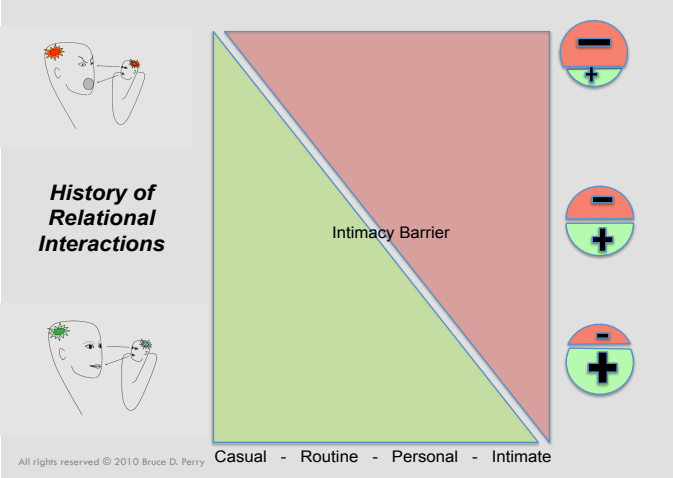


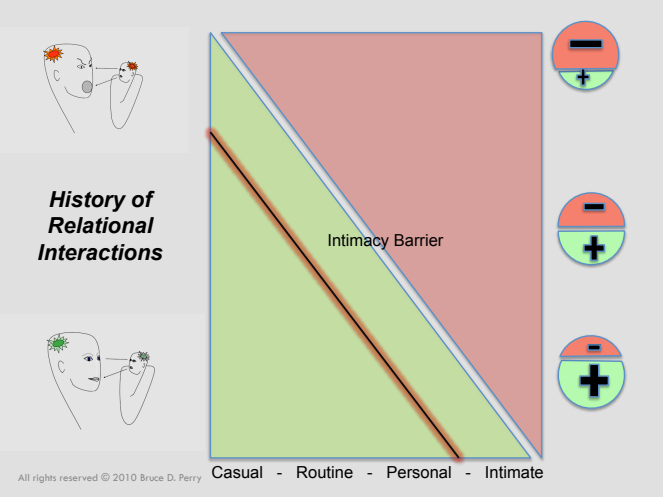
Notes:

CTA Clinical Practice Tools

The Intimacy Barrier

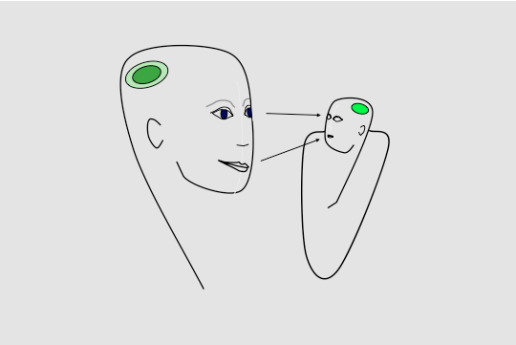


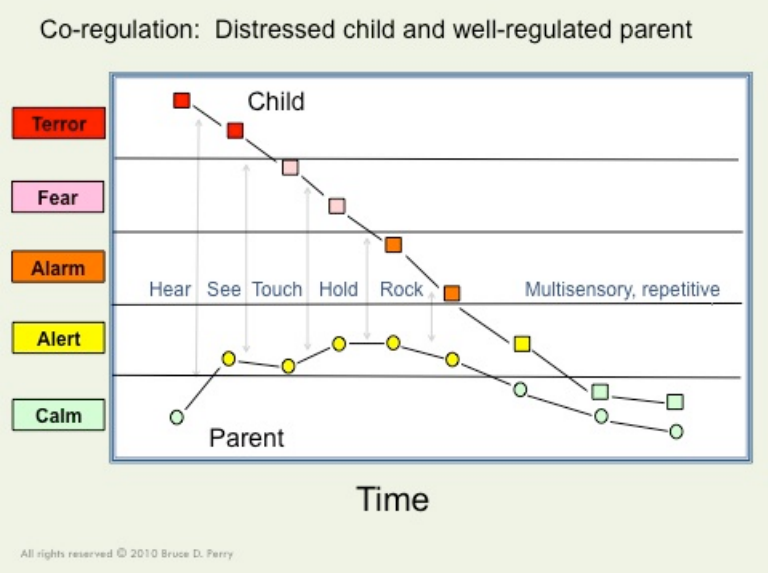


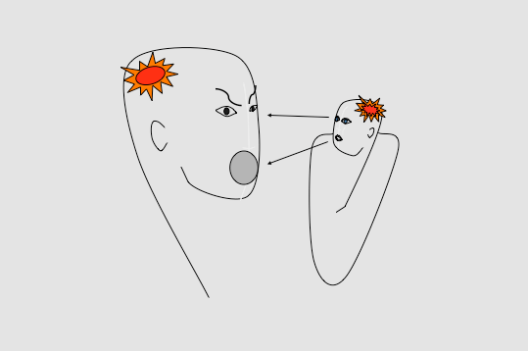


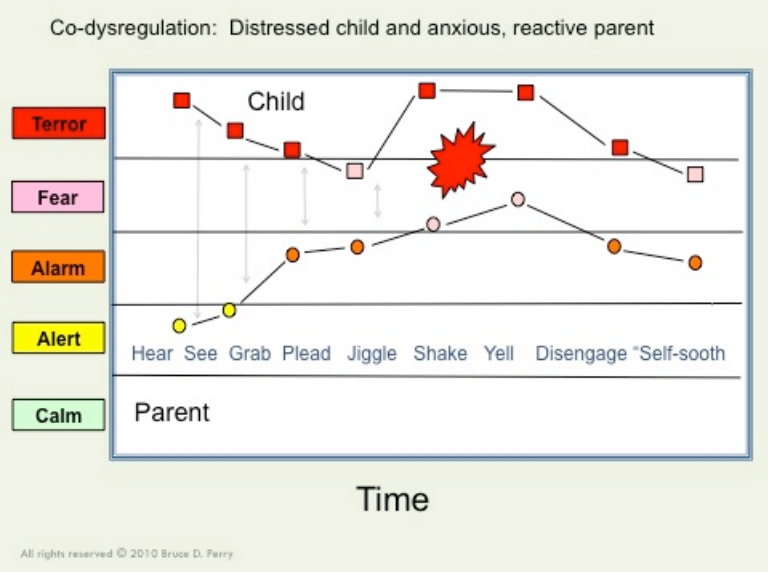
Notes:

CTA Clinical Practice Tools
Co-Regulation and Co-Dysregulation

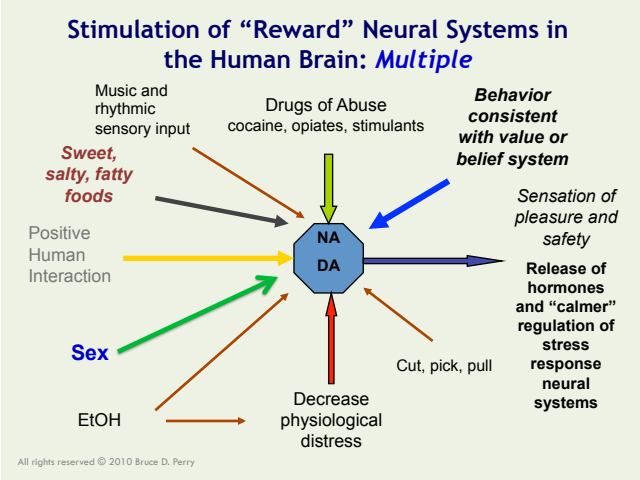


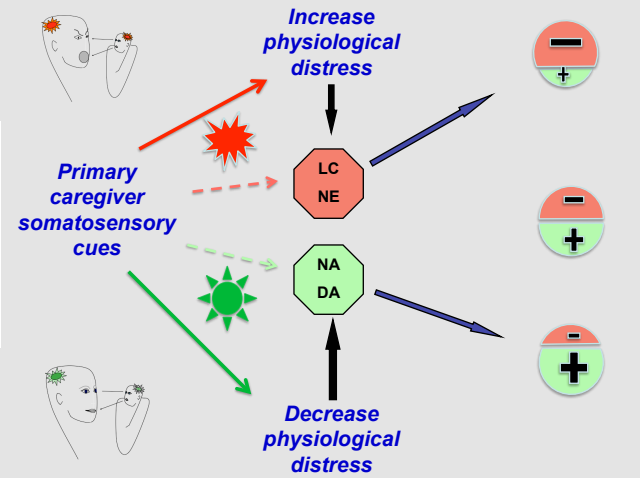


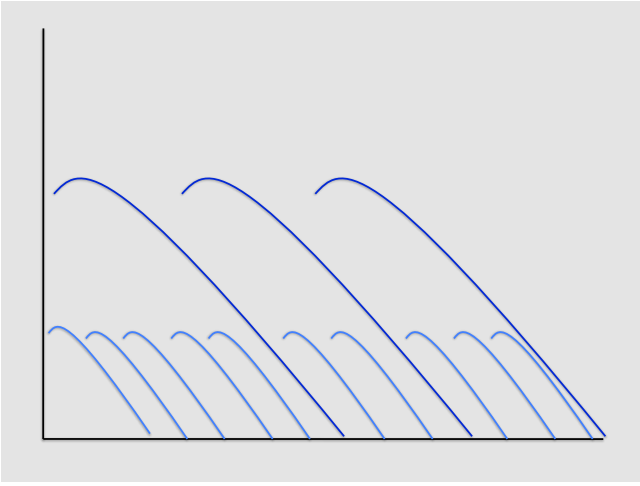




CTA Clinical Practice Tools
Reward

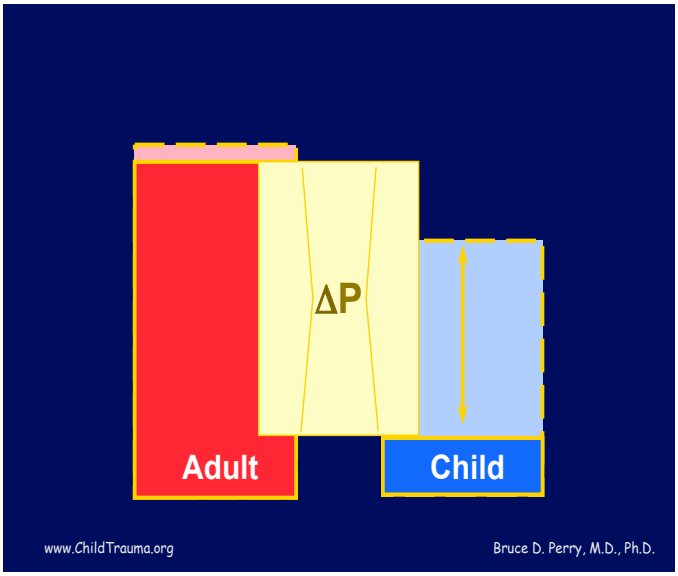






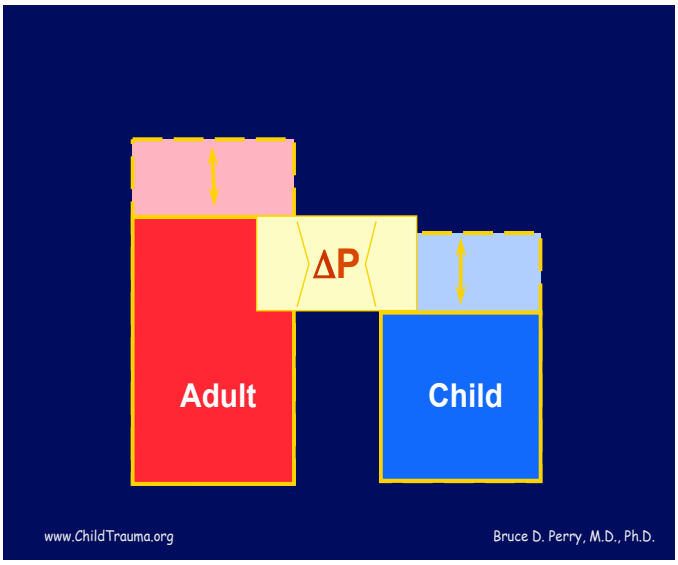
Notes:

CTA Clinical Practice Tools:
The Power Differential and Learning



Hyperarousal Continuum	Rest *(Male Child)*	Vigilance	Resistance	Defiance	Aggression
Dissociative Continuum	Rest *(Female Child)*	Avoidance	Compliance	Dissociation	Fainting
Primary *secondary* Brain Areas	**NEOCORTEX** *Subcortex*	**SUBCORTEX** *Limbic*	**LIMBIC** *Midbrain*	**MIDBRAIN** *Brainstem*	**BRAINSTEM** *Autonomic*
Cognition	Abstract	Concrete	Emotional	Reactive	Reflexive
Mental State	CALM	ALERT	ALARM	FEAR	TERROR

www.ChildTrauma.org Bruce D Perry, MD, PhD © 2010



Hyperarousal Continuum	Rest *(Male Child)*	Vigilance	Resistance	Defiance	Aggression
Dissociative Continuum	Rest *(Female Child)*	Avoidance	Compliance	Dissociation	Fainting
Primary *secondary* Brain Areas	**NEOCORTEX** *Subcortex*	**SUBCORTEX** *Limbic*	**LIMBIC** *Midbrain*	**MIDBRAIN** *Brainstem*	**BRAINSTEM** *Autonomic*
Cognition	Abstract	Concrete	Emotional	Reactive	Reflexive
Mental State	CALM	ALERT	ALARM	FEAR	TERROR

www.ChildTrauma.org Bruce D Perry, MD, PhD © 2010

Brain development

Key points

1. **The brain develops in a predictable fashion** – from the most primitive to the most complex.

2. **Normal development of the neuronal systems and the functions they mediate requires specific patterns of activity—**specific signals—at specific times during development.

3. **These sensitive periods are windows of vulnerability** during which the organizing systems are most sensitive to environmental input—including traumatic experience.

4. **There are different sensitive periods for different functions** (e.g., regulation of anxiety, mood, abstract thought) because the different systems in the brain develop (or mature) at different times in the life of a child.

5. **Optimal development of more complex systems (cortex) requires healthy development of less complex systems (brainstem and midbrain)** because these brain systems develop in a sequential fashion, from brainstem to cortex.

6. **Therefore, if the brainstem and midbrain** (state—regulating parts of the brain) **develop in less than optimal fashion** (e.g. following excessive traumatic experience) **this will impact development of all other regions of the brain.**

7. **The brain remains sensitive (plastic) to experience throughout life—**but different parts of the brain are more plastic (cortex) and others are relatively less plastic (brainstem).

"Experience can change **the mature brain—but experience during the critical periods of early childhood** organizes **brain systems!"**

Brain organization and function

Key points

1. **The brain is multi systemic**—Systems are interacting, interconnected and organized in a specific hierarchy—the most complex (cortex) is on the top and least complex (brainstem) is on the bottom.

2. **Different parts of the systems of the brain mediate different functions**. The cortex mediates thinking. The brainstem/midbrain mediates state of arousal.

3. **All systems in the brain are comprised of networks of nerve cells called neurons.** These neurons are continuously changing in chemical and structural ways, in response to signals form other parts of the brain, the body or the environment.

4. **The changes in neurons allow for the storage of 'information.'** This is the basis for memory of all types—motor, sensory, cognitive and affective.

5. **Different parts of the brain, which mediate different functions, store information that is specific to the function of that part.** This allows for different types of memory (cognitive—such as names, phone numbers, motor—such as typing or bike riding, or affective – such as nostalgia).

6. **The brain stores information in a use dependent fashion.** The more a neurobiological system is 'activated' the more that state (and functions associated with that state) will be built in. For example—memorizing a poem, practicing a piano, or staying in a state of fear.

7. **In different states of arousal (e.g. calm, fear, sleep) different neural systems are activated.** Because the brain stores information in a use-dependent fashion, the information stored (memories) in any given situation depends upon the state of arousal—which neural systems are activated. Learning is one example of 'state dependent 'learning. Another is the hyperarousal symptoms seen in post traumatic stress disorder.

The Response to Threat

KEY POINTS ADAPTIVE RESPONSES TO TRAUMATIC THREAT

1. The brain reconcile threat with a set of neuro-biological, neuro-endocrine and neuro-psychological) **predictable responses**

2. **The brain employs different survival strategies** ranging from fighting or fleeing to giving up or a surrender reaction.

3. **Responses to stress involve multiple sets of neurobiological and mental.** These vary with the nature, intensity and frequency of the event. Different individuals may have differing response sets to the same trauma.

4. **The primary adaptive response patterns in the face of extreme threat are:**

- **The hyper-arousal continuum** (defense—flight or flight)
- **The dissociation continuum** (freeze and surrender response).

Each of these response sets activates a unique combination of neural systems.

5. **These response patterns are somewhat different in infants, children and adults, though they share many similarities.** Adult males are more likely to use hyper-arousal (fight or flight) response. Young children are more likely to use a dissociative pattern (freeze and surrender) response.

6. **As with all experience—when the brain activates the neuro-physiological systems associated with alarm or with dissociation, there will be use-dependent neuro-biological changes (or in young children, use dependent organization) which reflects this activation.**

7. **It is these use-dependent changes in the brain development and organization which underlie the observed emotional, behavioral, cognitive, social and physiological alterations following childhood trauma.**

8. In general, **the predominant adaptive style of an individual in the acute traumatic situation will determine which post-traumatic symptoms will develop**—hyper-arousal or dissociative.

THE ADAPTIVE RESPONSE TO TRAUMA

DISSOCIATION - DEFINITIONS

The most well characterized response to threat is the fight or flight response. However, it is increasingly clear that individual responses to threat can vary tremendously. Another of the major adaptations to threat involves a different set of physiological and mental changes. Sometimes, when fighting or fleeing is not possible, the child will use avoidant and psychological fleeing mechanisms that are dissociative.

- Dissociation is basically a mental mechanism by which one withdraws attention from the outside world and focuses on the inner world.
- Dissociation may involve a distorted sense of time, a detached feeling that you are "observing" something happen to you as if it is unreal, and the sense that you may be watching a movie of your life.
- In extreme cases, children may withdraw into an elaborate fantasy world where they may assume special powers or strengths.
- Like the alarm response, this "defeat" or dissociative response is graded. The intensity of the dissociation varies with the intensity and duration of the traumatic event.
- Even when we are not threatened, we use dissociative mental mechanisms all of the time. Daydreaming is an example of a dissociative event. The period between wakefulness and sleep is another example of dissociating from the present to your inner thoughts, ideas, fears, fantasies and, then, ultimately moving into the state of sleep.
- All children and most adults use some degree of dissociation during a traumatic event. Some individuals will use, and some kinds of trauma induce, dissociation as a primary adaptive response.

For most children and adults, however, the adaptive response to an acute trauma involves a mixture of hyperarousal and dissociation. During the actual trauma, a child will feel threatened and the arousal systems will activate. With increased threat, the child moves along the arousal continuum. At some point along this continuum, the dissociative response is activated. This results in the host of protective mental (e.g., decreases in the perception of anxiety and pain) and physiological responses (decreased heart rate) that characterize the dissociative response.

Avoidance, Emotional Numbing and Dissociation

Traumatized children, when faced with reminders of the original traumatic event, may experience so much pain and anxiety that they become overwhelmed. In these situations - when they cannot physically withdraw from those reminders - they may dissociate.

- Following a traumatic experience, children may act stunned or numb.
- Dissociating children often appear to be gazing off into nowhere.
- They will not readily respond to questions by adults.
- Their answers to questions will seem unclear, unfocused or evasive.

This is understandable if we remember that while these children are present in body, their minds may be 'off in another place' – dissociated, trying to avoid the painful reminders of the original trauma.

Avoiding direct reminders of the trauma sometimes is extremely difficult. In that case, children will withdraw in to themselves in a variety of ways. This inward focused withdrawal basically means that they will have fewer opportunities to be provoked into having more intrusive thoughts about the event, and therefore, they can thereby avoid pain.

In the first days and weeks following the traumatic event, the symptoms listed above, 1) re-experiencing phenomena, 2) attempts to avoid reminders of the original event and 3) physiological hyper-reactivity are all relatively predictable, and indeed, highly adaptive physiological and mental responses to a trauma.

Unfortunately, the more prolonged the trauma and the more pronounced the symptoms during the immediate post-traumatic period, the more likely there will be long term chronic and potentially permanent changes in the emotional, behavioral, cognitive and physiological functioning of the child. It is this abnormal persistence of the originally adaptive responses that result in trauma-related neuropsychiatric disorders such as Post-traumatic Stress Disorder (PTSD).

In brief however, children who survive a traumatic event and have persistence of this low level fear state, may be:

- behaviorally impulsive
- hypervigilant
- hyperactive
- withdrawn or depressed
- have sleep difficulties (including insomnia, restless sleep and nightmares) and anxiety.

In general, these children may show some loss of previous functioning or a slow rate of acquiring new developmental tasks. Children may act in a regressed fashion. In addition, many of these children have persisting physiological hyper-reactivity with resulting fast heart rate or borderline high blood pressure.

SIX DIAGNOSTIC CRITERIA FOR PTSD.

Post traumatic stress disorder (PTSD) is a clinical syndrome that may develop following extreme traumatic stress (Diagnostic and Statistical Manual, Version IV, American Psychiatric Association referred to as DSM IV).

There are six diagnostic criteria for PTSD.

1) The first is an extreme traumatic stress accompanied by intense fear, horror or disorganized behavior.

The next three are symptom clusters:

2) persistent re-experiencing of the traumatic event such as repetitive play or recurring intrusive thoughts;

3) avoidance of cues associated with the trauma or emotional numbing;

4) persistent physiological hyper-reactivity or arousal.

Finally the last two diagnostic criterions refer to how long and how disabling the symptoms are.

5) Signs and symptoms must be present for more than one month following the traumatic event and cause clinically significant disturbance in functioning. A child is considered to have Acute Stress Disorder (DSM IV) when these criteria are met during the month following a traumatic event.

6) PTSD is further characterized as Acute when present for less than three months, Chronic for more than three months or Delayed Onset when symptoms develop initially six months or more after the trauma.

Clinical presentation

Children with PTSD may present with a combination of problems. In fact, two children may both meet diagnostic criterion for PTSD but have a very different set of symptoms. This can be somewhat confusing to the non-clinical professionals trying to understand traumatized children. In addition, the signs and symptoms of PTSD can look very similar to other neuropsychiatric disorders in children, including attention deficit hyperactivity disorder (ADHD) and major depression.

Typical signs and symptoms of PTSD include

- Impulsivity
- Distractibility and attention problems (due to hypervigilance)
- Dysphoria
- Emotional numbing
- Social avoidance
- Dissociation
- Sleep problems
- Aggressive (often re-enactment) play
- School failure
- Regressed or delayed development.

In most studies examining the development of PTSD following a given traumatic experience, twice as many children suffer from significant post-traumatic signs or symptoms (PTSS) but lack all of the criteria necessary for the diagnosis of PTSD. In these cases, the clinician may identify trauma-related symptoms as being part of another neuropsychiatric syndrome (e.g., hypervigilance is often consider an attention problem and traumatized children will be diagnosed and treated as if they have ADHD).

THE MISDIAGNOSIS OF TRAUMATIZED CHILDREN WITH PTSD IS COMMON.

Sometimes a clinician may be unaware of ongoing traumatic stressors (e.g., domestic violence or abuse). In other cases, the family brings in a child because of new symptoms such as school failure or social withdrawal but makes no association between the child's symptoms and events in the distant past (e.g., car accident, death of a relative, exposure to violence). Without any relevant trauma history to aid the clinician, PTSD may not be diagnosed and post-traumatic stress symptoms (PTSS) are classified as part of other conditions.

Children with PTSD as a primary diagnosis are often labeled with:

- Attention Deficit Hyperactivity Disorder (ADHD)
- Major depression
- Oppositional-defiant disorder
- Conduct disorder
- Separation anxiety or specific phobia.

In some cases, children with PTSD will meet diagnostic criterion for multiple diagnoses. This is especially so when examining co-morbidity (the co-occurrence of multiple DSM IV diagnoses) in children with chronic trauma such as physical or sexual abuse. In some studies, the majority of maltreated children met diagnostic criteria for three or more Axis I diagnoses in addition to PTSD.

When children are evaluated multiple times over several years, the diagnostic confusion can get worse. The clinical presentation of trauma-related symptoms can evolve. In the typical evaluation process, the evaluating clinical team or clinician rarely has the benefit of complete history about the origin and evolution of symptoms. Histories are frequently based upon one caregiver's recollection and assessment is based upon a single clinical visit (e.g., a school-mandated evaluation). In these cases, the traumatized child may "accumulate" diagnoses. It is not unusual for a child with PTSD related to chronic traumatic exposure (e.g., sexual abuse, domestic violence, physical abuse) to have six, seven or eight diagnoses given over five or six previous evaluations. Unfortunately, there are often six, seven or eight different (and partial) treatment approaches that match these diagnostic impressions. This can be tremendously frustrating to the caregivers, teachers, caseworkers or other professionals trying to help these children.

VULNERABILITY AND RESILIENCE

Not all children exposed to traumatic events develop PTSD and those who do, don't all have the same severity of symptoms. A major research focus has been identifying factors (mediating factors) that are associated with increased (vulnerability) or decreased (resilience) risk for developing PTSD following exposure to traumatic stress.

Factors related to risk seem to fall into three broad categories:

1) Characteristics of the child – age of child

2) Characteristics of the event - the more life-threatening the event, the more likely someone is to develop PTSD. The more the event disrupts the person's normal family or social experience the more likely someone is to develop PTSD.

3) Characteristics of family/social system - Having an intact, supportive and nurturing family appears to be a relative protective factor.

Unfortunately, a great majority of children who survive traumatic experiences also have a concomitant major disruption in their way of life, their sense of community, their family structure, and will be exposed to a variety of ongoing provocative reminders of the original event (e.g., ongoing legal actions, high press visibility). The frequency with which children develop post-traumatic stress disorders following comparable traumatic events is relatively high (45-60%).

Children who survive traumatic events and exhibit this diverse set of symptoms and physical signs are frequently also able to meet diagnostic criteria for attention-deficit hyperactivity disorder, anxiety disorder NOS, major depressive disorder, conduct disorder, and a variety of Axis I DSM III-R diagnoses. Keeping in mind, however, that these children have been traumatized and that the symptoms of anxiety, depression and behavioral impulsivity are reflective of core changes related to the traumatic event helps one provide better diagnostic, prognostic and the therapeutic services for these children.

LONG-TERM CONSEQUENCES OF CHILDHOOD TRAUMA

PTSD is a chronic disorder. Untreated, the residual emotional, behavioral, cognitive and social sequelae of childhood trauma appear to persist and contribute to a host of neuropsychiatric problems throughout life. Traumatic stress in childhood may increases risk for:

- Attachment problems
- Eating disorders
- Depression
- Suicidal behavior
- Anxiety
- Alcoholism
- Violent behavior
- Mood disorders
- PTSD, to name a few.

Traumatic stress impacts other aspects of physical health throughout life, as well. Adults victimized by sexual abuse in childhood are more likely to have difficulty in childbirth, a variety of gastrointestinal and gynecological disorders and other somatic problems such as chronic pain, headaches and fatigue. There appears to be a graded relationship between the number of adverse events in childhood and the adult health and disease outcomes examined (e.g., heart disease, cancer, chronic lung disease, and various risk behaviors).

	Event-Related Factors	*Individual Characteristics*	*Family and Social*
Increase Risk *(Prolong the intensity or duration of the acute stress response)*	♦ Multiple or repeated event (in this case, ongoing threat) ♦ Physical injury to child ♦ Involves physical injury or death to loved one, particularly mother ♦ Dismembered or disfigured bodies seen ♦ Destroys home, school or community ♦ Disrupts community infrastructure (as in Manhattan) ♦ Perpetrator is family member ♦ Long duration, difficult recovery (as in the WTC collapse)	♦ Female ♦ Age (Younger more vulnerable) ♦ Subjective perception of physical harm ♦ History of previous exposure to trauma ♦ No cultural or religious anchors ♦ No shared experience with peers (experiential isolation) ♦ Low IQ ♦ Pre-existing neuropsychiatric disorder (especially anxiety related)	♦ Trauma directly impacts caregivers ♦ Anxiety in primary caregivers ♦ Continuing threat and disruption to family ♦ Chaotic, overwhelmed family ♦ Physical isolation ♦ Distant caregiving ♦ Absent caregivers
Decrease Risk *(Decrease intensity or duration of the acute stress response)*	♦ Single event ♦ Perpetrator is stranger ♦ No disruption of family or community structure ♦ Short duration (e.g., tornado)	♦ Cognitively capable of understanding abstract concepts ♦ Healthy coping skills ♦ Educated about normative post-traumatic responses ♦ Immediate post-traumatic interventions ♦ Strong ties to cultural or religious belief system	♦ Intact, nurturing family supports ♦ Non-traumatized caregivers ♦ Caregivers educated about normative post-traumatic responses ♦ Strong family beliefs ♦ Mature and attuned parenting skills

Table 1. A Neuroarcheological Chart of Development: Functional Organization

Functional Division	Constituent Parts	Developmental Division	Age of Functional Maturity	Functions
Neocortex	**Cerebral cortex** *Frontal Lobes* ***Temporal Lobes*** *Parietal Lobes* *Occipital Lobes* *Corpus Callosum*	**Telencephalon**	**Puberty**	**Abstraction** **Self-image** **Socialization**
Limbic *Cingulate Cortex* *Amygdala* *Hippocampus* *Septum*	**Amygdala** **Hippocampus** **Basal ganglia** *Caudate Nucleus* *Putamen* *Globus Pallidus*		**Childhood** **Early childhood**	**Affiliation** **Attachment** **Mood regulation** **Fine motor** **Large motor**
Diencephalon	**Thalamus** **Hypothalamus**	**Diencephalon**	**Infancy**	**Complex state regulation** *(e.g., sleep, appetite)*
Brainstem	**Midbrain** *Superior Colliculus* *Inferior Colliculus*	**Mesencephalon**	**Six months**	**Primary state regulation**
	Cerebellum **Pons**	**Metencephalon**		**Core physiological reflexes and regulatory functions**
	Medulla Oblongata	**Myelencephalon**	**Third trimester**	
Spinal Cord	**Spinal Cord**		**Third trimester**	

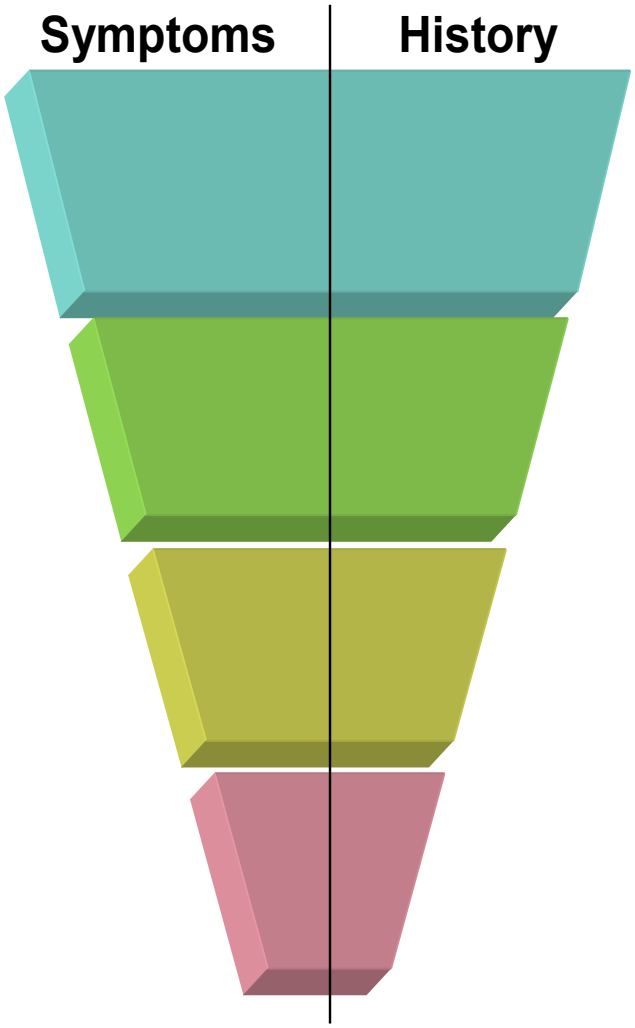


Table 2: Key Processes in Neurodevelopment

Key Processes	Age beginning*	Greatest period of activity**	Age of equilibrium**	Other
Neurogenesis	First trimester	*In utero*	99 % of 100 billion neurons born by birth	Evidence of hippocampal cell birth in adult life
Migration	First trimester	*In utero* through first year	Regional specific: majority of migration complete by age three	Some suggestion of migration following brain injury
Differentiation	First-second trimester	Third trimester through year one	Region specific: primary differentiation complete by age three	Continues in some fashion throughout life
Apoptosis	Third trimester	First year	Age one	Majority of programmed death complete by age three
Arborization	Third trimester	First year	Primary dendritic arborization present by age three	Very experience dependent – continued sensitivity throughout life
Synaptogenesis	Third trimester	8 months	Region specific: with most cortical areas by age 10, other areas earlier	Continuous activity-dependent process through life
Synaptic sculpting	Birth	First four years	Region specific: cortical areas by age six	Second phase of activity during puberty
Myelination	Birth	First four years	Region specific: majority complete by 10	Continuing important myelination through adolescence

** This refers to the age at which approximately 10% of this specific function is taking place. In most cases, there is evidence that some of these processes have started to some degree. Almost all of these processes continue in some form throughout life, the table is designed to illustrate the relative importance of childhood for the majority of activity in each of these processes.*

***These are crude estimates based upon data from multiple sources. The major point it to demonstrate that shifting activity from neurogenesis to myelination.*

Table 3: Shifting Developmental Activity across Brain Regions

Brain Region	Age of greatest developmental activity	Age of functional maturity**	Key functions
Neocortex	**Childhood**	**Adult**	Reasoning, problem solving, abstraction, secondary sensory integration
Limbic	**Early childhood**	**Puberty**	Memory, emotional regulation, attachment, affect regulation, primary sensory integration
Diencephalon	**Infancy**	**Childhood**	Motor control, secondary sensory processing
Brainstem	**In utero**	**Infancy**	Core physiological state regulation, primary sensory processing

Age of Most Active Growth	"Sensitive" Brain Area	Critical Functions Being Organized	Primary Developmental Goal	Optimizing Experiences (examples)	Therapeutic and Enrichment Activities (samples)
3-6	Cortex	Abstract cognitive functions Socio-emotional integration	Abstract reasoning Creativity Respect Moral and spiritual foundations	Complex conversation Social interactions Exploratory play Solitude, satiety, security	Storytelling Drama Exposure to performing arts Formal education Traditional insight-oriented or cognitive-behavioral interventions
1-4	Limbic	Emotional states, Social language: Interpretation of non-verbal information	Emotional regulation Empathy Affiliation Tolerance	Complex movement Narrative Social experiences	Play and play therapies Performing and creative arts and therapies Parallel play
6 mos-2	Diencephalon	Integration of multiple sensory inputs Fine motor control	Sensory Integration Motor control Relational flexibiity Attunement	More complex rhythmic movement Simple narrative Emotional and physical warmth	Music and movement Reiki Touch Therapeutic massage Equine or canine interactions
0-9 mos	Brainstem	Regulation of arousal, sleep, and fear 'states'	State regulation Primary attachment Flexible stress response Resilience	Rhythmic and patterned sensory input, auditory or tactile, motor Attuned, responsive caregiving	Massage Rhythm: Drumming Reiki Touch EMDR

Table 4. Sequential neurodevelopment and therapeutic activity. The chart above outlines the sequential development of the brain along with examples of appropriately matched experiences that help organize and influence the respective part of the brain that is most actively organizing during various stages of development. For maltreated children, developmental "age" rarely matches chronological age and therefore the sequential provision of therapeutic experiences should be matched to developmental stage and not chronological age.