Neuro-sequential Model of Therapeutics

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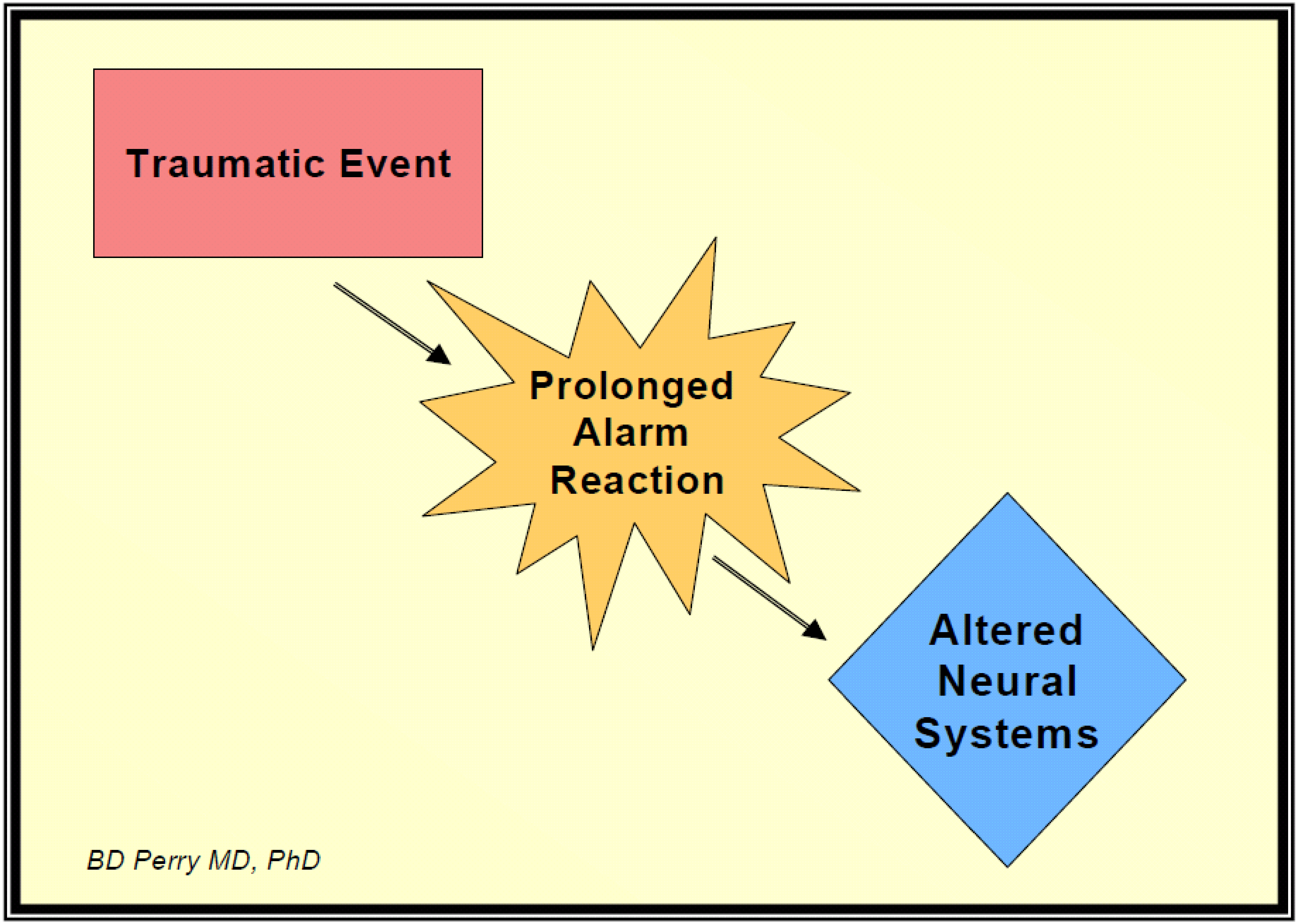
June 2017

Introduction

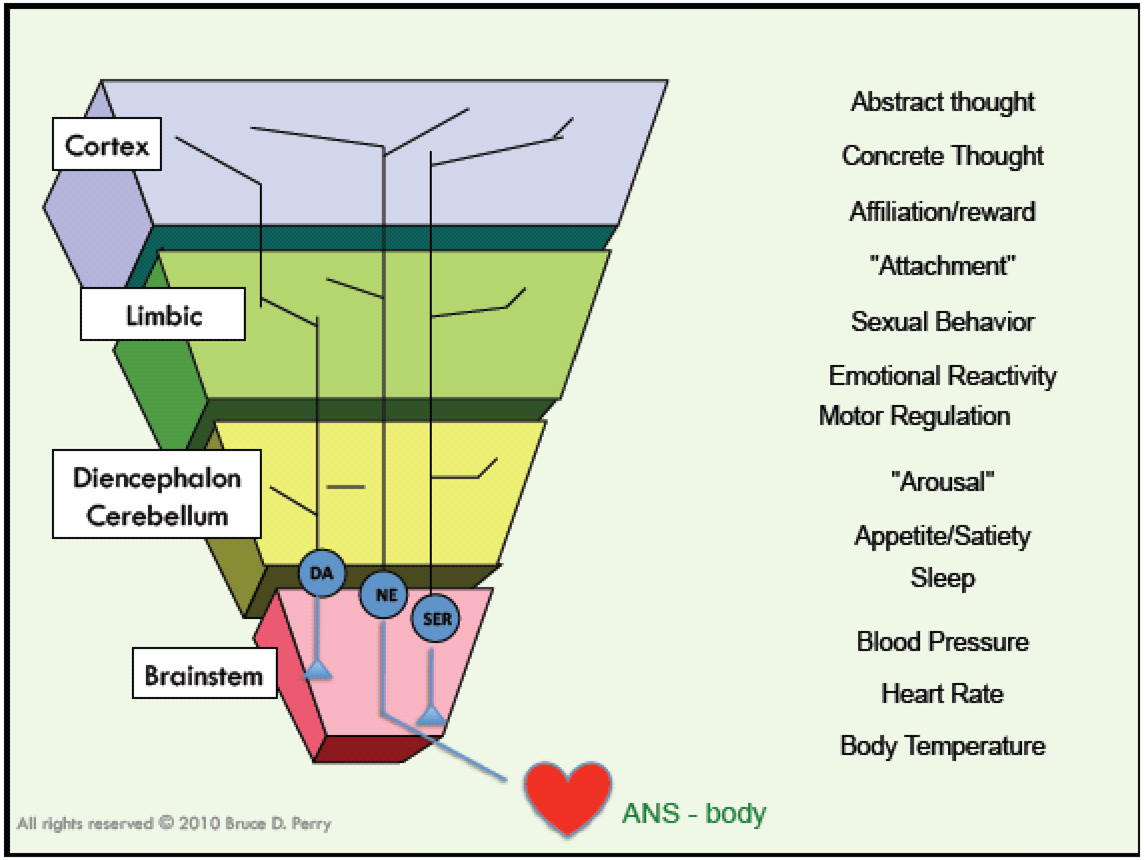
We are reminded that we are all "neurobiologically connected". We are built with brains that want and need to interact, and that the best way to heal is through relationships. "Presence, patience and persistence" in a relationship with a child, he said, will have far more impact than programmes of interventions services may provide.

Dr Bruce Perry

The effects of maltreatment on the developing brain – intrauterine, perinatal attachment and post natal trauma are well documented. Perry's work focuses on what can be done about this, attempting to directly target neuronal networks.


Traumatic Event
Prolonged Alarm Reaction
Altered Neural Systems
BD Perry MD, PhD

Distribution of primary regulatory networks



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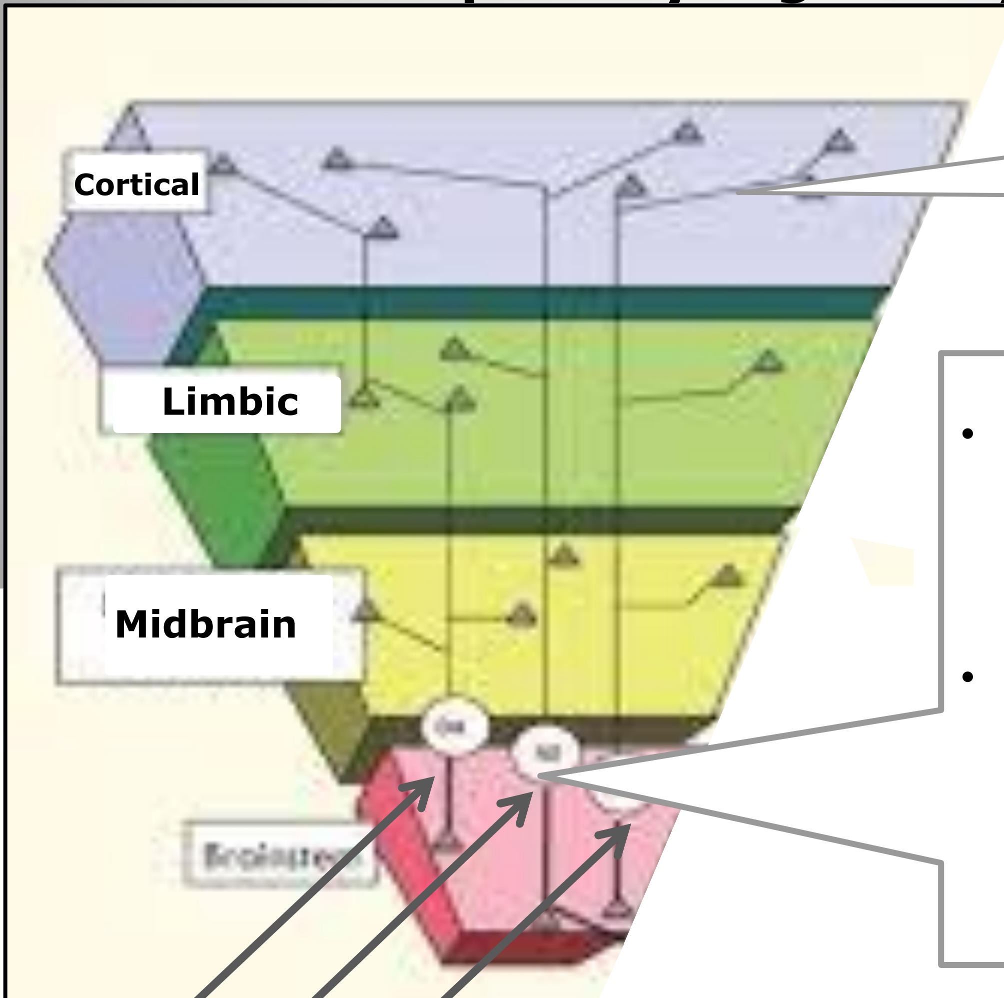


The majority of neurons are intrinsic within the same local area

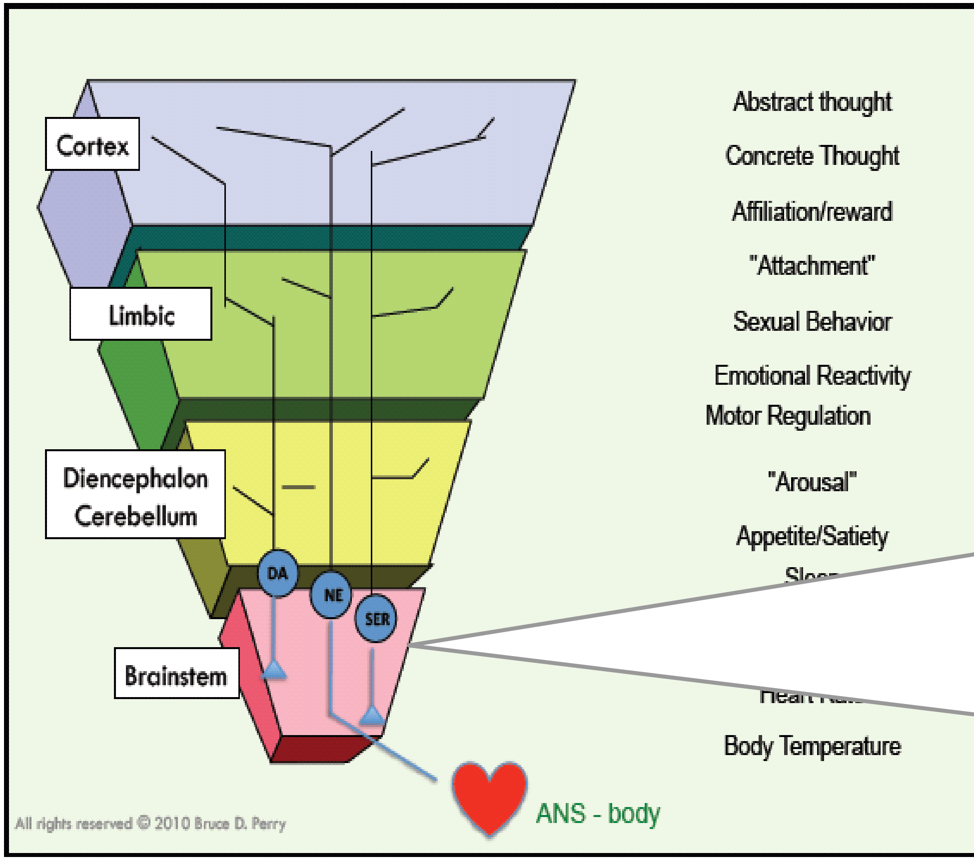
- Organise functioning across brain regions and throughout interconnected networks
- Cell bodies found in lower regions of the brain send projections up to higher regions of the brain and down into the body.

Serotonergic neural networks

Noradrenalinergic neural

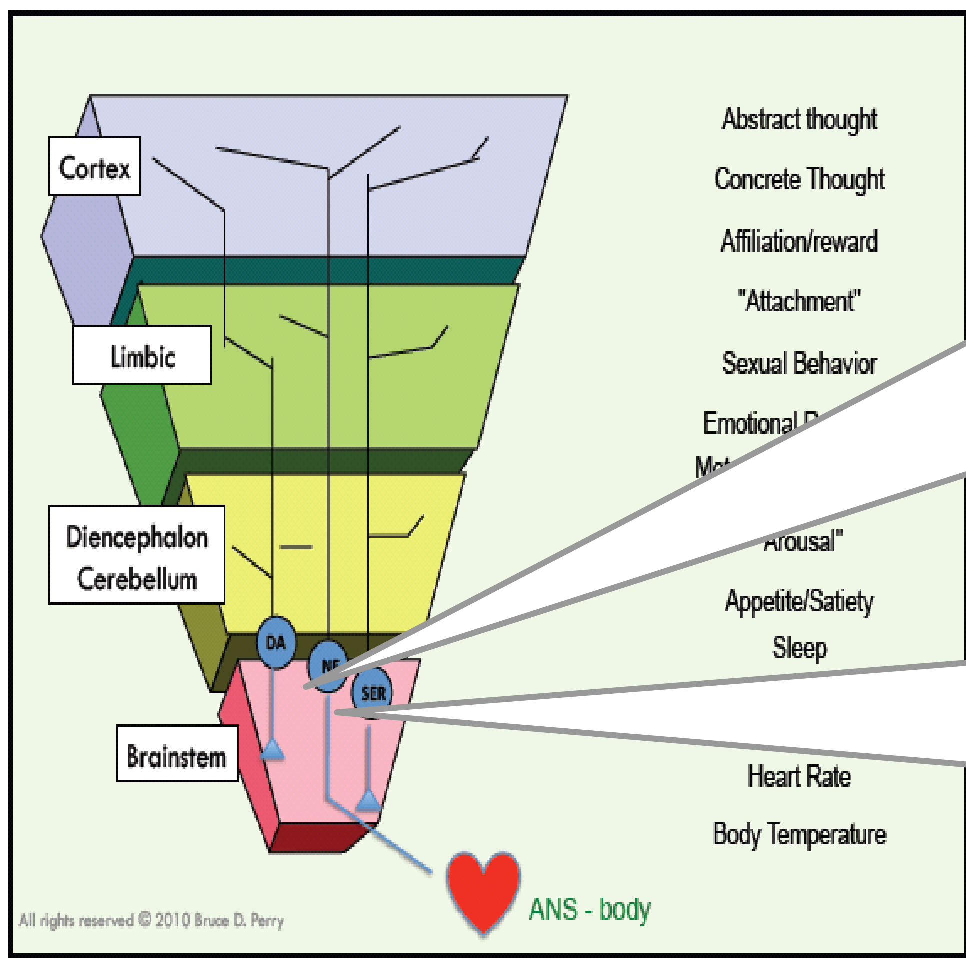
Dopaminergic neural

Distribution of primary regulatory networks



- These neural networks have a dis-propionate power in influencing and orchestrating functions across multiple parts of the brain.
- Particularly important role in stress response.

Maintaining equilibrium



- Signals from the outside world are translated by our senses into patterned neural activity going into the lower part of the brain and helps tell us what going on in the world.

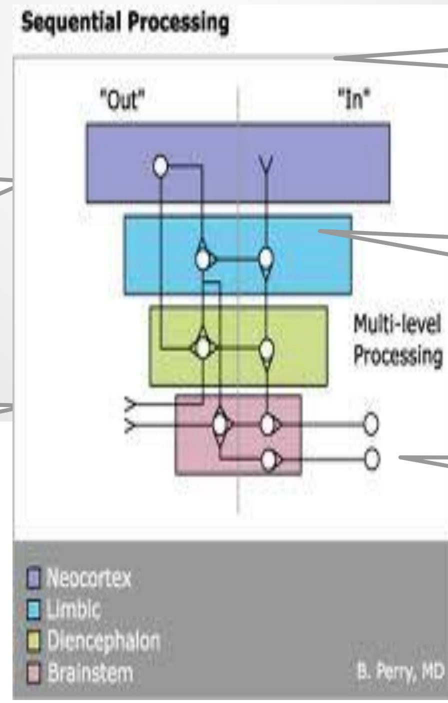
- Signals from the body into the lower part of the brain telling us where we are in space, how much oxygen, heart, etc..

Multi-level and sequential processing

Possible to react before the smart part of the brain can process information

Tell parts of the brain to change body posture

Tell parts of the brain to increase heart rate



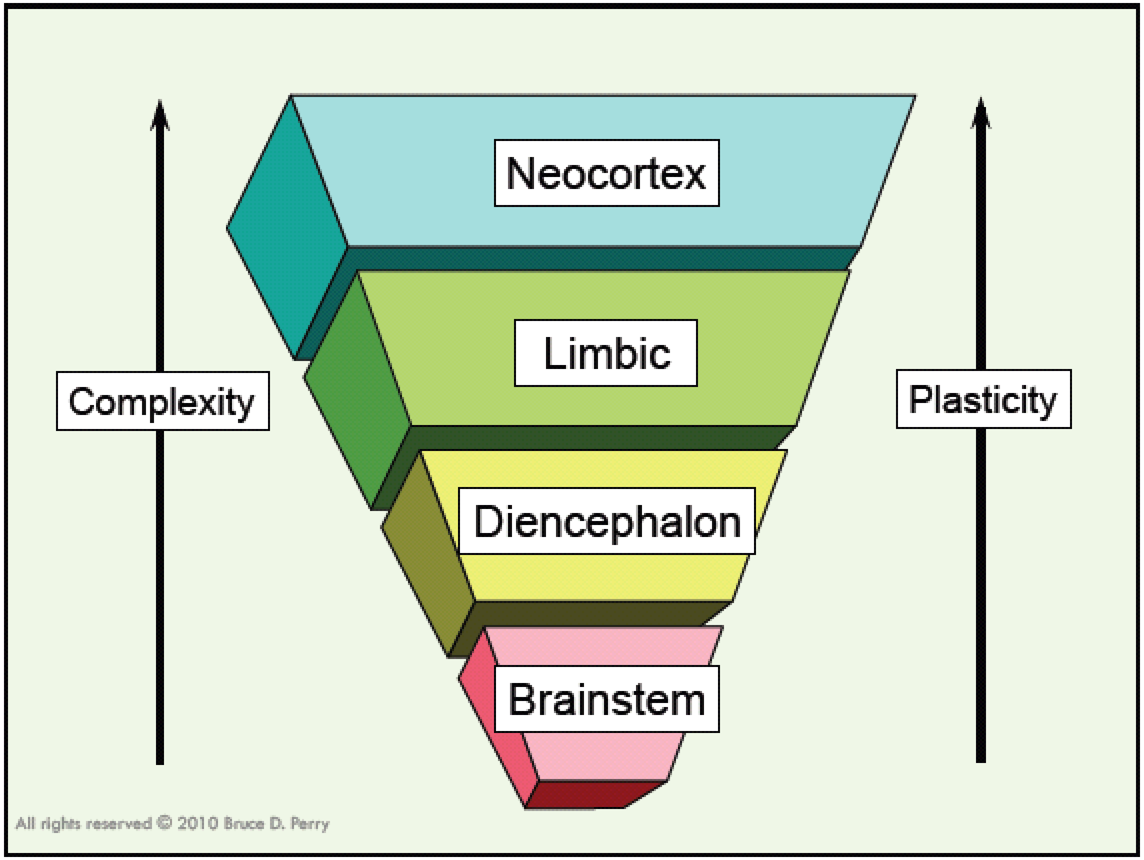
Tell the brain what words to use

Tell parts of the brain we are feeling frustrated, angry

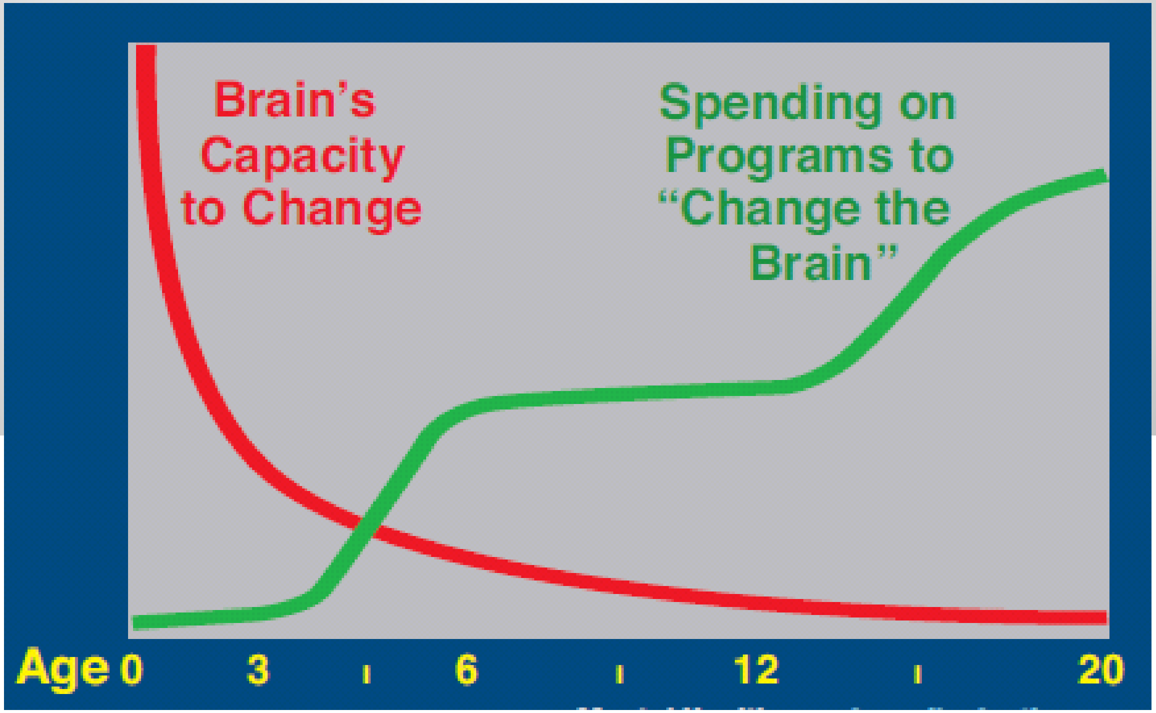
Hostile interaction with a work colleague

- It's the case that activation and response can occur before the cortical part of the brain has a chance to act.
- Every experience has the potential to elicit a variety of responses from the person mediated by a variety parts of the brain.

Complexity & Plasticity



Complexity & Plasticity



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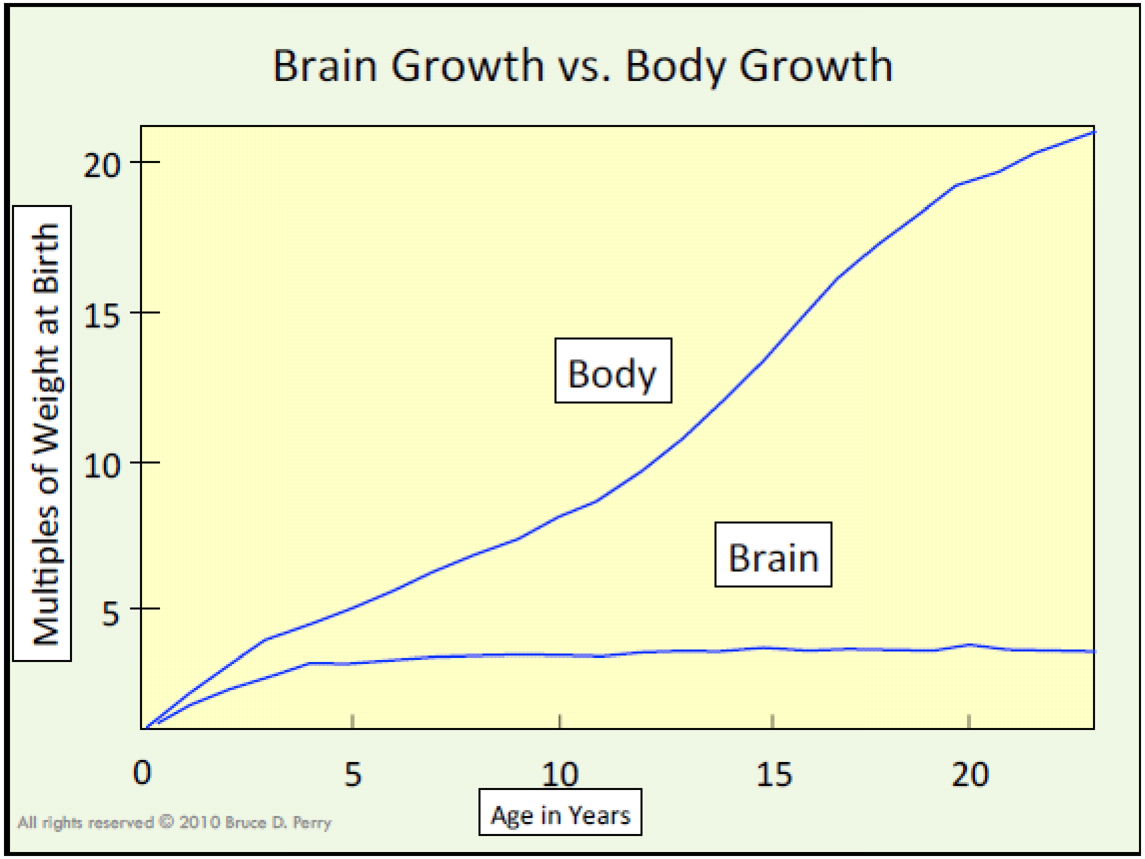
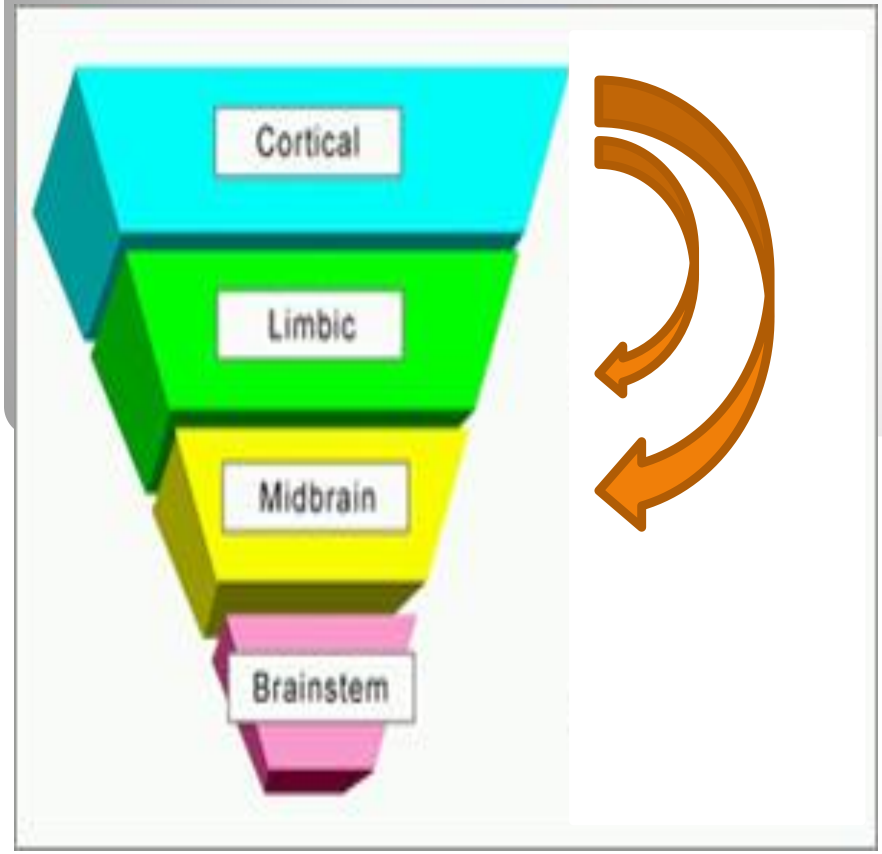


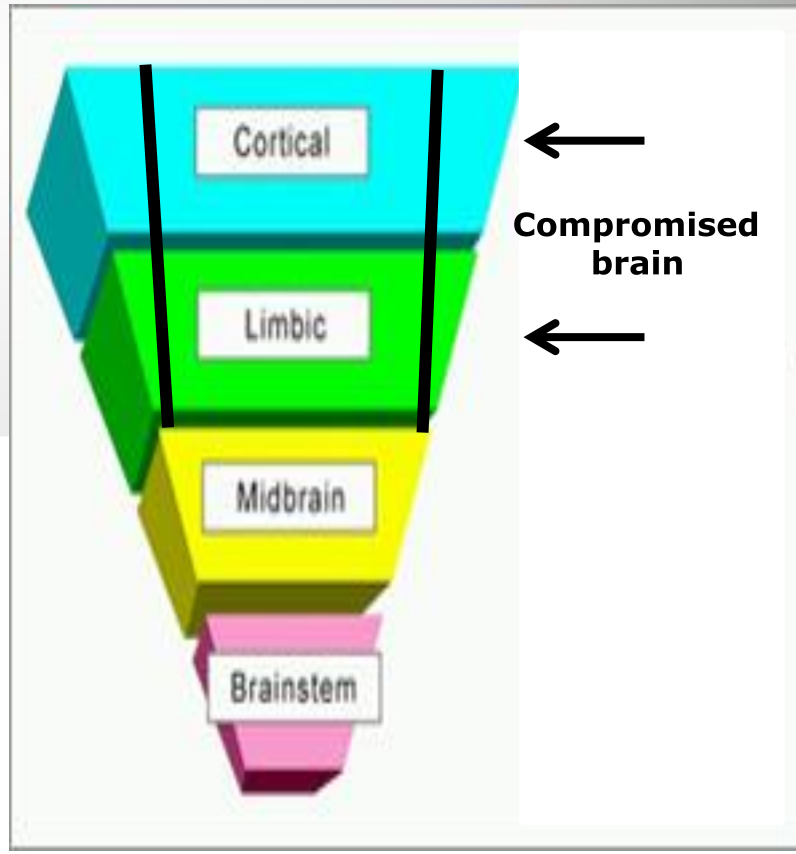
Cortical Modulation

Mature



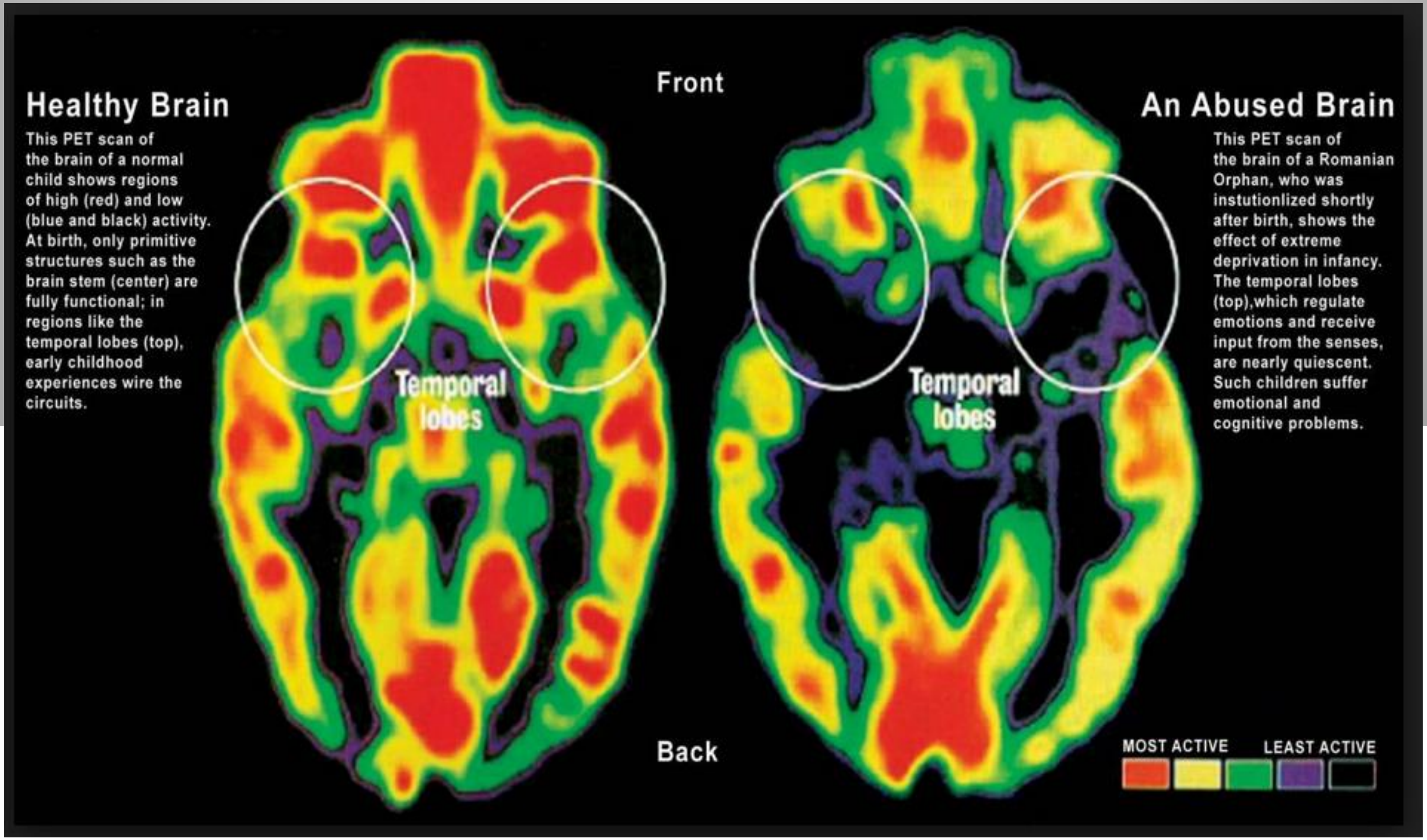
The cortex plays a major role in modulating and regulating our impulsivity and all the functions mediated by the lower brain.

Developing/neglect

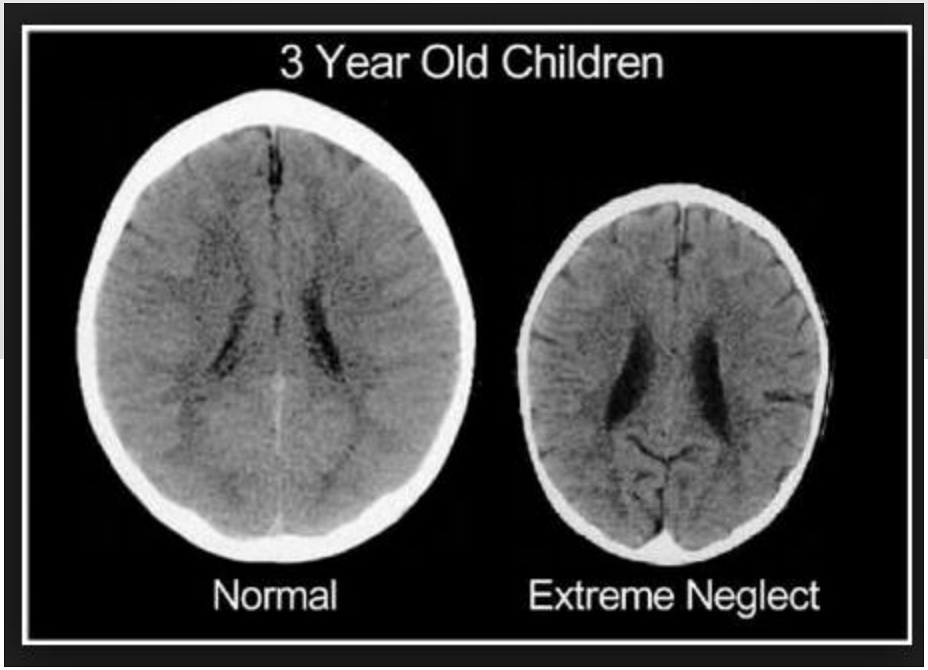


Anything that compromises the development or the functioning of the cortex will result in compromised cortical modulation.

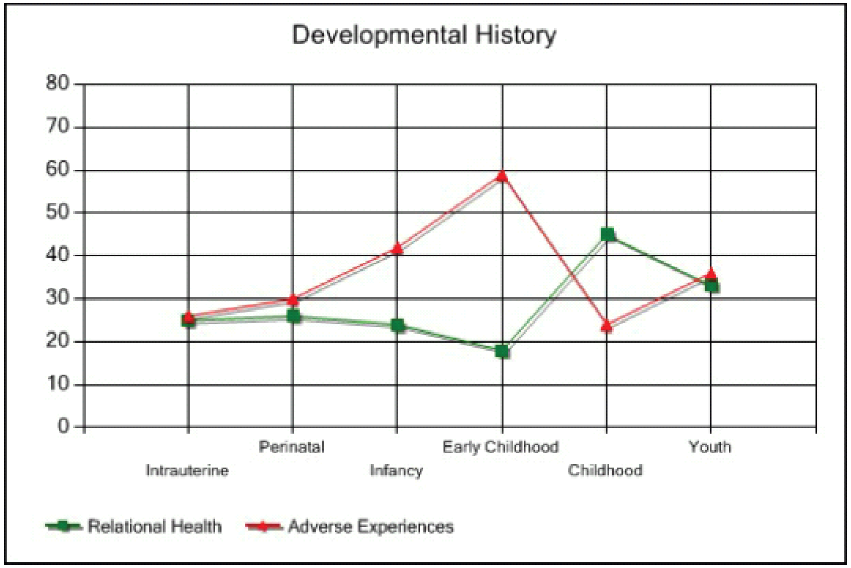
An abused brain

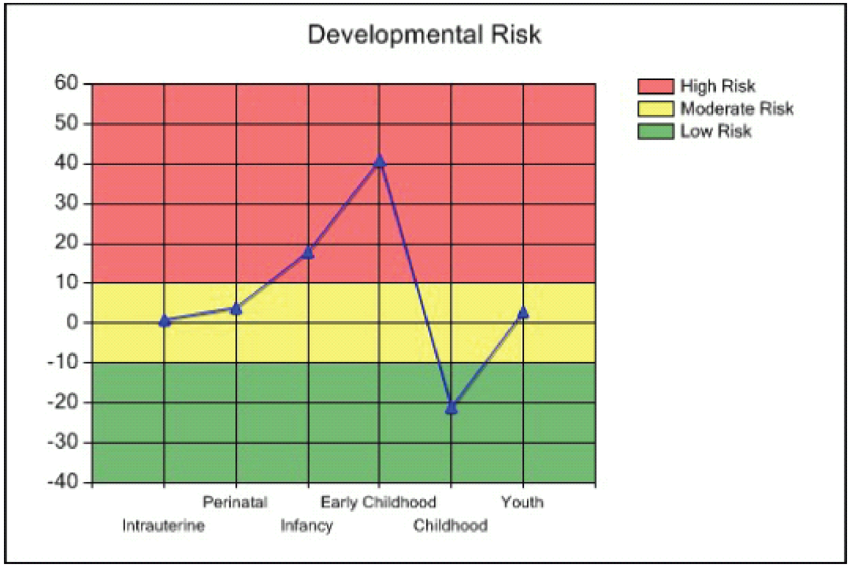


Cortical Modulation



Metrics





Developmental History Values

	Adverse Events	Relational Health	Developmental Risk
Intrauterine	26	25	1
Perinatal	30	26	4
Infancy	42	24	18
Early Childhood	59	18	41
Childhood	24	45	-21
Youth	36	33	3

Metrics

Current CNS Functionality

	Brainstem	Client	Typical
1	Cardiovascular/ANS	10	12
2	Autonomic Regulation	12	12
3	Temperature regulation/Metabolism	12	12
4	Extraocular Eye Movements	12	12
5	Suck/Swallow/Gag	12	12
6	Attention/Tracking	5	12
	DE/Cerebellum		
7	Feeding/Appetite	12	12
8	Sleep	12	12
9	Fine Motor Skills	11	12
10	Coordination/Large Motor Functioning	7	11
11	Dissociative Continuum	5	11
12	Arousal Continuum	5	11
13	Neuroendocrine/Hypothalamic	10	11
14	Primary Sensory Integration	12	12
	Limbic		
15	Reward	10	12
16	Affect Regulation/Mood	5	11
17	Attunement/Empathy	5	11
18	Psychosexual	5	10
19	Relational/Attachment	4	11
20	Short-term memory/Learning	9	12
	Cortex		
21	Somato/Motorsensory Integration	12	12
22	Sense Time/Delay Gratification	10	10
23	Communication Expressive/Receptive	10	12
24	Self Awareness/Self Image	3	10
25	Speech/Articulation	11	12
26	Concrete Cognition	11	11
	Frontal Cortex		
27	Non-verbal Cognition	10	10
28	Modulate Reactivity/Impulsivity	10	10
29	Math/Symbolic Cognition	8	10
30	Reading/Verbal	7	10
31	Abstract/Reflective Cognition	8	10
32	Values/Beliefs/Morality	10	10
	Total	285	358

Functional Brain Map(s) and Key

Client (14 years, 9 months) **Report Date: 10/18/2012**

8	8	10	10	7	10
11	10	12	10	3	11
4	5	10	5	5	9
	10	5	5	12	
	11	12	12	7	
		12	5		
		12	12		
		10	12		

Age Typical - 14 to 16

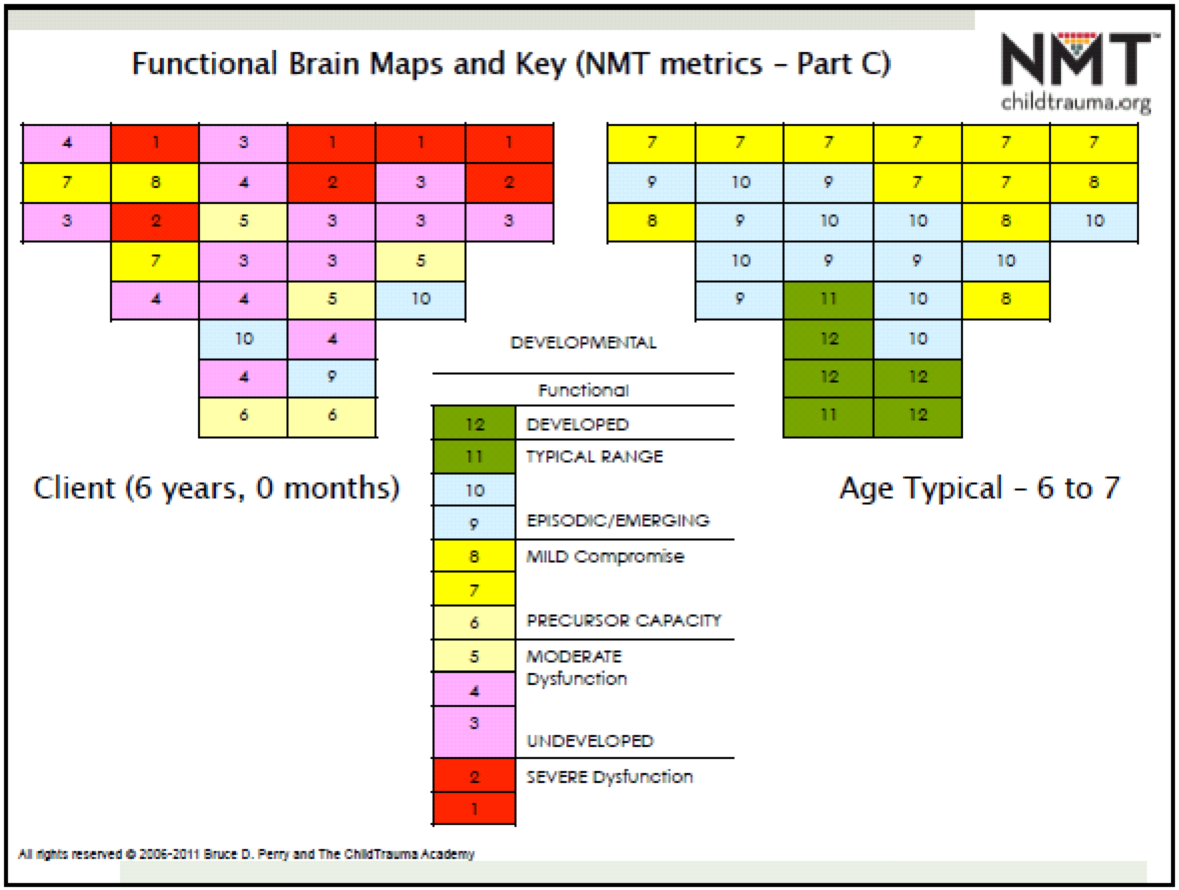
10	10	10	10	10	10
12	12	12	10	10	11
11	11	12	11	10	12
	11	11	11	12	
	12	12	12	11	
		12	12		
		12	12		
		12	12		

Functional Item Key

ABST (31)	MATH (29)	PERF (27)	MOD (28)	VERB (30)	VAL (32)
SPEECH (25)	COMM (23)	SSI (21)	TIME (22)	SELF (24)	CCOG (26)
REL (19)	ATTU (17)	REW (15)	AFF (16)	SEX (18)	MEM (20)
	NE (13)	DISS (11)	ARS (12)	PSI (14)	
	FMS (9)	FEED (7)	SLP (8)	LMF (10)	
		SSG (5)	ATTN (6)		
		MET (3)	EEOM (4)		
		CV (1)	ANS (2)		

Functional Brain Map Value Key

Metrics



Functional Brain Maps and Key (NMT metrics – Part C)
NMT
childtrauma.org
4 1 3 1 1 1
7 8 4 2 3 2
3 2 5 3 3 3
7 3 3 5
4 4 5 10
10 4
4 9
6 6
Client (6 years, 0 months)
DEVELOPMENTAL
Functional
12 DEVELOPED
11 TYPICAL RANGE
10
9 EPISODIC/EMERGING
8 MILD Compromise
7
6 PRECURSOR CAPACITY
5 MODERATE Dysfunction
4
3 UNDEVELOPED
2 SEVERE Dysfunction
1
7 7 7 7 7 7
9 10 9 7 7 8
8 9 10 10 8 10
10 9 9 10
9 11 10 8
12 10
12 12
11 12
Age Typical – 6 to 7
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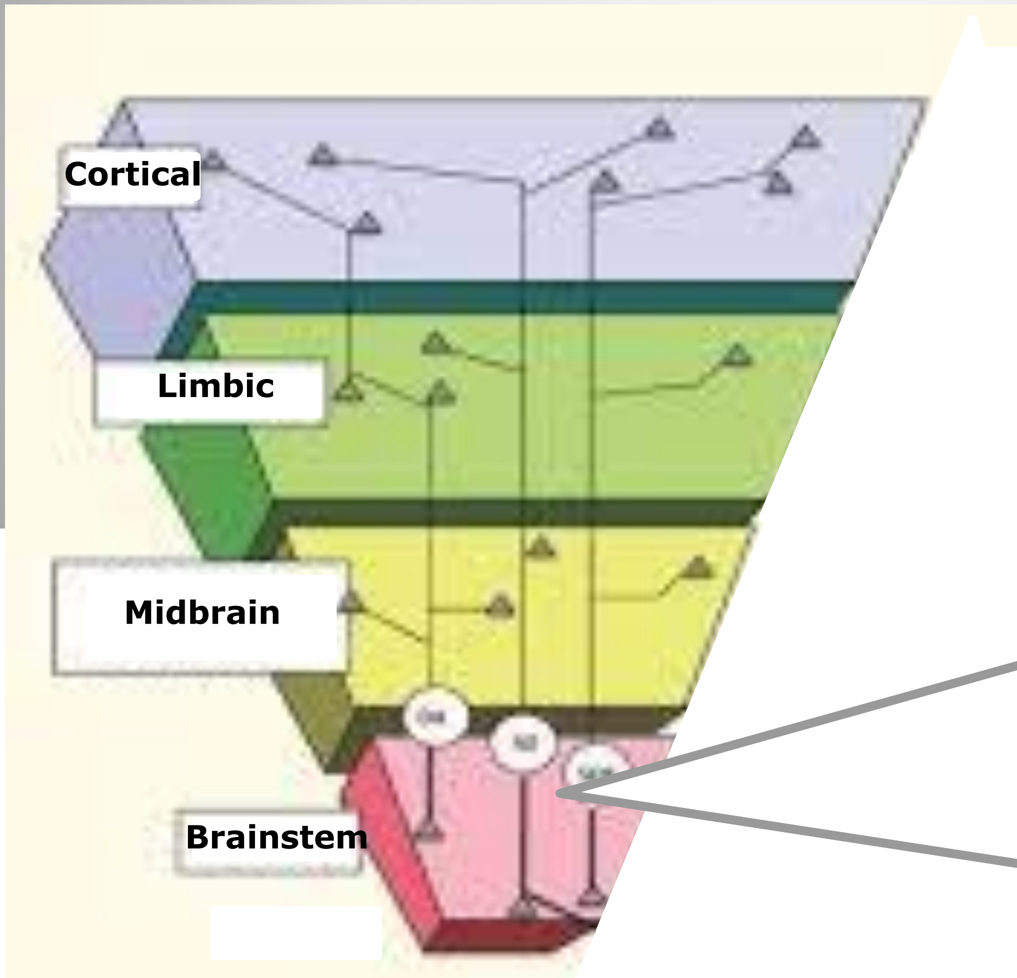
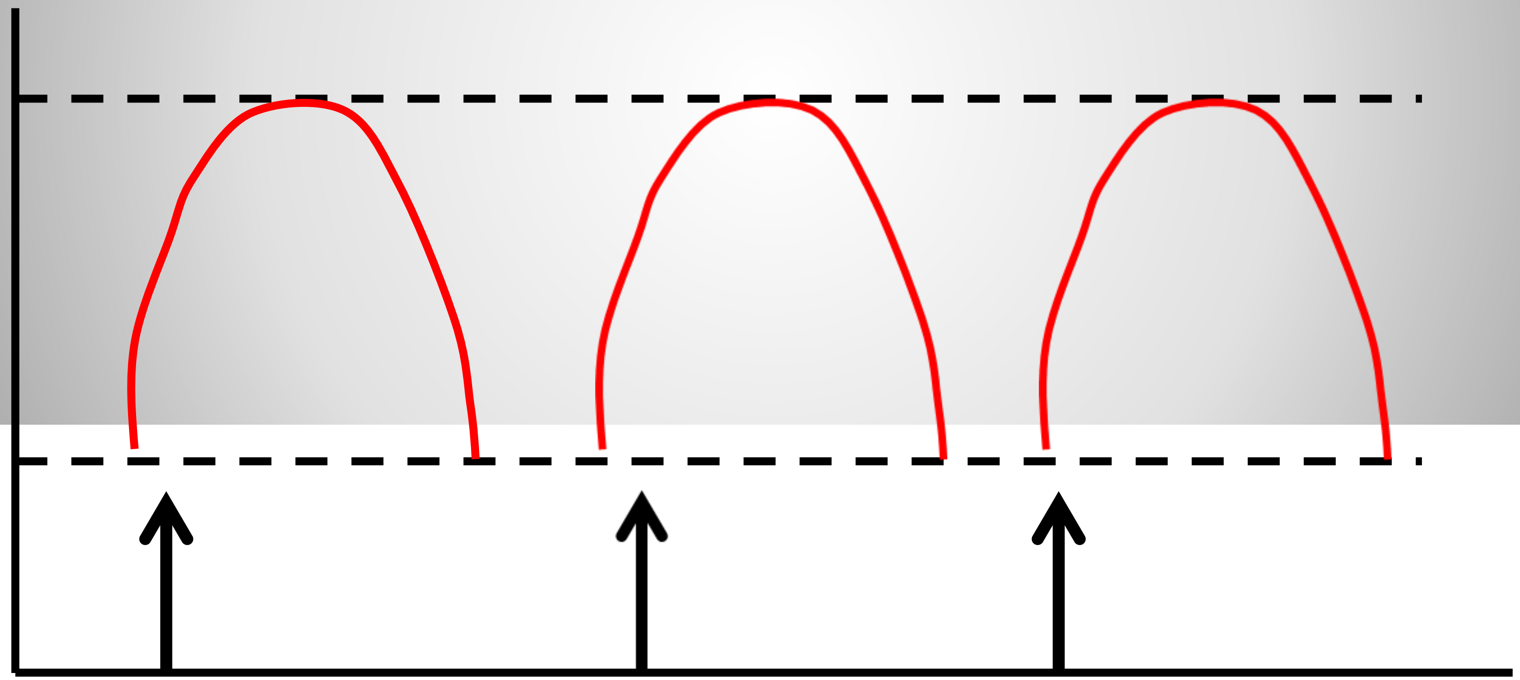
Distribution of primary regulatory networks



- The pattern of stimulation as it pertains to the sensitivity of these neural networks is crucial in normal development

- The sensitivity of these systems can be dramatically changed by the pattern of stimulation they receive.

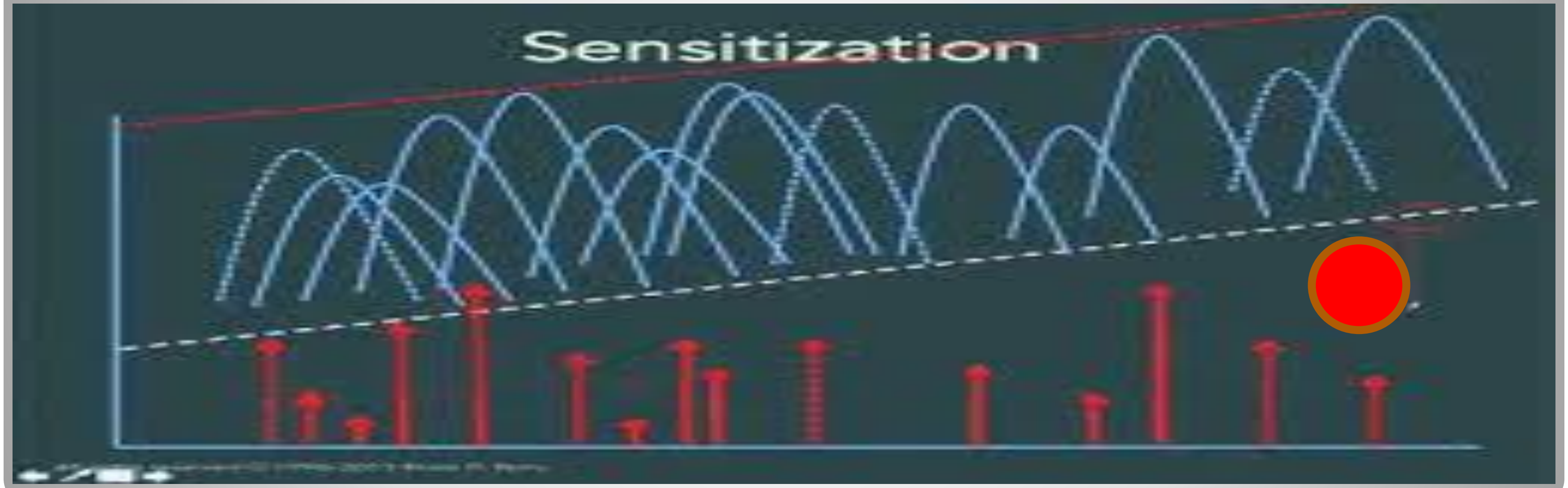
Sensitization and Tolerance



Some stimulus such as a
drug or stress activates a
neural network and results
in a certain amount of
activation for stimulus degree

If you wait for a few weeks
And stimulate with the same
Intensity – you will get
The same response.

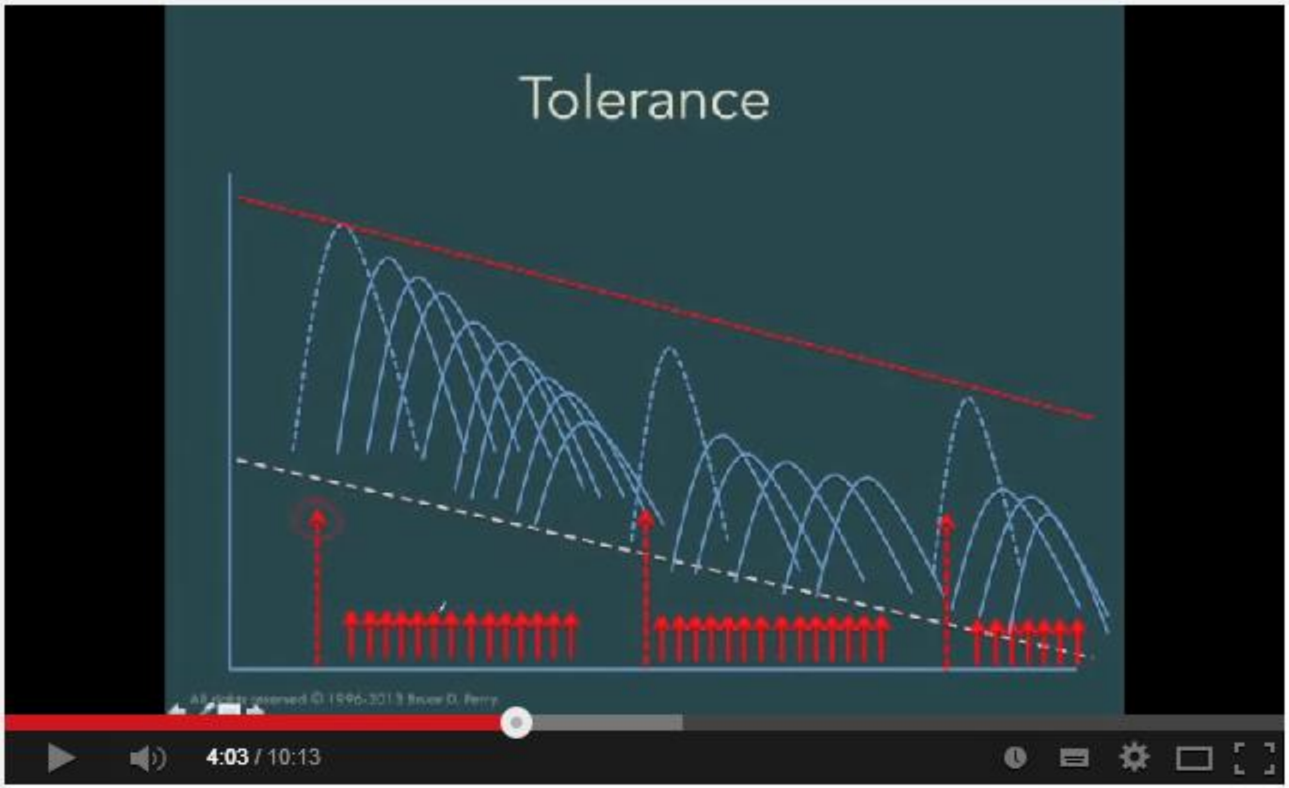
Sensitization



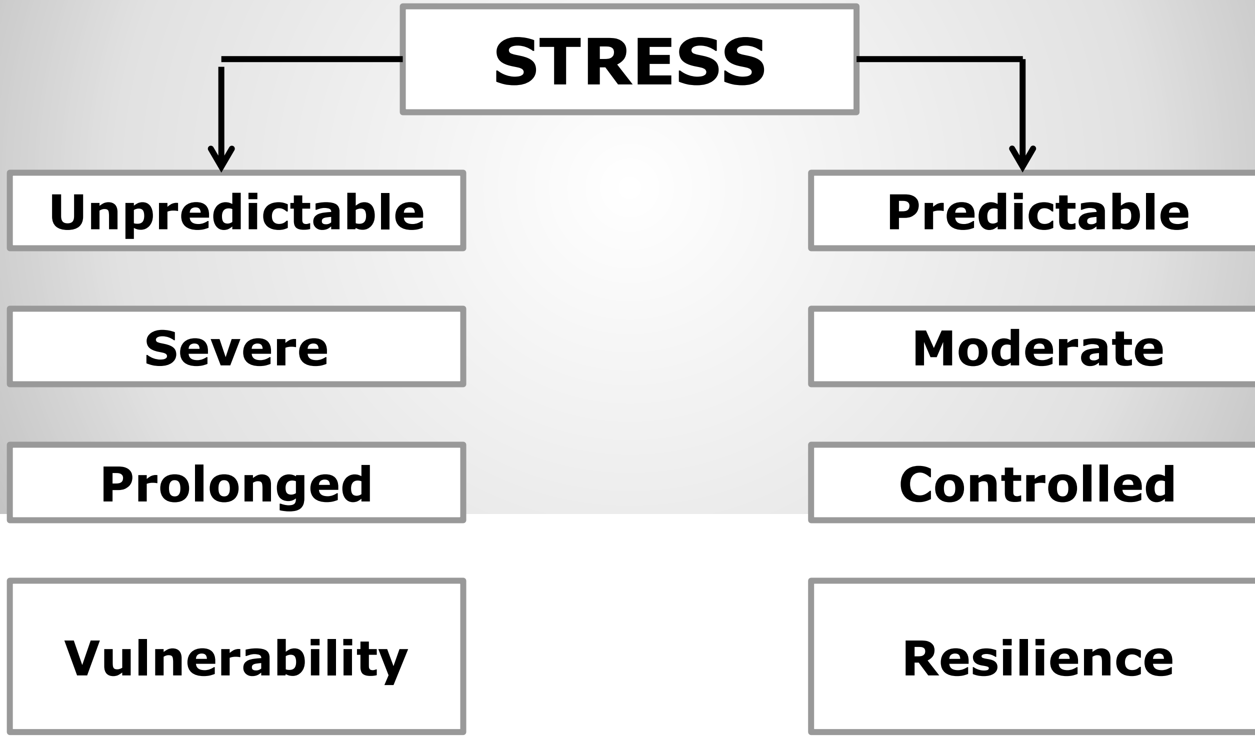
When the pattern of activation is not the same way. Rather than having a moderate continuous predictable activation that the neural networks adapts to when stimuli are not regular, not the same intensity. The system becomes more sensitive.

The system is so overly reactive that a small stimulus which previously caused a moderate activation can lead to an extreme activation or a seizure or some Other significant loss of function or deterioration of competence.

Tolerance



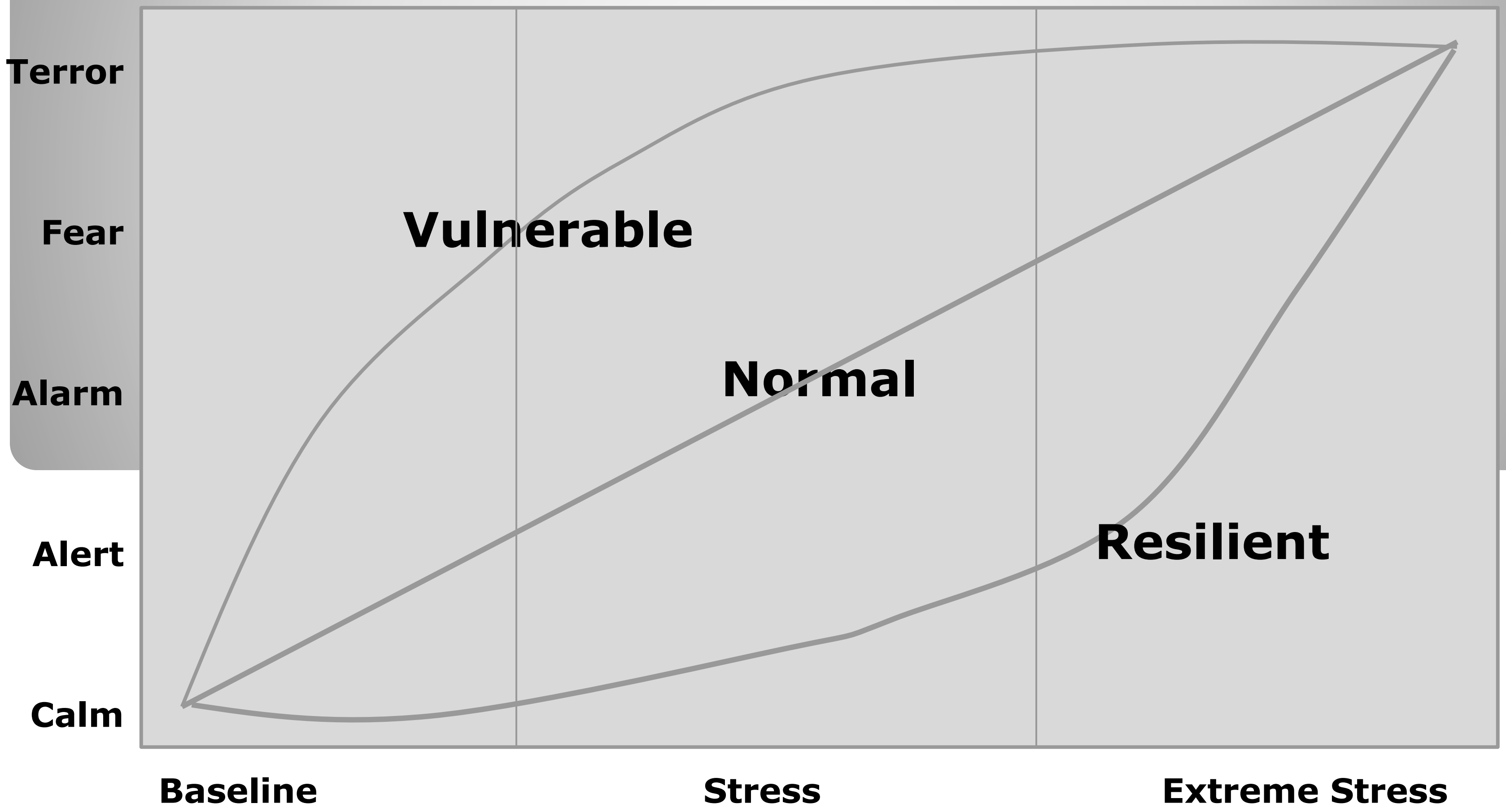
Stress Response



Toxic and leads to a whole range of functional compromise in the body and in a various brain meditating functions.

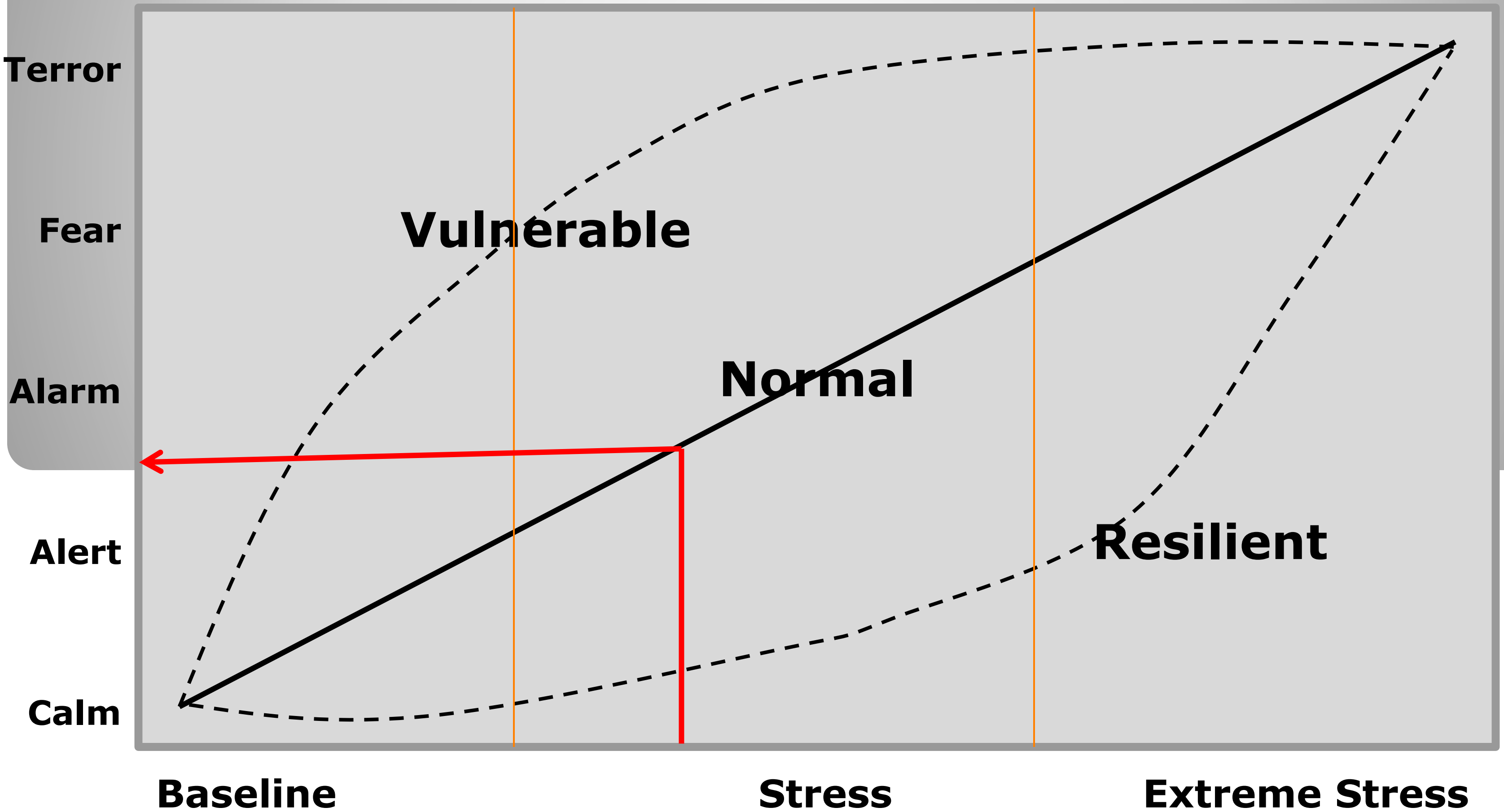
A flexible stress response capability in making the individual more capable with dealing with stressors

Differential State reactivity

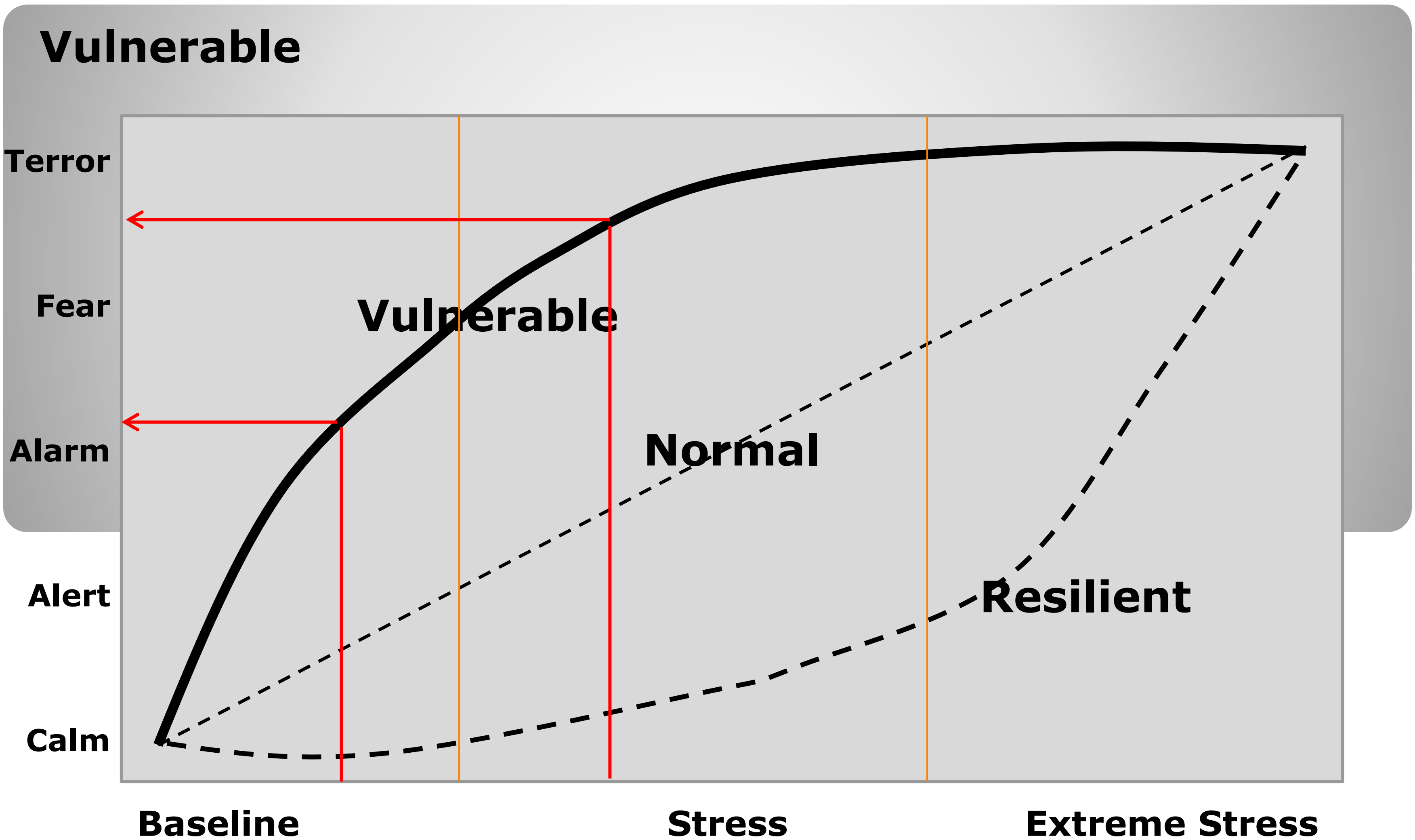


Trauma related alterations in function is the development of a vulnerability that arises from a sensitized stress response system.

Normal

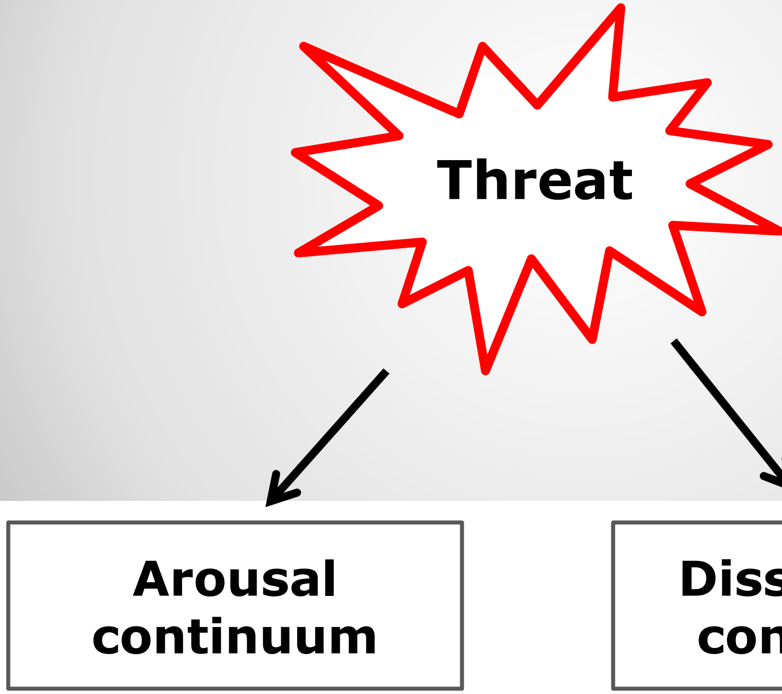


In a normal stress response reactivity, you will track to a linear "normal" reaction.



Individuals who have experienced a sensitized pattern of stress activation (kids who grow up in chaos, or unpredictable threatening environments, abuse and neglect) end up on this curve.

Threat response



Arousal continuum
- Norepinephrine
- Dopamine
- Gaba
- Serotonin

Dissociative continuum
- Opioid peptides
- Serotonin
- Dopamine

- 2 different threat responses are continuums and co-exist.
- They can be mutely activated when we are under threat

Threat response

Arousal

- Flight or fight
- Increase muscle tone
- Increased heart rate
- Less concerned with internal signals
- General activation and externalization

Dissociative

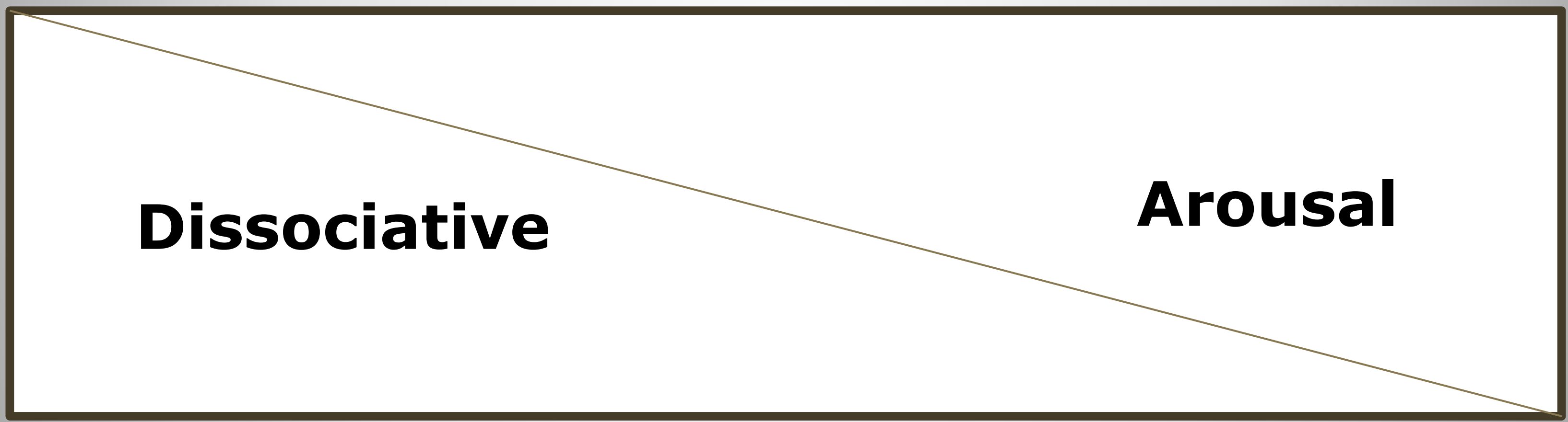
- Prepare for injury
- Disengage from external world
- Decreased heart rate
- General activation and internalization

Features

- Hypervigilance
- Impulsivity
- Alarm response
- Tachycardia
- Freeze – Fear
- Flight – Panic
- Fight - Terror

- Avoidant
- Numb
- Compliant
- Fainting
- Psychotic symptoms

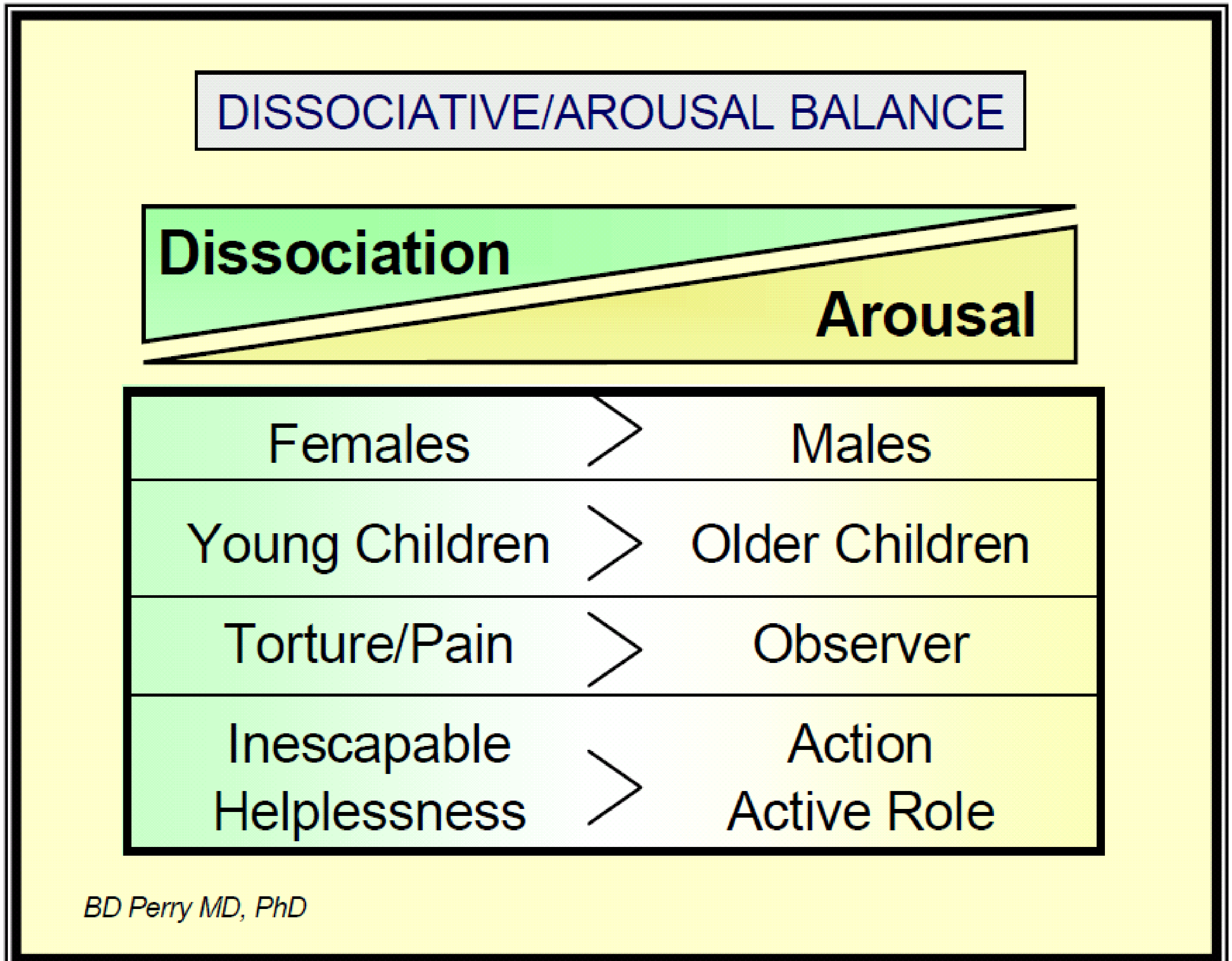
Adaptive modes



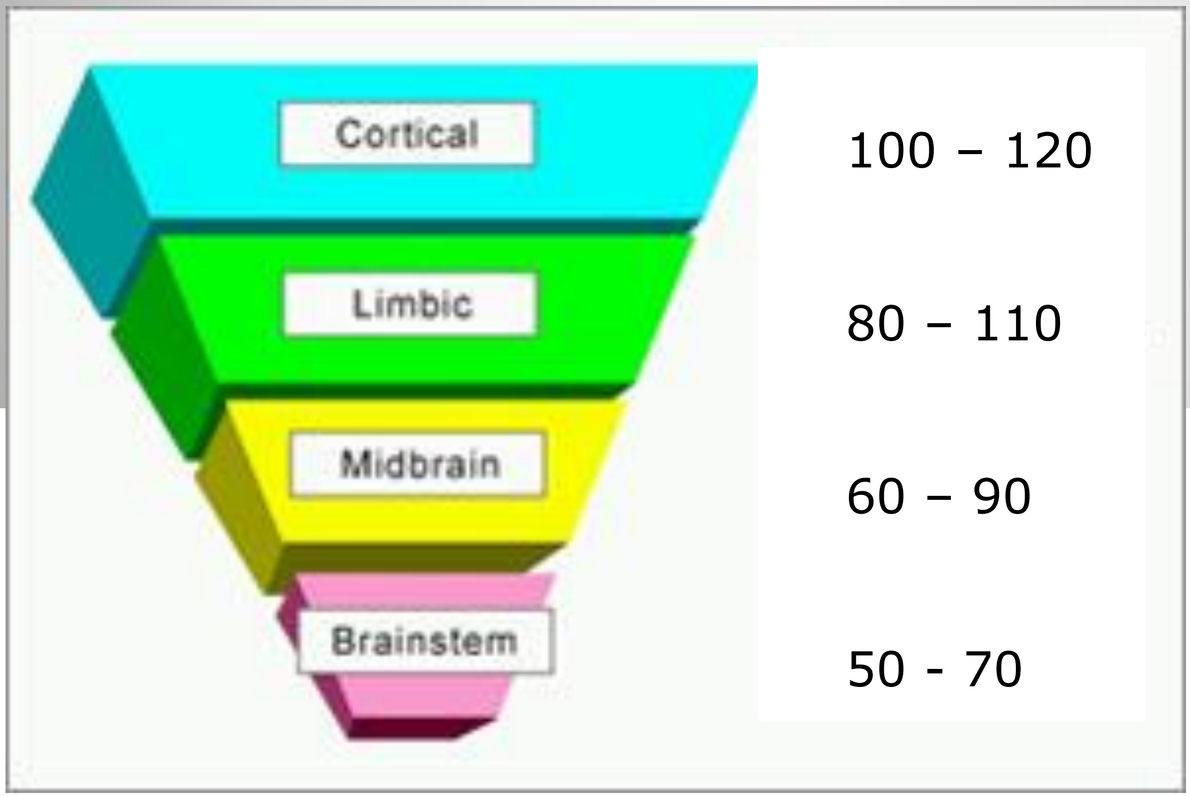
Infant → **Child** → **Adult**

- Developmental
- Gender
- Situation

Adaptive modes



The greater the threat, the dumber we become



The greater the threat, the dumber we become

Functional IQ	100 – 120	80 – 110	60 – 90	50 – 70	
Hyperarousal Continuum	REST	VIGILANCE	RESISTANCE **Crying**	DEFIANCE **Tantrums**	AGGRESSION
Dissociative Continuum	REST	AVOIDANCE	COMPLIANCE **Robotic/detached**	DISSOCIATION **Fetal Rocking**	FAINTING
Regulating Brain Region	NEOCORTEX Cortex	CORTEX Limbic	LIMBIC Midbrain	MIDBRAIN Brainstem	BRAINSTEM Autonomic
Cognitive Style	ABSTRACT	CONCRETE	EMOTIONAL	REACTIVE	REFLEXIVE
Internal State	CALM	AROUSAL	ALARM	FEAR	TERROR

The Adaptive Response to Trauma

The brain mediates threat with a set of predictable neurobiological, neuroendocrine and neuropsychological responses.

These responses may include different 'survival' strategies -- ranging from fighting or fleeing to 'giving up' or a 'surrender' reaction.

There are multiple sets of neurobiological and mental responses to stress. These vary with the nature, intensity and frequency of the event. Different children may have unique and individualized 'response' sets to the same trauma.

Two primary adaptive response patterns in the face of extreme threat are the hyperarousal continuum (defense -- fight or flight) and the dissociation continuum (freeze and surrender response). Each of these response 'sets' activates a unique combination of neural 'systems'.

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

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

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.

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

Support

- Relational (safe, stable)
- Relevant (geared to child’s developmental stage, not chronological age)
- Repetitive (creating patterns)
- Rewarding (pleasurable)
- Rhythmic (resonant with rhythmic patterns)
- Respectful (of the child, family and culture)

Support

Encourage abstract thought, puzzles

Facilitate socio, emotional and group Activities, turn-taking, winning, losing

Incorporate somatosensory integration

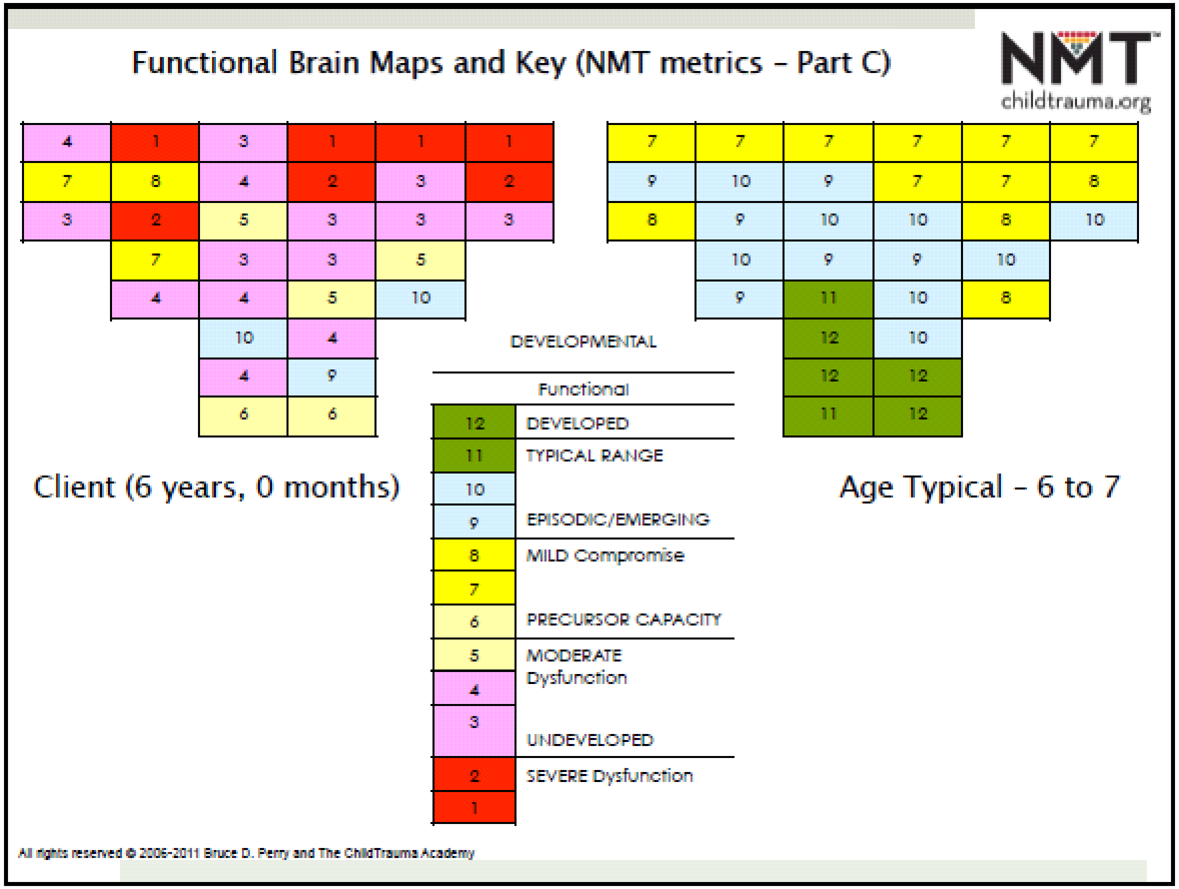
Establish state regulation, tactile play

Support

Dr. Bruce Perry's Six Core Strengths for Children:
A Vaccine Against Violence

ATTACHMENT:	being able to form and maintain healthy emotional bonds and relationships
SELF-REGULATION:	containing impulses, the ability to notice and control primary urges as well as feelings such as frustration
AFFILIATION:	being able to join and contribute to a group
ATTUNEMENT:	being aware of others, recognizing the needs, interests, strengths and values of others
TOLERANCE:	understanding and accepting differences in others
RESPECT:	finding value in differences, appreciating worth in yourself and others

Support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Age Typical – 6 to 7
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Sensory Regulation Patterns

	Behavioural Response Patterns		
Neurological Threshold Continuum		Passive	Active
	High Threshold (Less Sensitive)	**Low Registration** -notices less, -tolerates lots	**Sensation Seeking** -notices less, -seeks more
	Low Threshold (More Sensitive)	**Sensory Sensitivity** -notices more, -distractible -doesn't actively respond	**Sensation Avoiding** -notices, -doesn't tolerate, -does everything to avoid more

To increase sensory registration

- Concentrate sensory information so thresholds are more likely to be met
- Give multi-modal input – visual, auditory, tactile, 'doing'
- Example: tell the child a task, get them to repeat the instructions back to you, give them a written/picture instruction placed on a contrasting sheet of paper

To manage sensory avoidance

- Respect child's need for less sensory input
- Gradually introduce a wider range of sensory input.
- Change only one thing at a time until they get used to it
- Example: introduce one new texture of food mixed in with usual diet.

To reduce sensory over-sensitivity

- Need sensory input that helps add information to complete the task but is not arousing/alerting.
- Firm pressure touch
- Linear movement (not bending or spinning)
- Predictable patterns, not unexpected stimulation
- Brushing program

To reduce sensory seeking

- Increase sensory input, give them what they need
- Do not make them wait/use it as a reward, but incorporate into daily activities
- Look at behaviour to determine what input is needed. Eg. Constant fidgeting, use movement task; touching things, use tactile input