Calming the Fear-Driven Brain: Neurofeedback in Developmental Trauma

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Outline

Developmental trauma
The role of fear, shame and anger
Arousal: state, trait and personality
Neurofeedback models
Protocols
Psychotherapy and neurofeedback
Developmental Trauma

Often misdiagnosed

History of neglect, abandonment, loss of mother, emotional, physical or sexual abuse

Clinical assessment is vital

PTSD

RAD

Personality Disorders

Dissociative Identity Disorder; Dissociative Disorders
DSM and neurofeedback

Yoked to these discreet disorders

The human connectome Jan 2013

Common factors: working memory, fear circuits

NIMH- Finally open to researching neurofeedback!

Psychopharm: NeurEnhance

◦ No new psychotropic since 1990s
◦ 2 billion to bring new med to market
Fear-based Traits

High arousal as a base line

Chronic vagally mediated illnesses
- IBS; diarrhea; constipation
- Stomach pain; heart burn; reflux; hiccups

High levels of emotional reactivity

Poor affect regulation

Difficulties in relationships

Seen in DTD, RAD, PTSD, DID, BPD and APD

Traits are inherent to Axis II diagnosis
Axis II Fear

BPD and APD arise from neglect and/or abuse (both once DTD)

Lacking self, people identify with powerful sub-cortical affects.

They are their feelings

They have fear and shame based identities

Axis II- Disorders of high sub-cortical arousal

On going and/or easy kindling of fear circuits
Addiction

Addiction is attempt at affect regulation gone wrong
Developmental trauma disposes toward addiction
Peniston and Kulkosky protocols
Alpha-theta
Alpha-theta cautions with developmental trauma
Developmental trauma

PTSD and RAD inadequate diagnoses

Children experience and witness abuse and neglect in the context of their most important relationships

Their nervous systems form in response to absence of caretaker and to unrelenting threat all too often from caretaker

No internalized experience of safety  9/11
DEVELOPMENTAL TRAUMA

- Neglect
- Abuse: emotional; harsh discipline; domestic turmoil
- Assault: sexual; physical; sadistic
- Parental mental illness
- Primary insecurity
  - Parental absence
  - Food; malnutrition
  - Home/shelter
  - Domestic conflict, threats
  - Drugs
- Major impact on the developing brain and nervous system
- ACE study
- Major societal impact
Adverse Childhood Experiences (ACE) Study

- Ongoing study based on data from Kaiser Permanente Health Plan members conducted in conjunction with the U.S. Centers for Disease Control (CDC).
- Study cohort of >17,000, largely middle class.
  - 50/50 male/female.
  - 80% White (inc. Hispanic); 10% Black; 10% Asian.
  - Average age of 57.
  - All had good health insurance.
- The study originally dealt with obesity.
The likelihood of dropping out related to the number of *Adverse Childhood Experiences the subjects encountered* – This Effect Turned Out to Generalize to Other Health Problems.

- Originally identified eight categories (stressors) when reviewing first wave of data: Before the age of 18 did you experience:
  - **Abuse:**
    - Emotional/recurrent threats/humiliation.
    - Physical (beating).
    - Sexual (with “contact”).
  - **Dysfunctional home:**
    - Mother treated violently.
    - Family member = alcoholic / drug user.
    - Imprisoned household member.
    - Chronically mentally ill with or without psychiatric hospitalization.

- Added categories of neglect with second wave:
  - **Neglect:**
    - Physical neglect.
    - Emotional neglect.

- One of more instances of any one category counts as **one ACE score**.
  - ACE score range is zero to ten (0-10).
ACE cont.

They were quantitative measures:
\[ \text{◦ Did you ever experience...} \]

In essence, it is just a simple checklist.
\[ \text{◦ The more boxes you checked, the higher your ACE score, the more likely you were to encounter a range of mental & physical health problems.} \]
ACE and Developmental Trauma

Kids and adults who suffer from conditions related to developmental trauma will have high ACE scores.

Their qualitative experience would also be high.

Rarely if ever one instance of incest or beating or humiliation.

The symptoms are never as bad as the conditions that gave rise to them.
ACE data

Women are 50% more likely to have an ACE score of 5 or above.

Men who have an ACE score of 6 are 4600% more likely to become IV drug abusers than men with ACE score of 0.

ACE score 5 predicts 20 year shorter life span in both men and women.
For those with up to a maximum of 4+ ACEs, the following risk factors and disease conditions were found to be substantially more common (compared to those persons with 0 ACEs):

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Increase Factor</th>
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</thead>
<tbody>
<tr>
<td>Cigarette Smokers to 2+ times (x)</td>
<td>IHD 2.2 x</td>
</tr>
<tr>
<td>those with no ACEs</td>
<td></td>
</tr>
<tr>
<td>Severe obesity 1.6 x</td>
<td>Cancer 1.9 x</td>
</tr>
<tr>
<td>No leisure time physical activity 1.3 x</td>
<td>Stroke 2.4 x</td>
</tr>
<tr>
<td>Depressed 2 weeks 4.6 x</td>
<td>COPD 3.9 x</td>
</tr>
<tr>
<td>Suicide attempt 12.2 x</td>
<td>Diabetes 1.6 x</td>
</tr>
<tr>
<td>Alcoholic 7.4 x</td>
<td>Broken bones 1.6 x</td>
</tr>
<tr>
<td>Illegal drug use 4.7 x</td>
<td>Hepatitis/jaundice 2.4 x</td>
</tr>
<tr>
<td>Injected drugs 10.3 x</td>
<td>Fair/poor health 2.2 x</td>
</tr>
<tr>
<td>Had an STD 2.5 x</td>
<td>50+ intercourse partners 3.2 x</td>
</tr>
</tbody>
</table>
Developmental trauma

Motherlessness:

Acute states of terror; chronic ambient background fear

Lack of development of pre-frontal cortex, DMN and cerebellum

Lack of affect regulation

No cause and effect- the basis of all learning

Lack of self and other
Attachment, Fear and Self-Organization

Unrepaired attachment disruption is at the core of most serious psychopathology.

Unrepaired attachment disruption and/or trauma leaves the disorganized infant in a state of baseline survival fear.

When fear and its amygdaloid neighbors, shame and rage, rule we see psychopathology.

The greatest of these is fear.

These are the drivers in developmental trauma.
Limbic circuitry

Fear, shame and rage/anger are primary affects of the limbic brain

We are always “treating” the limbic brain

Highly aroused, reactive nervous systems driven subcortically, particularly in the non verbal right hemisphere

Talk therapies focus on the cortical, verbal and frontal left hemisphere

Geographically the furthest away from non verbal, subcortical center of the problem: RH survival amygdala
Fight, flight and/or freeze

Porges- Polyvagal theory

- Reptilian freeze response = dissociation
- Mammalian fight or flight
- Social vagus

Dissociation is parasympathetic but beneath it is terror, rage and shame; sympathetic activation

These patients are unable to quiet arousal or regulate affect

Babies and small children have no capacity for flight of fight
Controls (n=16): Positive Correlation

PTSD (n=18): Positive Correlation

Bluhm et al. J of Psychiatry & Neuroscience, 2009
Breakdown in cortical timing in PTSD


Values based on comparisons of relative rCBF with subject average gCBF normalised to 50mL/100g/min

Clark, McFarlane, Morris, Weber, Sonkkilla, Marcina, Egan (in submission)
The Primacy of Fear

Fear is the core emotion in psychopathology

Joseph LeDoux, The Emotional Brain
Schore: Fear and Psychopathology

Affect regulation depends on adequate brain structure and function in the right hemisphere, particularly the ROC (Right Orbital Frontal Cortex-Schore)

Mothering builds ROC and the cerebellum (sensory processing and early inhibition of temporal lobes)

The insula, the ACC and then the ROC inhibit the amygdala, i.e.

- fear, shame and rage

To the extent they are developmentally or structurally compromised, fear, shame and rage rule
Development of Amygdala Inhibition

RH amygdala fully developed in utero (5-6 months, coincident with fetal movement) (Treat the mother?)

Cerebellum (inion ridge)

Right Insula (FP8)

ACC (FZ)

Right Orbital Cortex/ right pre-frontal cortex (FP2? ; FPO2)

DMN (PZ and AFZ)
Quieting Fear (the Arousal Model)

By addressing frequencies that give rise to over arousal, neurofeedback helps to quiet fear. With DTD this is our primary goal.
Thesis

Arousal (brain)

Personality Identity

Traits (climate)

Affect (mind)

States (weather)
Thesis

Neurons fire
Arousal (brain)
Affect (mind)
State (weather)
Justifying narrative ("syntonic")
Trait (climate)
Personality- This is just who I am
Identity- Identification with all this
Fear-based States

Sympathetic arousal: scared all the time or never
CNS in constant over drive
Reactivity
Hyper vigilance
Impaired empathy
Reduced capacity for self and other
Problems with trust: too little or too much
Vagally mediated illnesses
State dependence

We believe our states

All states come with justifying narratives

The more fear driven the more compelling

They appear to relate to survival

We are all state dependent

Fear states deregulate

These are the states most known to people with DTD – often called severe depression
State to Trait

Traits can be understood as states rehearsed repeatedly and reinforced by experience

“What fires together, wires together” – Hebb

Weather (states) transforms into weather patterns which over time become the climate (traits, personality)

In DTD, the “amygdala storms” become the stormy climate—a place no one wants to live and few want to visit
Axis II Fear

BPD and APD arise from neglect and/or abuse (both once DTD)

Lacking self, people identify with powerful sub-cortical affects.

They are their feelings

They have a fear-based identity

Axis II- Disorders of high sub-cortical arousal

Unrelenting activation of fear circuits in DT
Personality

Collection and interplay of traits
Reinforced overtime by experience
Wiring together and firing together
Traits we identify as “me”

In DTD and subsequent Axis II conditions, the personality is overtaken by shame, rage and terror.
Identity

Parents, siblings, peers, culture, gender, race, class, body, genetics, epigenetics all contribute to our sense of identity

Nature, nurture and fate
  ◦ Temperament?

Arousal, affect and self-regulation

Ambient fear is “self”; it is at the core of their identity
Trauma Identity

Fear-based
Shame-based
Anger is there somewhere
Self-describe as depressed - over aroused
Rage-driven – both BPD and APD
No sense of self separate from affects
No self; no “other”
Trauma Identity, 2

Identity is highly unstable

Cannot trust their own minds

Cannot perceive the other

Lack a theory of mind

Often do not trust the motivations of the other

Limited understanding and access to what drives them

Profoundly motherless
Motherlessness

The extent to which one can regulate their affective states correlates highly with how well their mother could regulate her (his) own in this person’s early childhood.

Good-enough mothering = affect regulation

The more motherless, the more fear

What happens when you quiet fear
The NF Healing Paradox

Your goal is to reduce fear

When you reduce fear, you challenge fear-based identity

Many will cling to fear as if it were life itself.

It is. It is who they are

Fear has also been the primary validation of a traumatic past

“Amygdala resistance”
The Healing Crisis

- There is no other path: we must reduce fear
- We also must reduce fear of no fear/no self
- 1. Recognize the dilemma
- 2. Help them recognize the dilemma
- 3. Prepare them for it
  - Neurofeedback
  - Therapy
  - Meditation
  - Breathing
  - Tapes, relaxation exercises
- There will be many rounds- both the brain and the mind gravitate toward the familiar
What is Possible

- Neurons fire: regulated and quieted sub cortically
- Arousal: Lowered and regulated
- Affect: Full range of affective states available; calm prevails
- State: Flexible, calm, often happy, even peaceful
- Narrative: As it arises and seen for what it is
- Trait: Begin to give way
- Personality: Reorganizing sense of self; pro-social
- Identity: No fear means a new identity
Affect Regulation

More than any other single thing, affect regulation is the gift of the “good enough mother”

Affect regulation is the single most important contribution of neurofeedback

Once the person experiences ongoing internalized regulation of their own emotions, they will feel mothered now and back in time

This has to be done within a secure relationship with an other, not just with a training system
Placements: Triangulate the Amygdala

Temporal lobe focus:
Initially, T4-P4 or T3-T4 (Othmer)
T4-F8, T4-FZ

Cingulate focus:
FZ-A2 and or PZ-A2
FZ-CZ; CZ-PZ Precuneus

Prefrontal focus:
FPO2 (Fisher)
Rewards and Inhibits

10.5-13.5, up or down as needed, guided by person’s response

Usually lower, to 0-3 or beneath 1 HZ

The temporal lobe/slow-wave concern

Case vignette of FPO2

Inhibit through spectral

Default inhibit in DTD: 1-6 HZ

Fear seems encoded in these slow frequencies

Overlapping rewards and inhibits
Alpha Suppression

Lanius and Ros (Mind over Chatter)

PZ: 8-12 down

Alpha rebound after tx

Organizes the default mode network

Improvement in self-system; more coherent sense of self

Significant decreases in dissociation
Left hemisphere training

Always keeping your awareness on raising arousal beyond what’s helpful

Left hemisphere can be trained quite low

Will be required in most people with DT, but add only as symptomatically indicated

Temporal focus
Default Mode Network Protocols-Kaiser

Disconnections in the DMN may be biomarker for developmental trauma- Lanius, et al.

Q based looking at the cingulate or the DMN, the self system

Amplitude synchrony or comodulation at PZ and AFZ T3 and T4 and other sites as well depending on the map

Ohio story
Consider the Cerebellum

Teicher and Anderson: Limbic instability

The vermis and abuse

The need for holding/rocking to organize the brain
  ◦ Harlow and Heath
  ◦ Training at the back of the brain

  ◦ The cerebellum always shows up in scans of DT (Lanius and van der Kolk)
Cerebellum Protocols?

01-02

TPO-TPO (Temporal parietal occipital junction)

PZ

Inion - does it regulate the vermis?

Beta Reset (Gisburne)
  ◦ Are we reaching the cerebellum?
  ◦ These sites have EEG and are trainable
Therapy

All therapy is about regulation

If you disagulate either with NF or inquiry, recalibrate

The therapeutic relationship is there to contain training issues

Abreaction reinforces fear circuits

Avoid cathartic or exposure therapies

Lack of progress is not resistance

Dual track listening-the brain and the brain’s owner
Transference

Negative transference is sub-cortical event

This over arousal and the distortion it brings can rarely be mitigated by talk therapy

With DTD, I work to minimize transference

Stress the partnership

The difficult balance: Profound motherlessness (an unbearable yearning) and minimizing transference

Affect regulation=mother
Summary

The primacy of fear

Fear-based or “trauma identity”

Training goal is fear reduction

Find the protocol(s) that accomplish this

Success creates therapeutic crisis

Anticipate this-fear of loss of self and loss of you

Befriend the emerging identity
NEUROFEEDBACK
IN THE TREATMENT OF
DEVELOPMENTAL TRAUMA

Calming the Fear-Driven Brain

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Thank you!

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Intergenerational Transmission of Trauma