

Trauma and Altered States of Consciousness: Toward the Rebirth of the Self

Ruth Lanius, MD, PhD
Harris-Woodman Chair
Professor of Psychiatry
University of Western Ontario
Canada



Objectives

- Describe the effects of trauma on psychopathology and its relationship to attachment

Discuss 5 dimensions of consciousness that are often affected by trauma-related psychopathology:

TIME (temporarility)

THOUGHT (narrative)

BODY (embodiment)

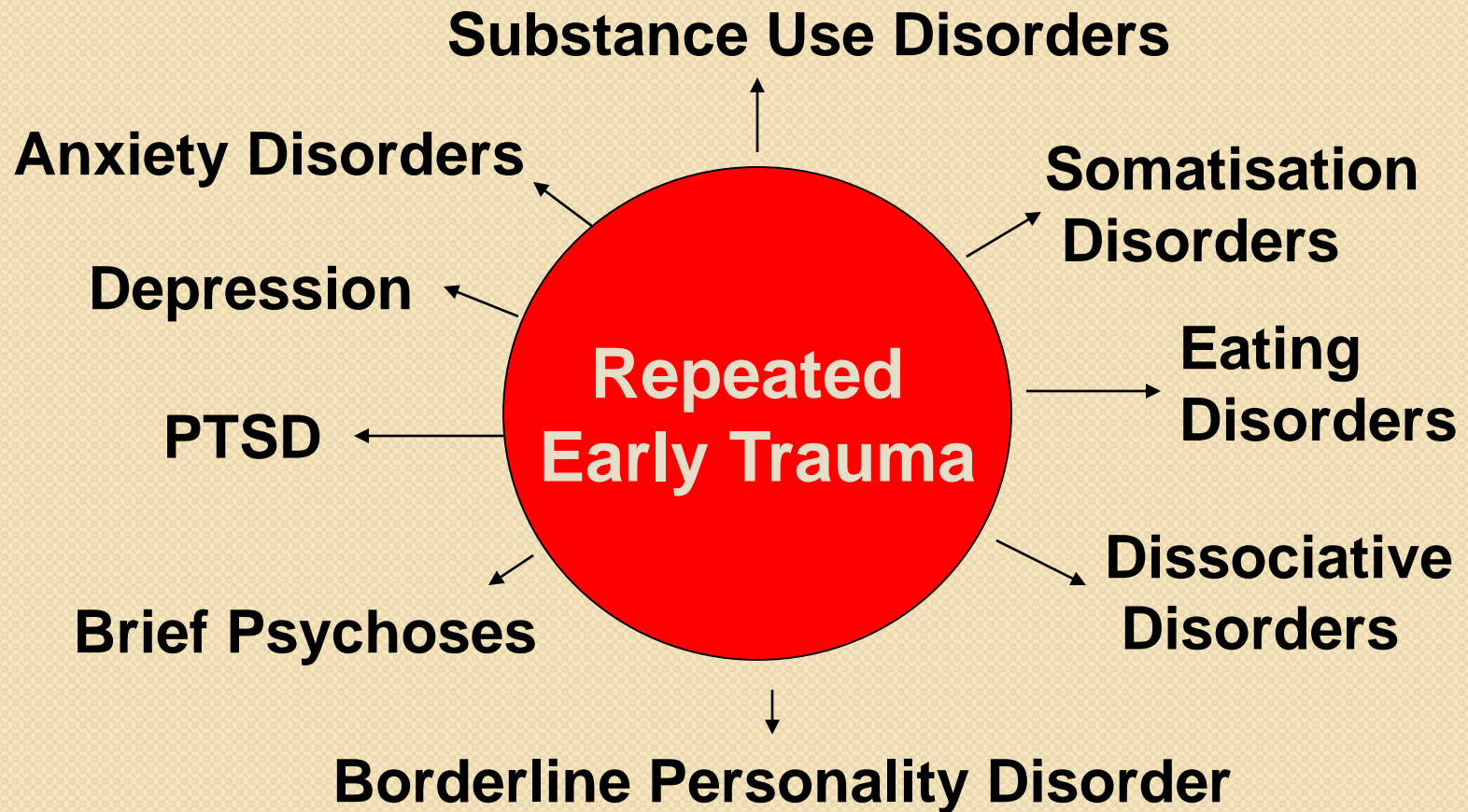
EMOTION (affect)

INTERSUBJECTIVITY

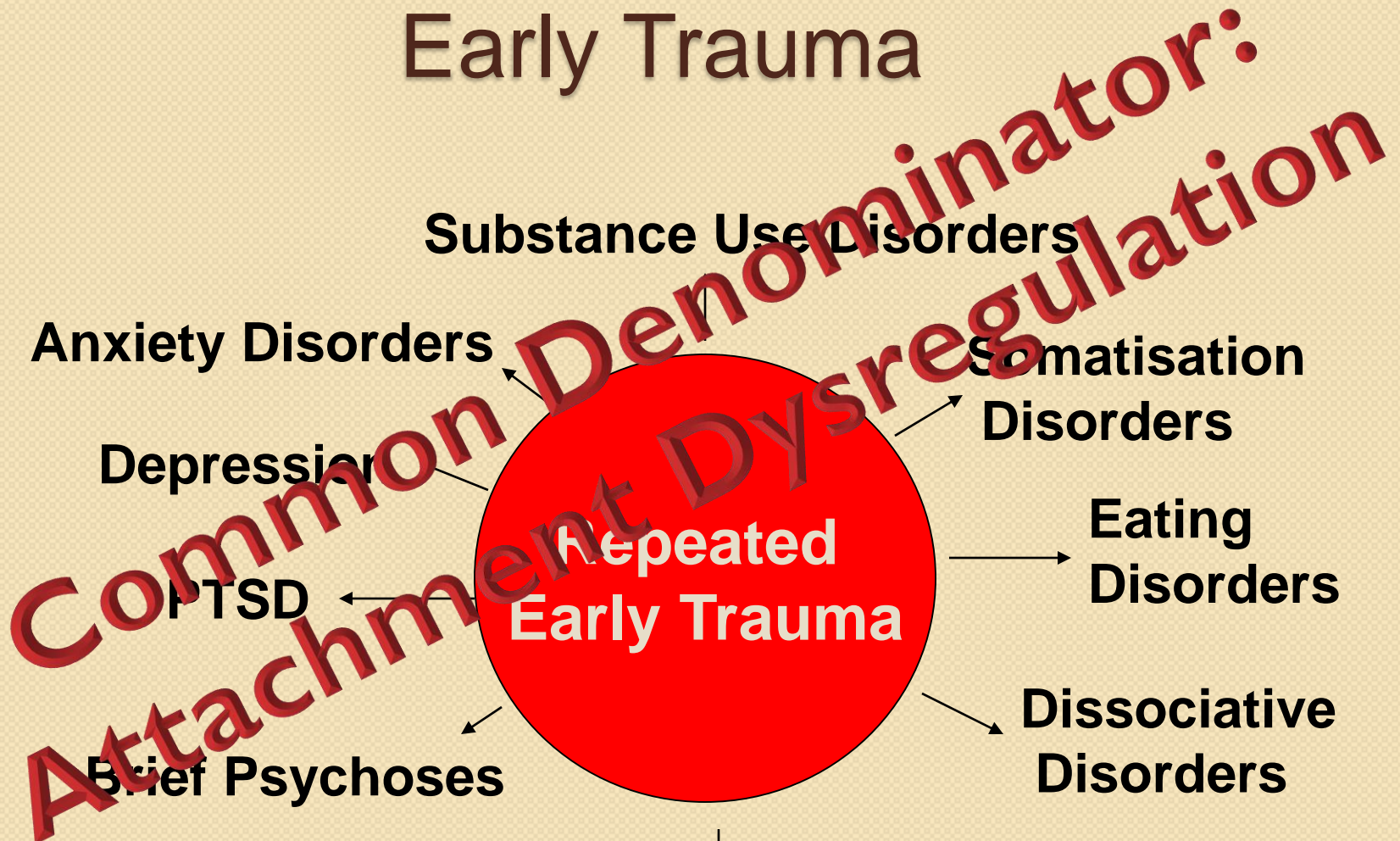
Discuss the role of the reptilian (subconscious) brain

Body, emotion, and intersubjectivity

Psychiatric Comorbidity of Chronic Early Trauma




Psychiatric Comorbidity of Chronic Early Trauma






How Do We Develop Adequate Emotion Regulation Capacities?



The Attachment Relationship: A Prerequisite for an Adequate Window of Emotional Arousal

The more repetitive the traumatic experience or the attachment dysregulation, the greater likelihood of developing severe emotion dysregulation, altered states of consciousness, and dissociation...



*“Extreme states induced by stress and trauma are robustly different on state-defining variables (i.e., dissociated) from normal states of consciousness. **The more severe the trauma**, at least on certain indices, **the greater the likelihood that an individual will be driven into an altered state of consciousness**. Chronic or repetitive trauma leads to a greater number of altered states, which coevolve with time.”*
(Putnam, 1996, p. 176)

Four Dimensions of Consciousness Affected by Psychological Trauma

Time

Experience of “now” (continuous transition between immediate past, present, and future)

Thought

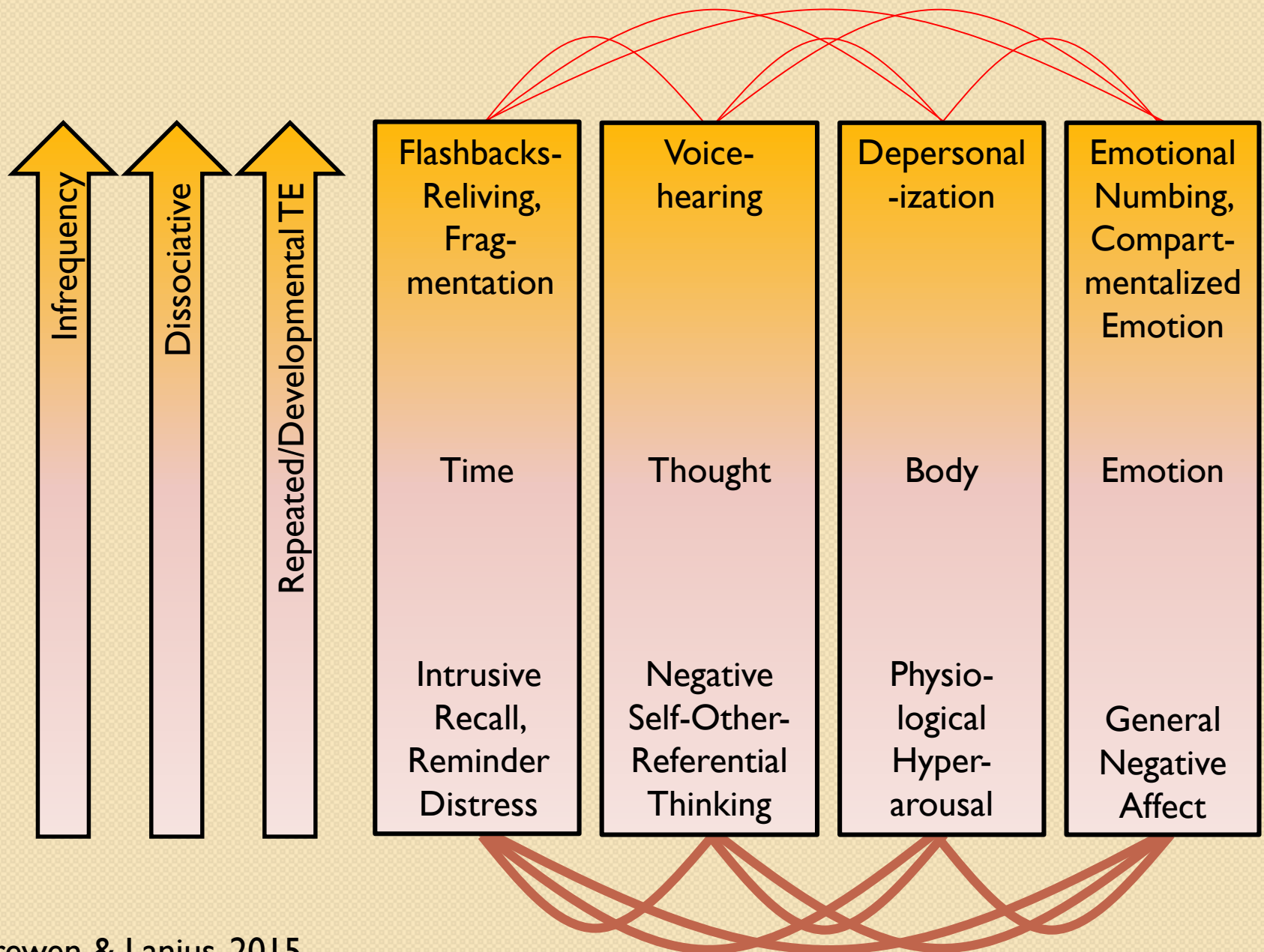
“Story-like” structural organization of consciousness (content, plot, narrator)

Body

Thoughts, feelings, and actions originate from the body

Emotion

Refers to valence, arousal, and distinct emotional feelings



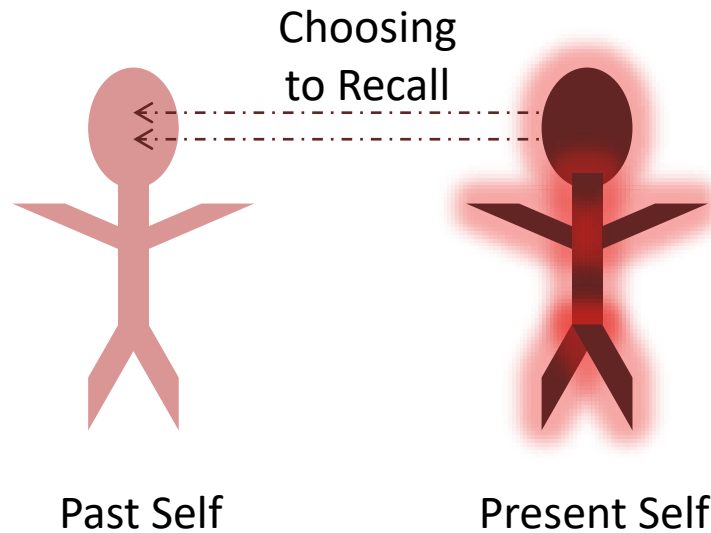


Endel Tulving (2005)

Episodic memory and autonoesis [the ability to mentally place oneself in the past or in the future]: *Uniquely human?*

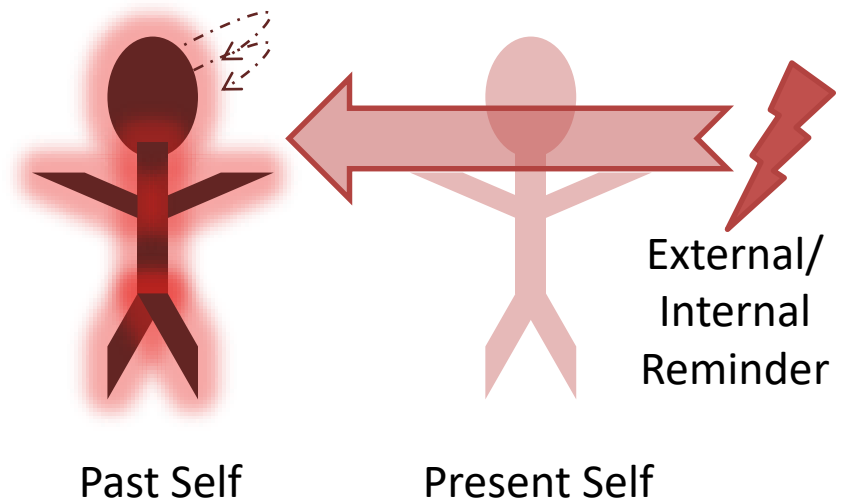
- *Episodic memory differs from other kinds of memory in that its operations require a self. It is the self that engages in the mental activity that is referred to as mental time travel: there can be no travel without a traveler...*

Remembering



Mental Time Travel and Absorption in Recall is 'Partial'. The "I"-Ego resides in the Present Self. Attention is directed, *by choice*, from Present Self to Past Self. The experience is of being in the present, and remembering the past (autonoesis). Awareness of Present Self is thus maintained; the representation of the Present Self outweighs that of the Past Self. Referring to 'mental time travel', in effect, the present self travels back to visit a past self. Considered part of normal waking consciousness.

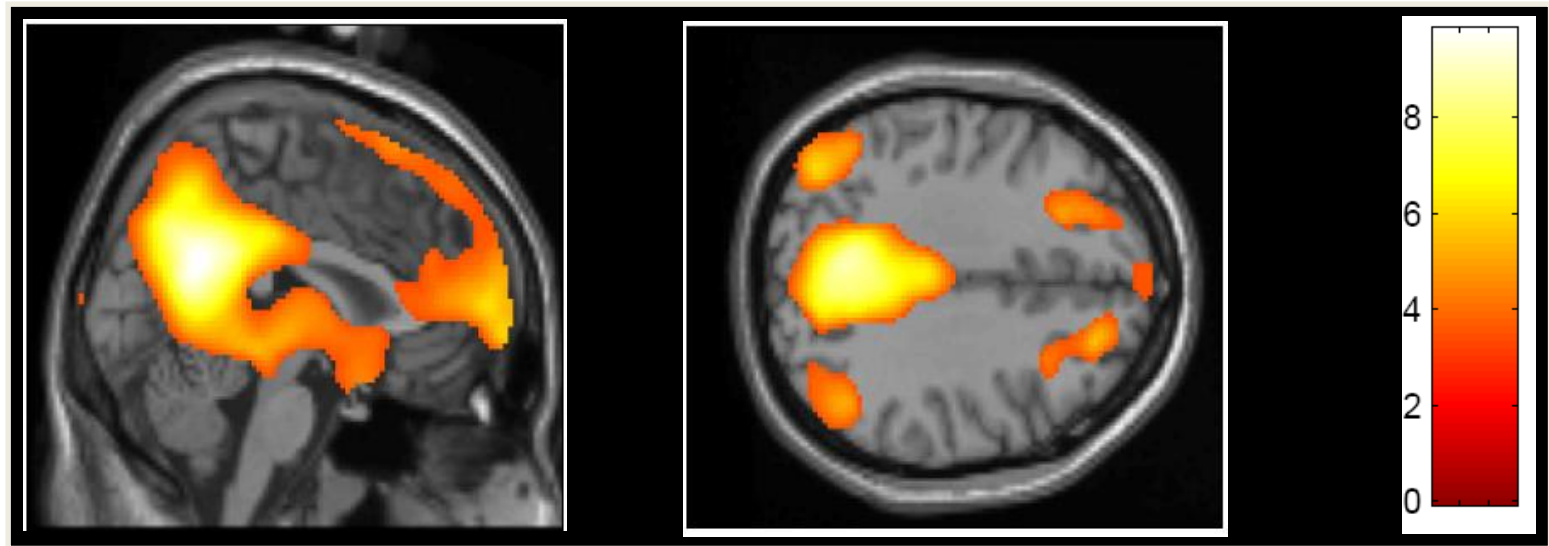
Reliving



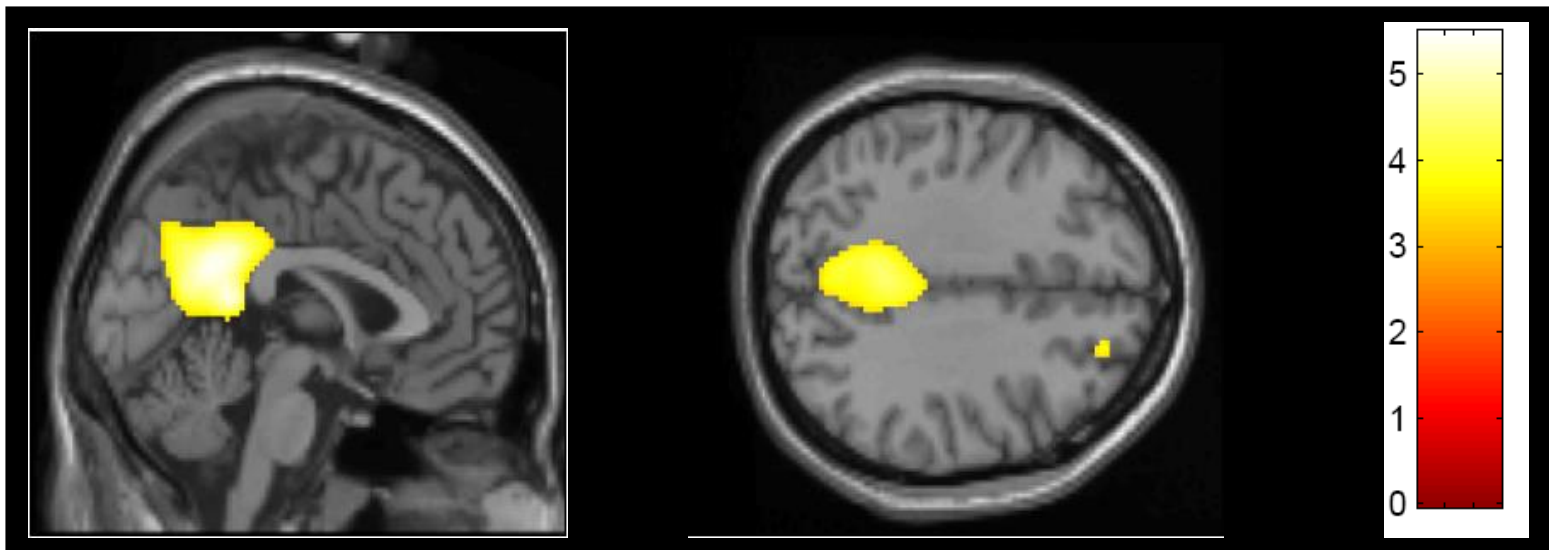
Mental Time Travel and Absorption in Recall is 'in Full'. Recall is not by choice but typically prompted by an external event matching a Past Self State and bypassing a weakened representation of Present Self. The "I"-Ego now resides as if in the Past Self, and attention is directed from Past Self to itself, with Present Self unattended. The experience is thus of being in the past. Awareness of Present Self is reduced; the representation of the Past Self outweighs that of the Present Self. In effect, referring to mental time travel, "there can be no travel without a traveler".

The Default Mode Network as a Model for the Sense of Self/Mental Time Traveller...

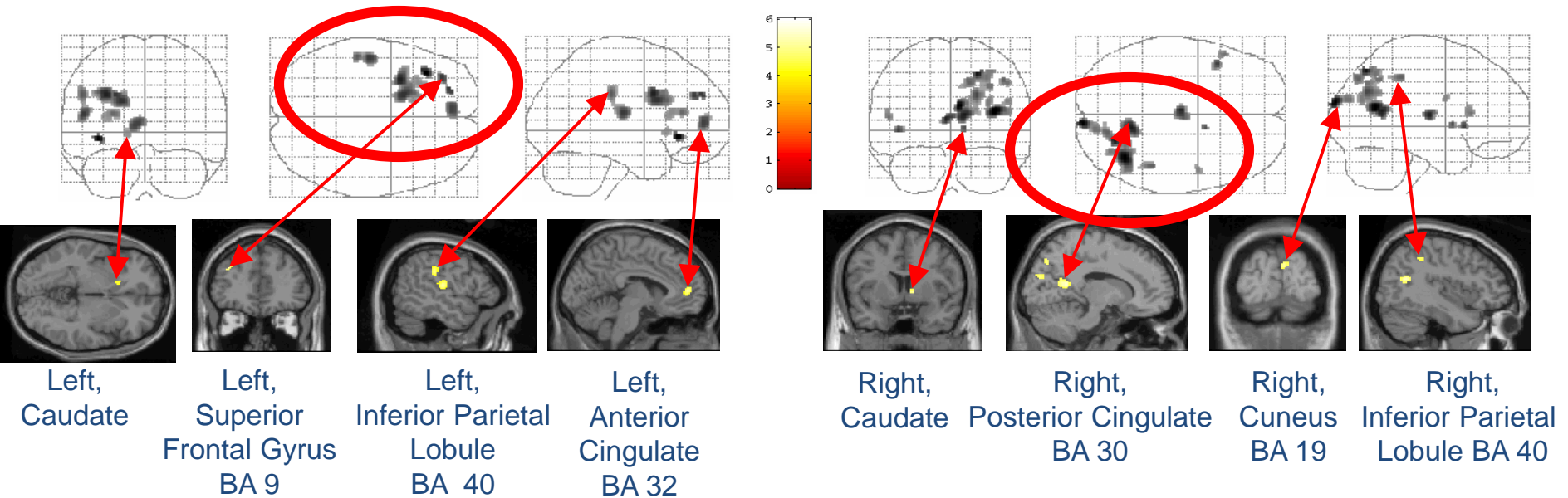
Controls (n=16): Positive Correlation



PTSD (n=18): Positive Correlation



Functional Connectivity Analyses [-14 -16 4] CONTROL (n=11) versus Flashback/Reliving (n=13)



Control > PTSD

PTSD > Control

Clinical Implications

- **PRESENT CENTERED THERAPIES:**
Strengthening the self (e.g., building of safe relationships, including the therapeutic relationship, attachment resources, grounding skills, resource building, positive imagery, increasing positive affect tolerance, increased capacity for emotion regulation)
- **PAST CENTERED THERAPIES:**
Exposure based treatments

Present vs Past Centered Therapies

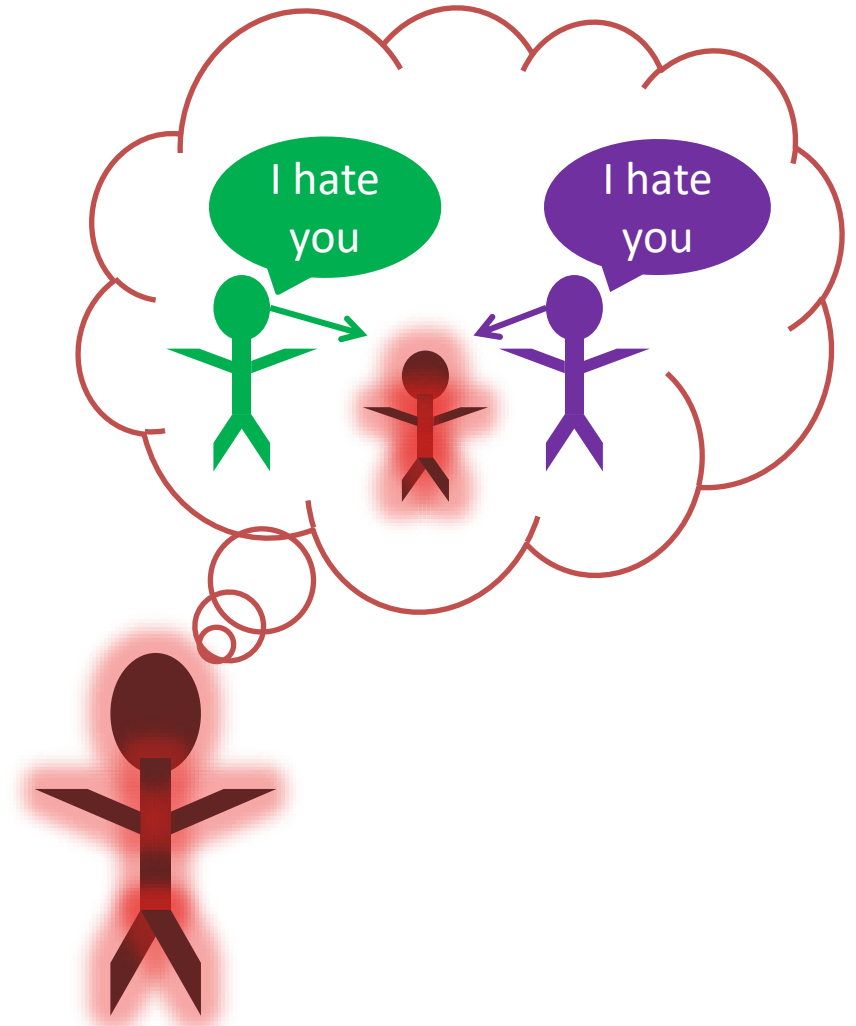
Effects for present centered therapy was similar to a evidence-based trauma focused treatments (Frost et al., 2014; King et al., 2016)

Mindfulness based treatments are also showing efficacy for PTSD (e.g., Heffner et al., 2016; Frewen et al., 2015; Garland et al., 2015)

1st Person Perspective: Thoughts Non-Dissociative



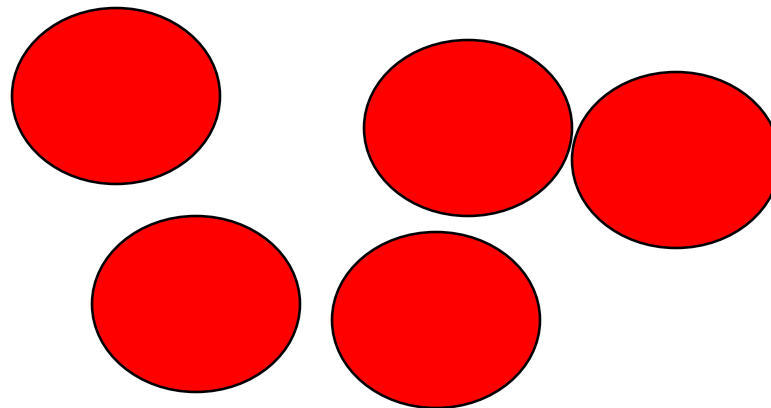
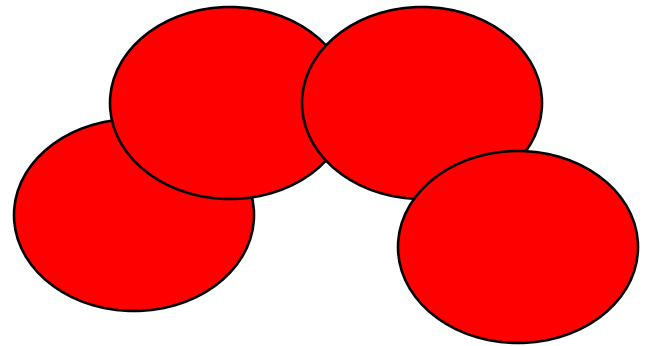
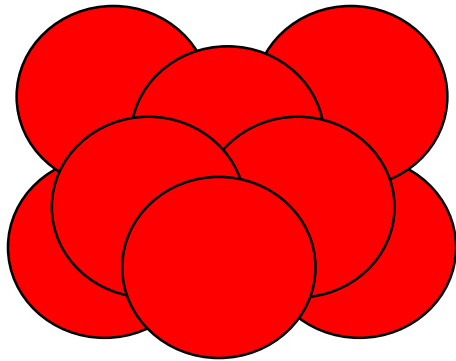
2nd Person Perspective: Voices Dissociative



Dissociative Change in Narrative Perspective

- No longer is person the sole orator of his or her lived experience; another narrative voice(s) also speaks inside his or her head
- The tale of one's moment-to-moment phenomenal experience becomes shared among several speakers, a group conceivably differing in terms of interpretation (e.g., as evaluating an event as good vs. bad), emphasis (e.g., what is worthy of one's attention), affect (e.g., negative vs. positive), goals (e.g., what choices one should make), and sense of time (e.g., present vs. past)

Fragmentation of the Self



Voice Hearing and Trauma-Related Disorders

- Studies have identified an association between early psychological trauma histories and voice hearing (Longdon et al., *Psych Bull*, 2012)
- Prevalence of voice hearing in individuals with trauma-related disorders did not differ significantly from individuals with schizophrenia
- Strong relationship between voice hearing and dissociation ($r=0.52$) (Pilton et al., *Clinical Psychology Review*, 2015)

Differentiating Psychotic Disorders from Dissociation

- Individuals with dissociative disorders were
 - more likely to experience voices before reaching adult age
 - more likely to experience three or more voices
 - were more likely to experience both child and adult voices (individuals with schizophrenia experienced almost exclusively adult-age voices)

Dorahy et al. (2009)



Working with the internalized
voice of the perpetrator...



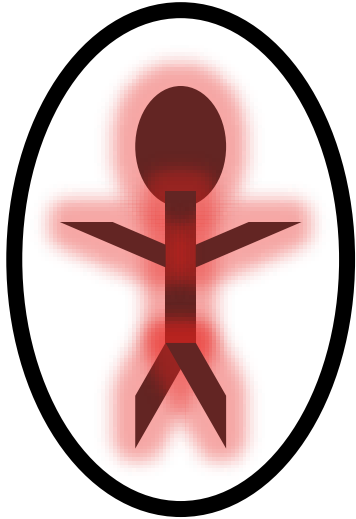
Toward Self-Compassion: Fostering Empathy and Mentilization Among Different Parts of the Self



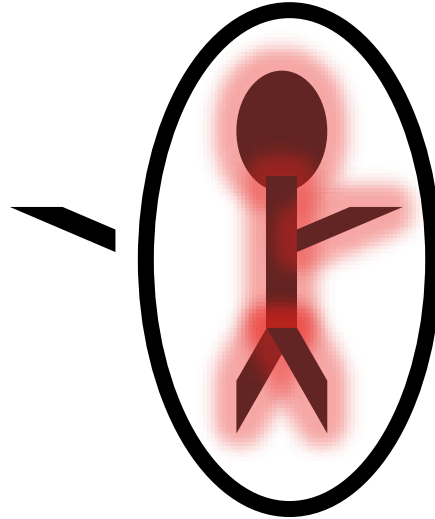
“The Body Keeps the Score.”

Bessel van der Kolk

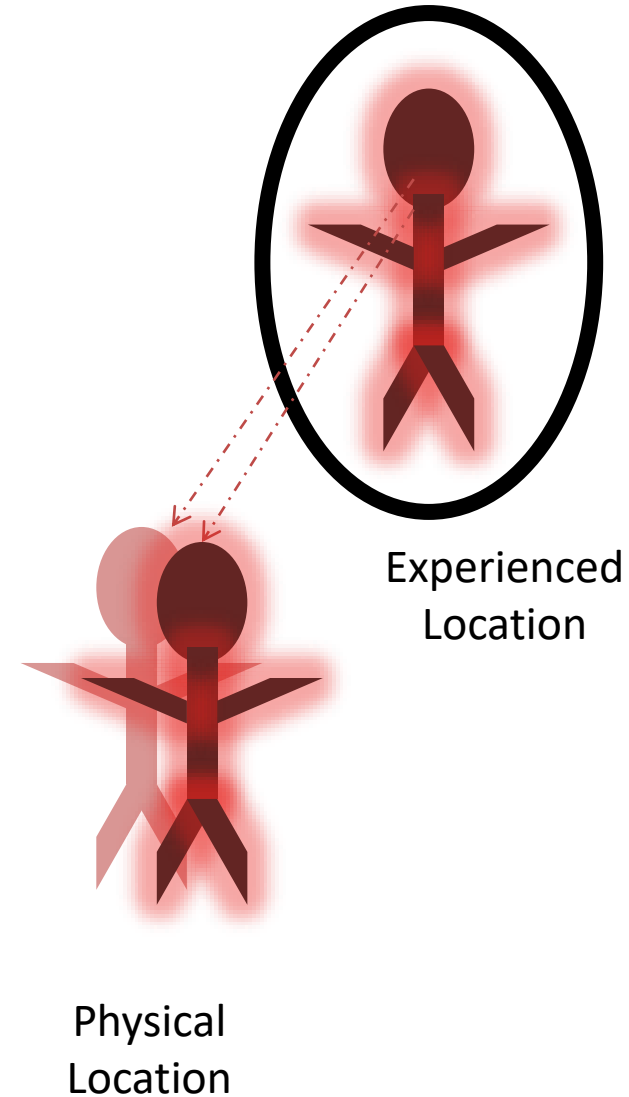
Full Embodiment



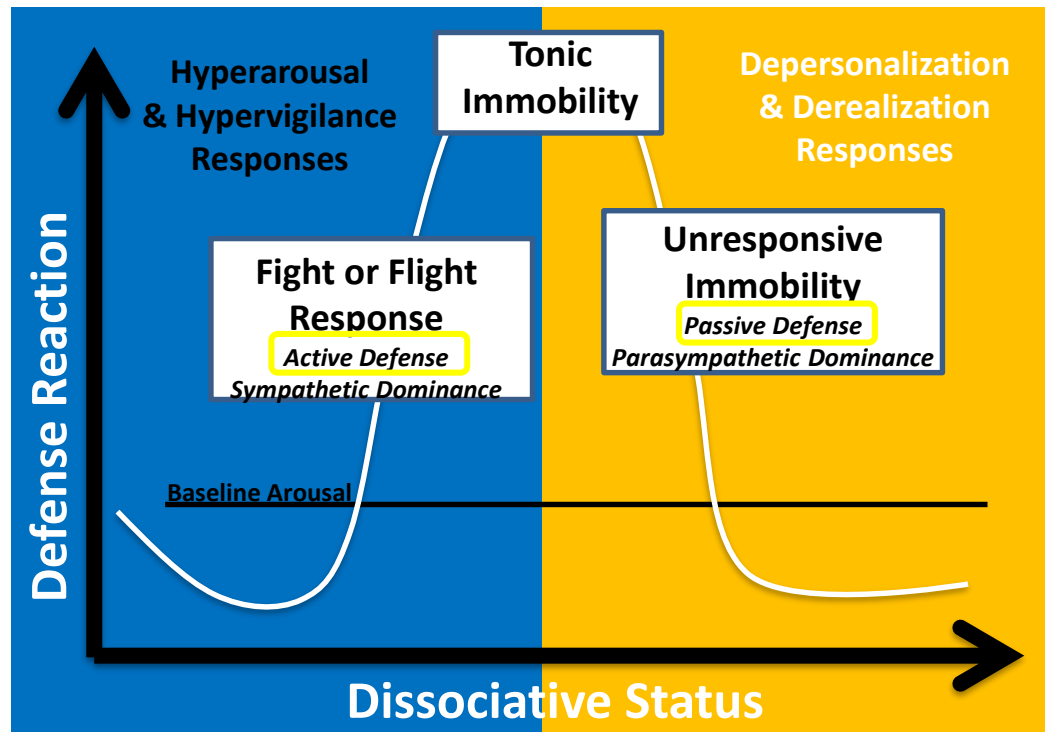
Partial Disembodiment



Full Disembodiment



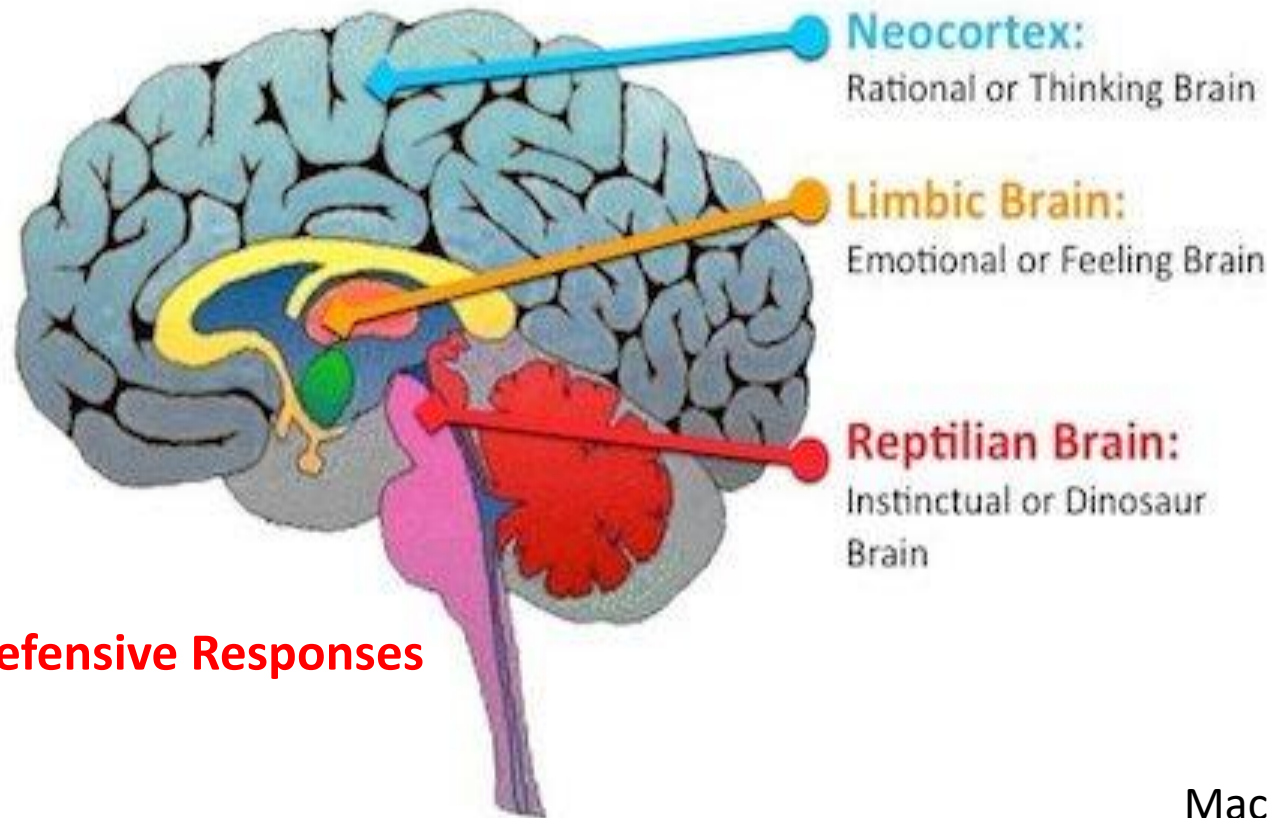
Defense Cascade Model



adapted from Schauer & Elbert, 2010; Kozłowska, 2015

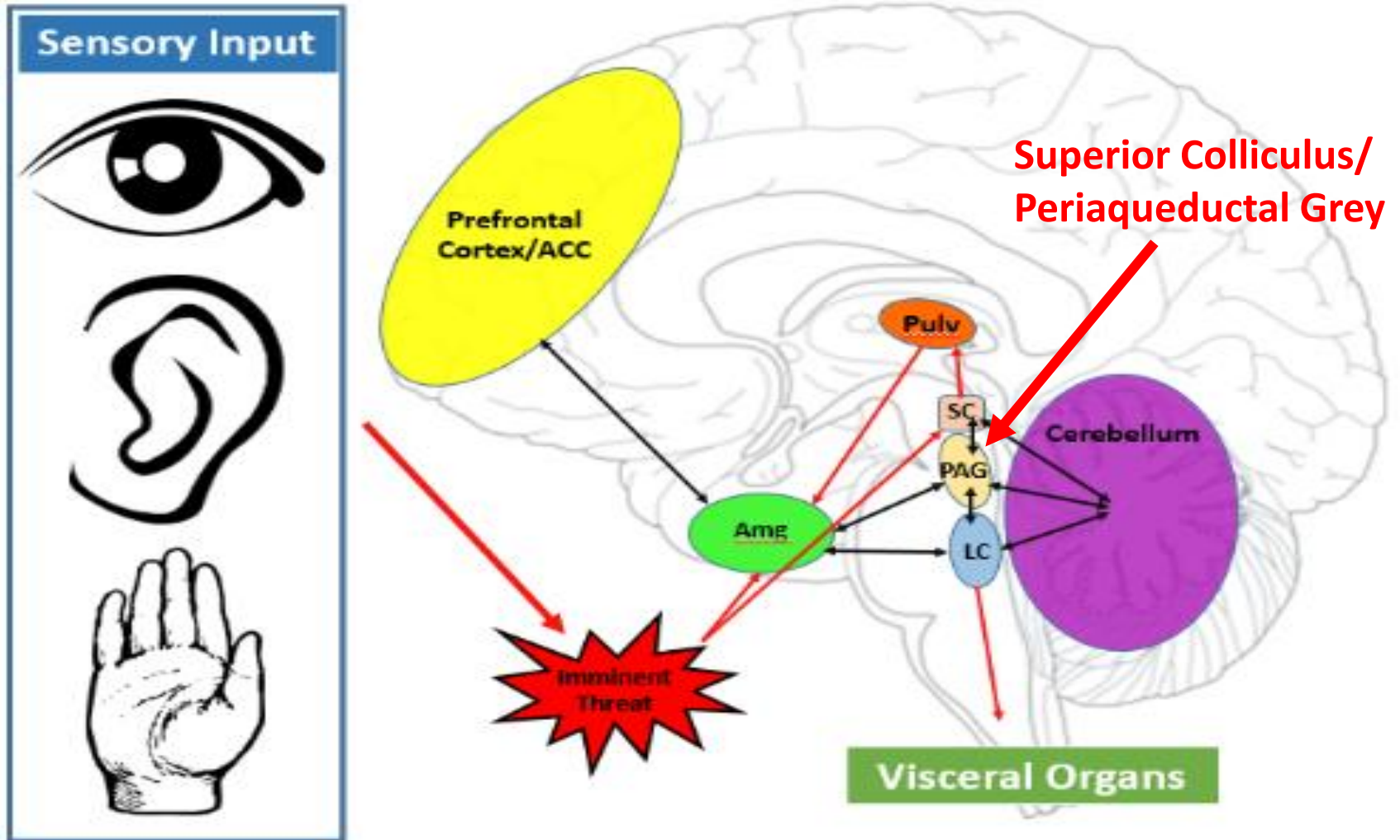
The Reptilian Brain:

The Subconscious Brain



Hardwired Defensive Responses

The Reptilian Brain and the Innate Alarm System

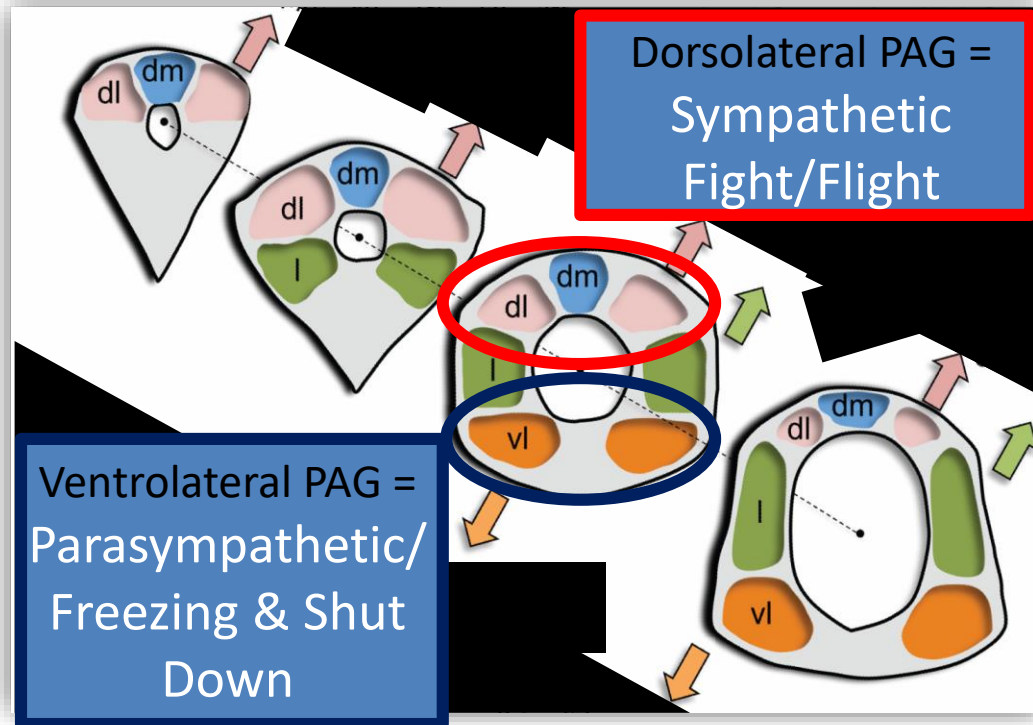


Periaqueductal Gray (PAG)



- Small tube-shaped region in midbrain
- Critical for autonomic regulation and for defensive responses
- Crucial role in basic emotional systems
- Comprised of multiple subdivisions that vary in function

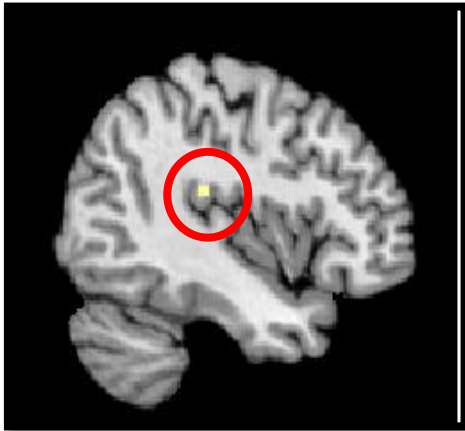
PAG Subdivisions



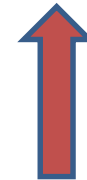
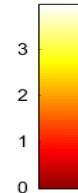
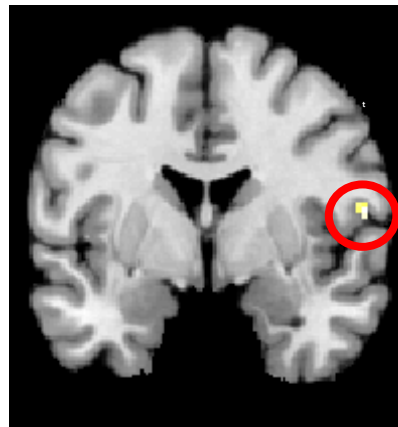
(Bandler et al., 2000; adapted by Linmann et al., 2012)

Dissociative PTSD: Greater Ventrolateral PAG Connectivity

Left TPJ

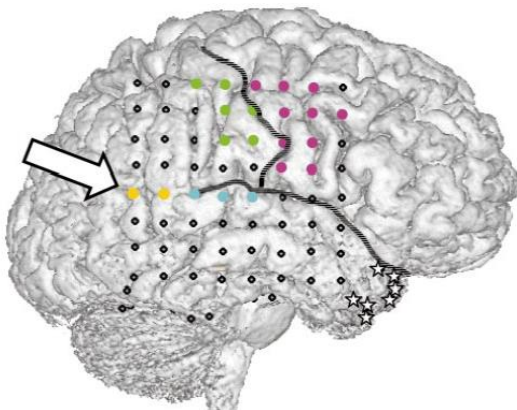


Right Rolandic
Operculum



**Increased
Depersonalization**

(Blanke & Arzy, 2005; Muscatelli et al., 2010;)



Harricharan et al., 2016

The Midbrain Periaqueductal Gray Control of Respiration

Hari H. Subramanian,¹ Ron J. Balnave,² and Gert Holstege¹

¹Center for Uroneurology, University Medical Center Groningen, University of Groningen, 9700 RB Groningen, The Netherlands, and ²School of Medical Sciences, University of Sydney, Lidcombe, New South Wales 1825, Australia

The midbrain periaqueductal gray (PAG) organizes basic survival behavior, which includes respiration. How the PAG controls respiration is not known. We studied the PAG control of respiration by injecting D,L-homocysteic acid in the PAG in unanesthetized precollicularly decerebrated cats. Injections in different parts of the PAG caused different respiratory effects. Stimulation in the dorsomedial PAG induced slow and deep breathing and dyspnea. Stimulation in the dorsolateral PAG resulted in active breathing and tachypnea consistent with the respiratory changes during fright and flight. Stimulation in the medial part of lateral PAG caused inspiratory apneusis. Stimulation in lateral parts of the lateral and ventrolateral PAG produced respiratory changes associated with vocalization (mews, alternating mews and hisses, or hisses). D,L-Homocysteic acid injections in the caudal ventrolateral PAG induced irregular breathing. These results demonstrate that the PAG exerts a strong influence on respiration, suggesting that it serves as the behavioral modulator of breathing.

Key words: midbrain; emotional breathing control; pattern generation; periaqueductal gray; brainstem; respiration

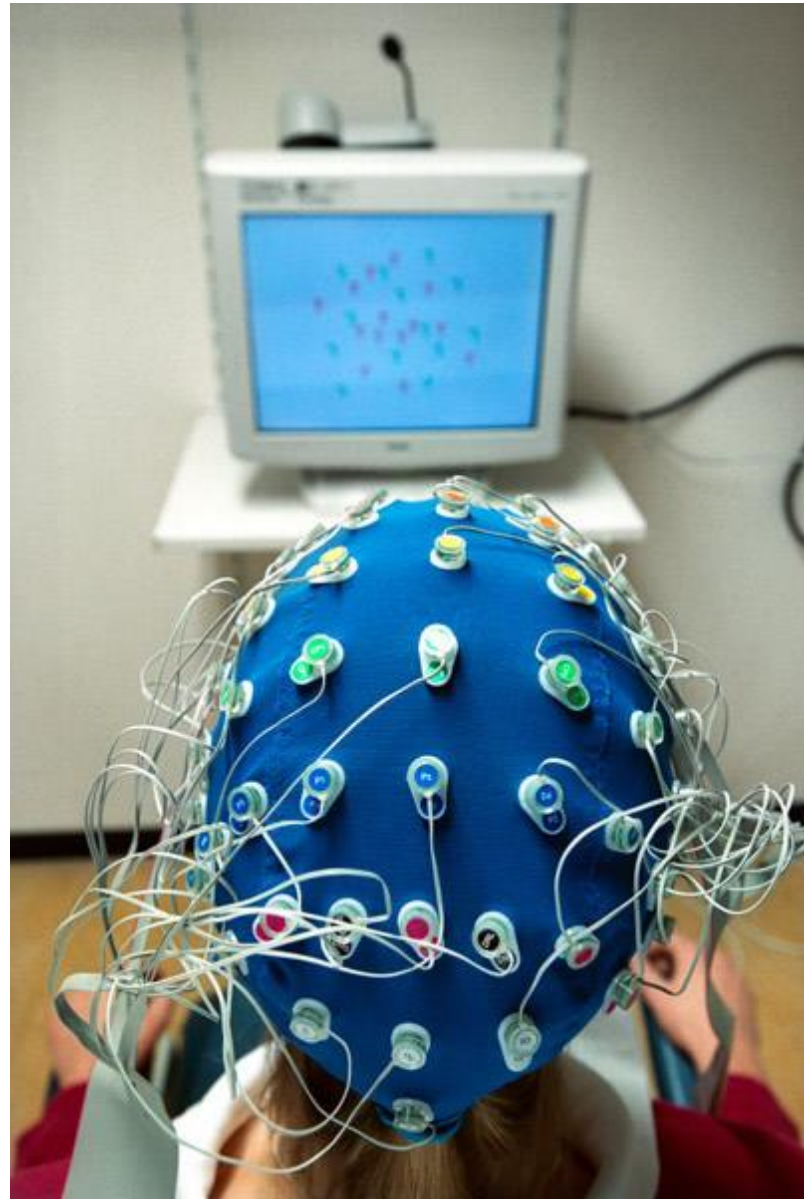


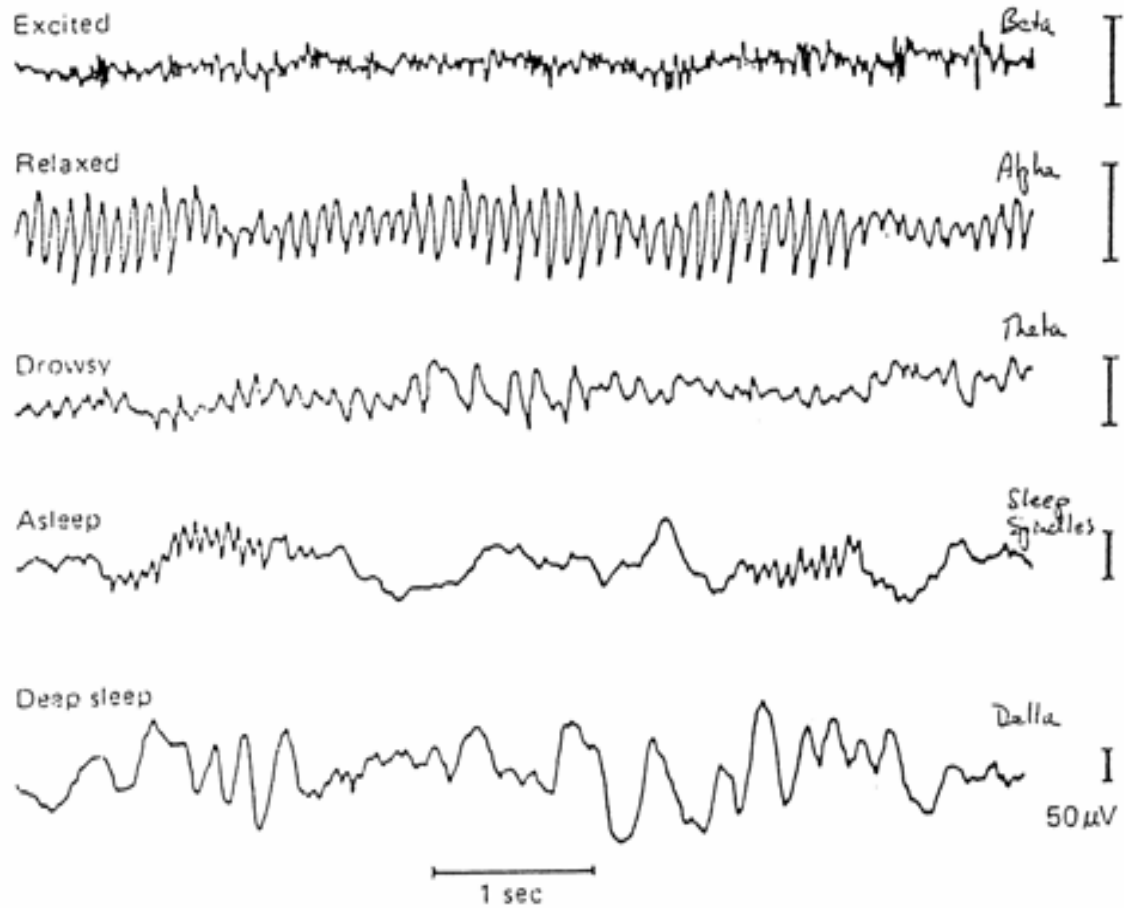
Clinical Implications

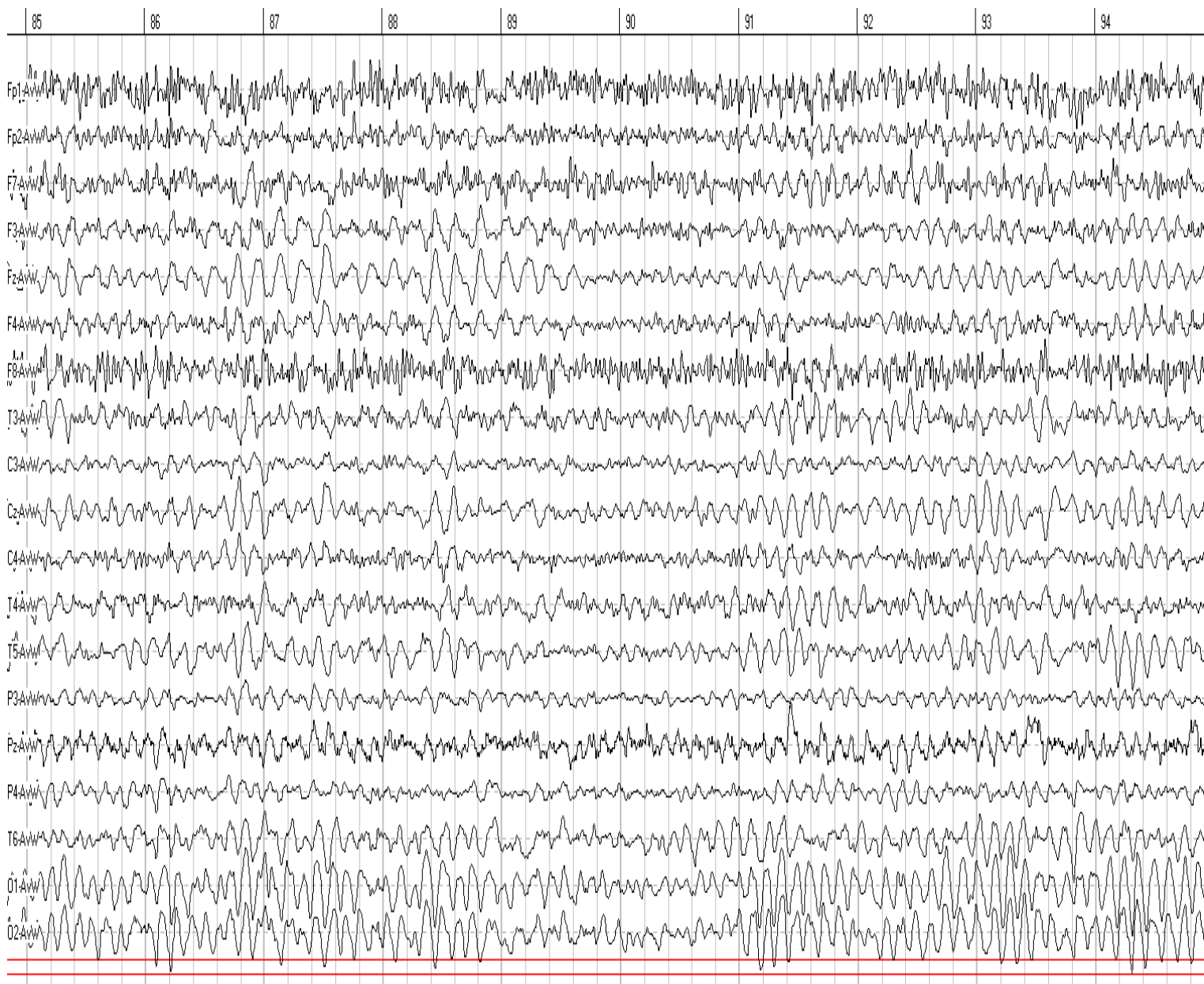
- The use of body scans (e.g., Kabat-Zin) adapted for traumatized clients

A Case Example:
Using Body Scans and
Neurofeedback to Work with
Dissociation and a Fragmented Self

EEG







Patient EEG 1 Compared to Normative Database

	Delta	Theta	Alpha	SMR	Beta1	Beta2	Total
Fp1-AvW	6.22 p<0.005	6.17 p<0.000	8.23 p<0.000	2.36 p<0.000	3.95 p<0.000	10.81 p<0.000	58.27 p<0.016
Fp2-AvW	0.14 p<0.594	2.66 p<0.008	6.14 p<0.000	0.74 p<0.005	1.19 p<0.001	2.61 p<0.009	10.53 p<0.258
F7-AvW	1.09 p<0.466	5.66 p<0.013	8.66 p<0.017	1.00 p<0.037	2.10 p<0.001	3.88 p<0.004	14.26 p<0.405
F3-AvW	0.04 p<0.724	6.57 p<0.002	4.00 p<0.059	0.48 p<0.086	0.63 p<0.025	1.57 p<0.028	11.33 p<0.137
Fz-AvW	-1.82 p<0.588	14.15 p<0.005	5.00 p<0.071	0.16 p<0.414	0.22 p<0.255	0.33 p<0.306	10.77 p<0.284
F4-AvW	-0.61 p<0.659	4.89 p<0.005	4.78 p<0.035	0.55 p<0.063	0.67 p<0.036	1.75 p<0.036	9.13 p<0.205
F8-AvW	0.23 p<0.621	4.87 p<0.012	7.14 p<0.012	1.48 p<0.003	2.89 p<0.000	9.65 p<0.000	21.88 p<0.272
T3-AvW	0.19 p<0.655	8.41 p<0.001	10.18 p<0.01	0.65 p<0.219	0.61 p<0.270	0.28 p<0.448	13.00 p<0.327
C3-AvW	-0.36 p<0.956	3.30 p<0.019	0.97 p<0.437	0.00 p<0.659	0.29 p<0.143	0.34 p<0.263	1.59 p<0.603
Cz-AvW	0.18 p<0.614	14.49 p<0.001	8.34 p<0.049	0.44 p<0.131	0.53 p<0.039	0.42 p<0.188	21.40 p<0.074
C4-AvW	-0.47 p<0.796	4.07 p<0.010	1.30 p<0.395	0.16 p<0.501	0.56 p<0.066	1.28 p<0.048	4.40 p<0.436
T4-AvW	0.14 p<0.673	9.58 p<0.001	6.72 p<0.033	0.28 p<0.416	0.31 p<0.358	0.31 p<0.408	9.02 p<0.414
T5-AvW	-0.15 p<0.844	14.95 p<0.000	11.22 p<0.025	0.55 p<0.212	0.84 p<0.073	0.56 p<0.232	24.60 p<0.055
P3-AvW	-0.32 p<0.838	2.72 p<0.017	3.86 p<0.150	0.09 p<0.542	0.31 p<0.134	0.23 p<0.322	3.68 p<0.424
Pz-AvW	7.65 p<0.006	10.41 p<0.001	11.32 p<0.059	1.49 p<0.025	1.42 p<0.007	3.10 p<0.001	42.11 p<0.021
P4-AvW	-0.28 p<0.958	2.93 p<0.026	3.99 p<0.224	0.05 p<0.653	0.25 p<0.207	0.31 p<0.268	3.24 p<0.503
T6-AvW	1.35 p<0.198	16.43 p<0.000	15.37 p<0.027	0.98 p<0.133	0.71 p<0.152	0.44 p<0.348	31.16 p<0.064
O1-AvW	0.88 p<0.355	23.40 p<0.000	51.65 p<0.002	1.95 p<0.057	1.97 p<0.015	1.03 p<0.115	76.40 p<0.005
O2-AvW	3.37 p<0.078	20.66 p<0.000	46.89 p<0.005	2.75 p<0.029	2.17 p<0.015	0.83 p<0.206	72.50 p<0.013

EEG Neurofeedback (downtraining alpha amplitude) as an Adjunct Treatment for Complex PTSD ...

After four sessions of
neurofeedback in
conjunction with longterm
psychotherapy...

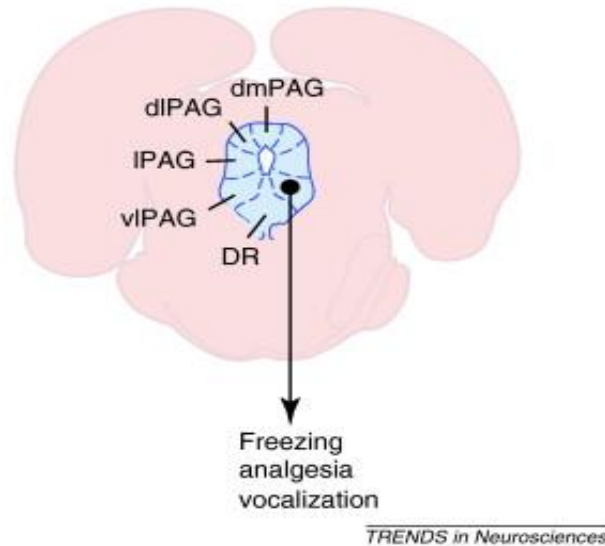
Patient EEG 2 Compared to Normative Database

	Delta	Theta	Alpha	SMR	Beta1	Beta2	Total
Fp1-AvW	-0.54 p<0.699	0.87 p<0.099	3.94 p<0.001	0.12 p<0.226	0.10 p<0.268	0.01 p<0.629	-4.10 p<0.993
Fp2-AvW	0.73 p<0.314	1.61 p<0.033	4.17 p<0.001	0.53 p<0.015	0.60 p<0.013	0.92 p<0.075	3.57 p<0.490
F7-AvW	-0.38 p<0.793	1.94 p<0.156	7.14 p<0.028	0.88 p<0.051	0.88 p<0.026	2.12 p<0.026	-3.63 p<0.770
F3-AvW	-0.31 p<0.927	1.76 p<0.100	2.98 p<0.098	0.15 p<0.383	0.25 p<0.173	0.20 p<0.445	0.83 p<0.696
Fz-AvW	-1.49 p<0.787	1.93 p<0.271	3.12 p<0.146	-0.05 p<0.847	0.10 p<0.420	0.01 p<0.693	-3.83 p<0.980
F4-AvW	-0.27 p<0.960	2.43 p<0.048	3.12 p<0.082	0.23 p<0.265	0.39 p<0.110	0.62 p<0.203	2.91 p<0.523
F8-AvW	0.03 p<0.678	2.26 p<0.092	6.11 p<0.018	1.60 p<0.002	2.04 p<0.001	3.43 p<0.010	5.52 p<0.540
T3-AvW	-0.24 p<0.900	2.15 p<0.102	5.45 p<0.060	-0.04 p<0.823	-0.29 p<0.975	-1.35 p<0.716	-4.55 p<0.981
C3-AvW	-0.43 p<0.856	0.99 p<0.197	1.36 p<0.376	-0.20 p<0.919	0.10 p<0.394	0.04 p<0.653	-1.63 p<0.971
Cz-AvW	0.32 p<0.555	3.64 p<0.068	4.58 p<0.123	0.16 p<0.399	0.30 p<0.122	0.17 p<0.395	6.20 p<0.367
C4-AvW	-0.34 p<0.953	1.35 p<0.140	1.75 p<0.336	-0.17 p<0.974	0.15 p<0.373	0.14 p<0.516	-0.79 p<0.854
T4-AvW	-0.00 p<0.746	4.60 p<0.012	8.27 p<0.020	0.24 p<0.449	0.02 p<0.520	-0.90 p<0.889	2.03 p<0.626
T5-AvW	-0.20 p<0.889	5.42 p<0.004	7.20 p<0.058	0.38 p<0.307	0.43 p<0.204	0.15 p<0.503	9.22 p<0.263
P3-AvW	-0.03 p<0.745	1.70 p<0.058	6.87 p<0.070	0.12 p<0.488	0.16 p<0.292	0.13 p<0.444	5.84 p<0.310
Pz-AvW	-0.09 p<0.745	2.66 p<0.060	9.36 p<0.078	0.44 p<0.222	0.22 p<0.260	0.07 p<0.555	7.40 p<0.353
P4-AvW	-0.56 p<0.687	1.10 p<0.170	6.12 p<0.148	-0.05 p<0.875	0.07 p<0.535	0.09 p<0.549	1.91 p<0.594
T6-AvW	0.18 p<0.612	13.47 p<0.000	14.44 p<0.031	0.43 p<0.330	0.72 p<0.148	0.16 p<0.503	23.39 p<0.111
O1-AvW	1.02 p<0.326	9.11 p<0.002	16.03 p<0.031	1.09 p<0.146	0.85 p<0.093	0.75 p<0.175	28.48 p<0.081
O2-AvW	3.44 p<0.075	14.15 p<0.001	16.57 p<0.045	1.58 p<0.088	1.30 p<0.050	1.65 p<0.087	34.96 p<0.077

Consciousness of Emotion

- Theorists have increasingly pointed out the significant role likely played by emotional processing in the across-species evolution of consciousness (e.g., Panksepp, 2008).

PAG



- Active and passive defensive responses
- Important role in all basic emotional systems (fear, rage, seeking, panic)
- Consciousness

Panksepp's Basic Emotional Systems

Basic Emotional Systems

Key Brain Areas

Key Neuromodulators

General Pos. Motivation
SEEKING/ Expectancy
System

Nucleus Accumbens – VTA
Mesolimbic and mesocortical outputs
Lateral hypothalamus – **PAG**

DA (+), glutamate (+),
opioids (+), **neurotensin (+)**,
orexin (+), Many other
neuropeptides

RAGE/ Anger

Medial amygdala to Bed Nucleus of
Stria Terminalis (BNST). Medial and
perifornical hypothalamic to **PAG**

Substance P (+), Ach (+),
glutamate (+)

FEAR/ Anxiety

Central & lateral amygdala to medial
hypothalamus and dorsal **PAG**

Glutamate (+), **DBI**, **CRF**,
CCK, **alpha-MSH**, **NPY**

LUST/ Sexuality

Cortico-medial amygdala,
Bed nucleus of stria terminalis (BNST)
Preoptic hypothalamus, VMH, **PAG**

Steroids (+), **vasopressin**, &
oxytocin, **LH-RH**, **CCK**

CARE/ Nurturance

Anterior Cingulate, BNST
Preoptic Area, VTA, **PAG**

oxytocin (+), **prolactin (+)**
dopamine (+), **opioids (+/-)**

PANIC/ Separation

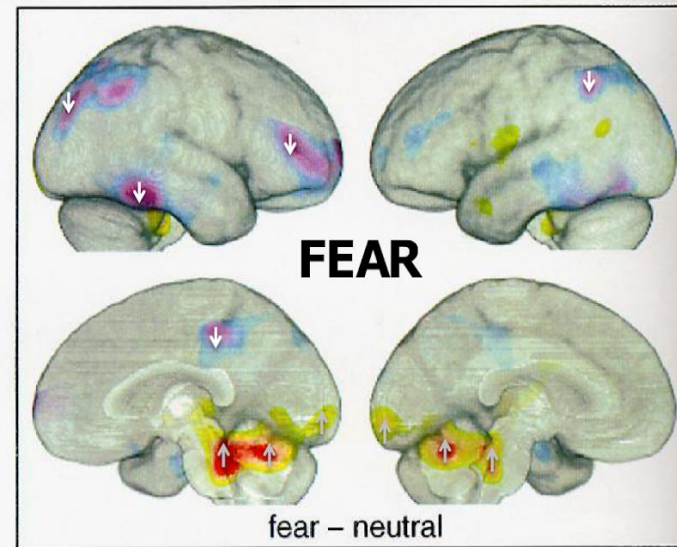
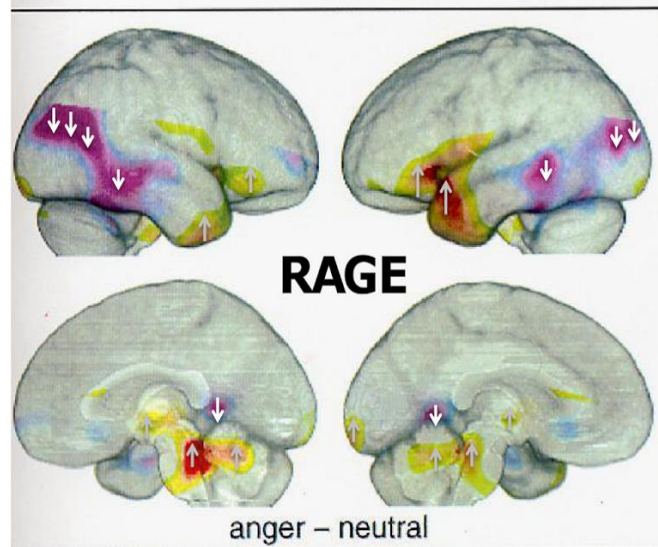
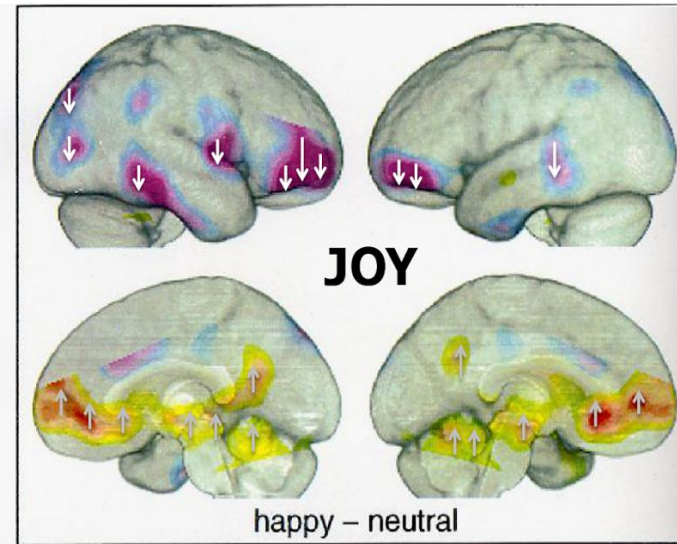
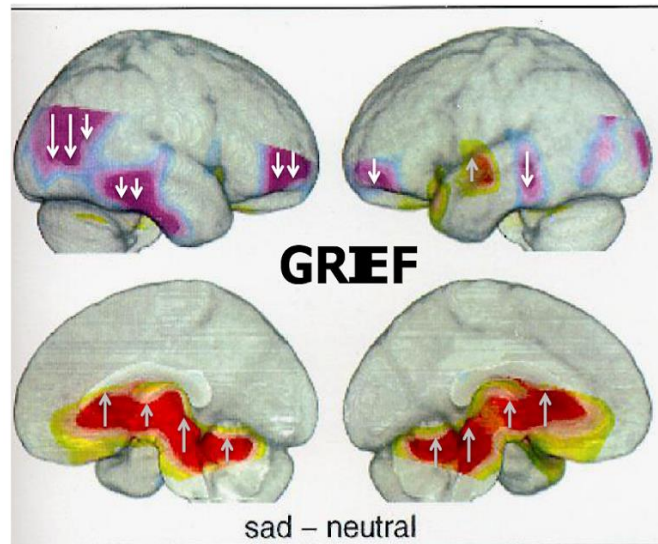
Anterior Cingulate,
BNST & Preoptic Area
Dorsomedial Thalamus, **PAG**

opioids (-), **oxytocin (-)**
prolactin (-), **CRF (+)**
glutamate (+)

PLAY/ Joy

Dorso-medial diencephalon
Parafascicular Area, **PAG**

opioids (+/-), glutamate (+)
Ach (+), **cannabinoids**,
TRH?



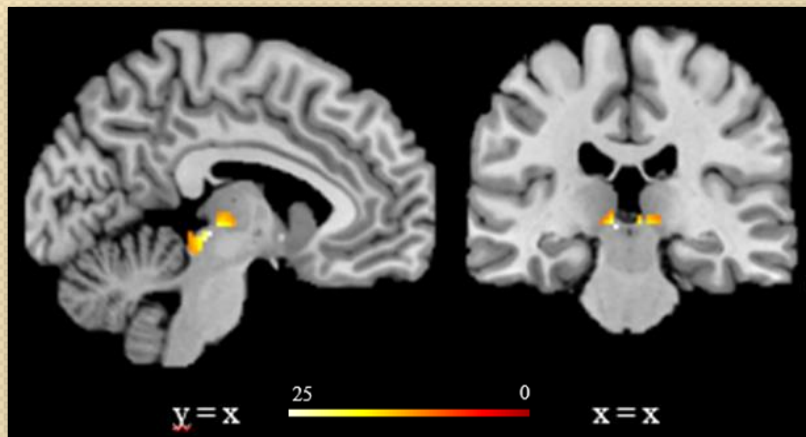
Consciousness Without a Cortex



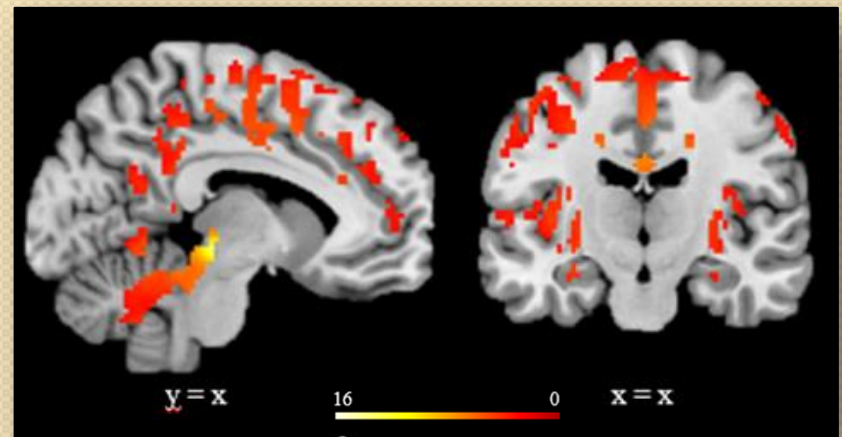
Figure 9. The reaction of a three-year-old girl with hydranence- phaly in a social situation in which her baby brother has been placed in her arms by her parents, who face her attentively and help support the baby while photographing.

PAG Seed Region

Resting State Connectivity



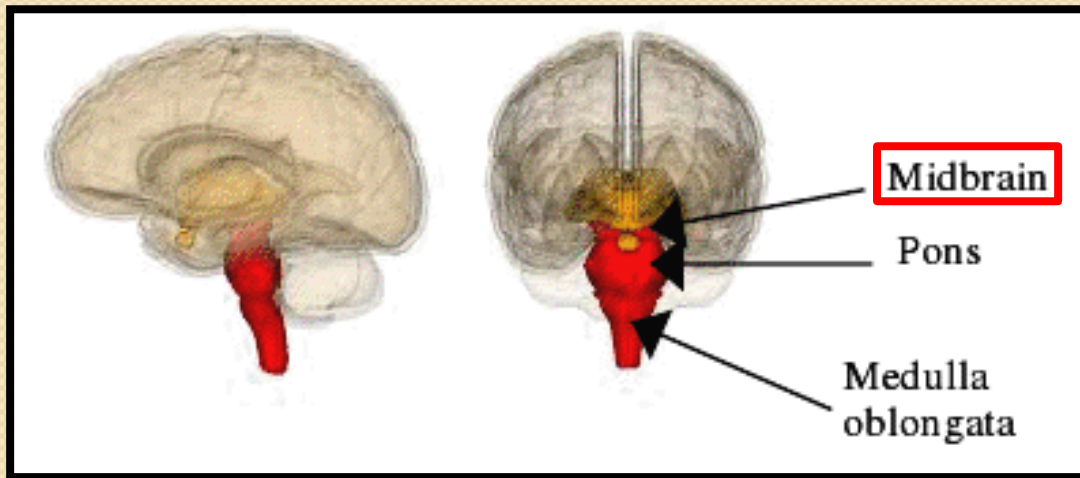
Control
n = 41



PTSD
n = 57

- Increased connectivity in areas involving emotional reactivity such as **amygdala, anterior cingulate cortex, insula, cerebellum** (Adolphs et al., 1994; Bush et al., 2000; Stein et al., 2007; Turner et al., 2007)

When Fear Is Near




Innate Behavioural Knowledge

“Imminent danger results in fast, likely ‘hard-wired’, defensive reactions mediated by the midbrain.” – Mobbs et al., 2009, *J Neurosci*

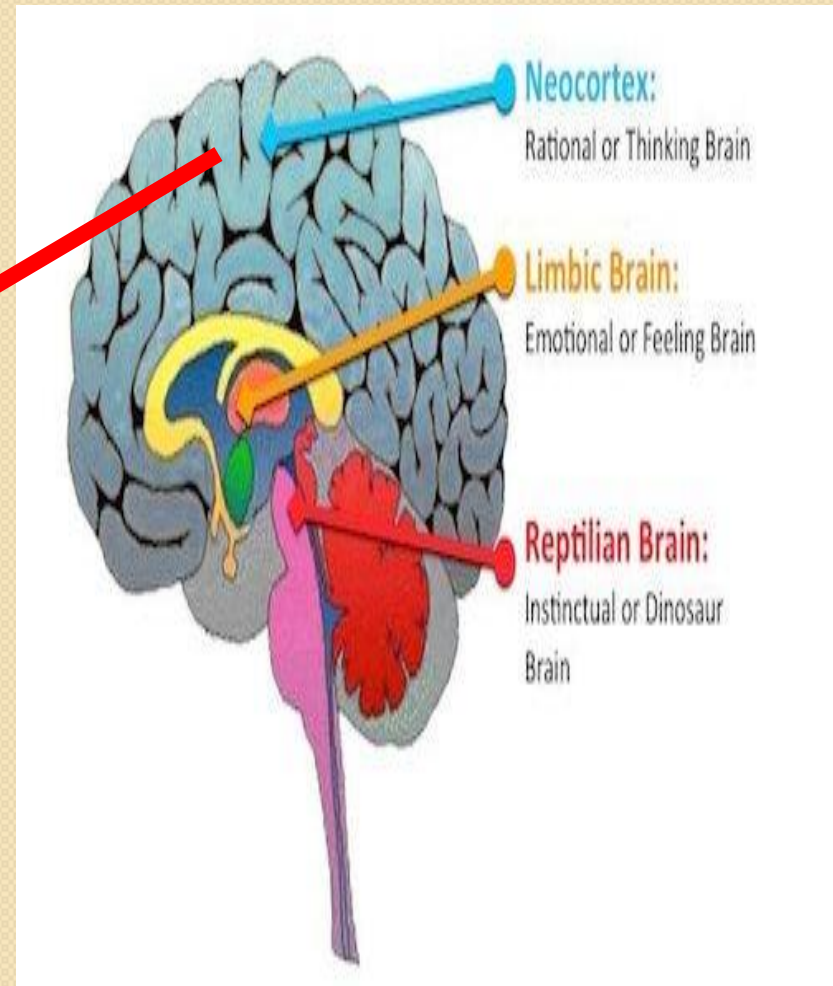
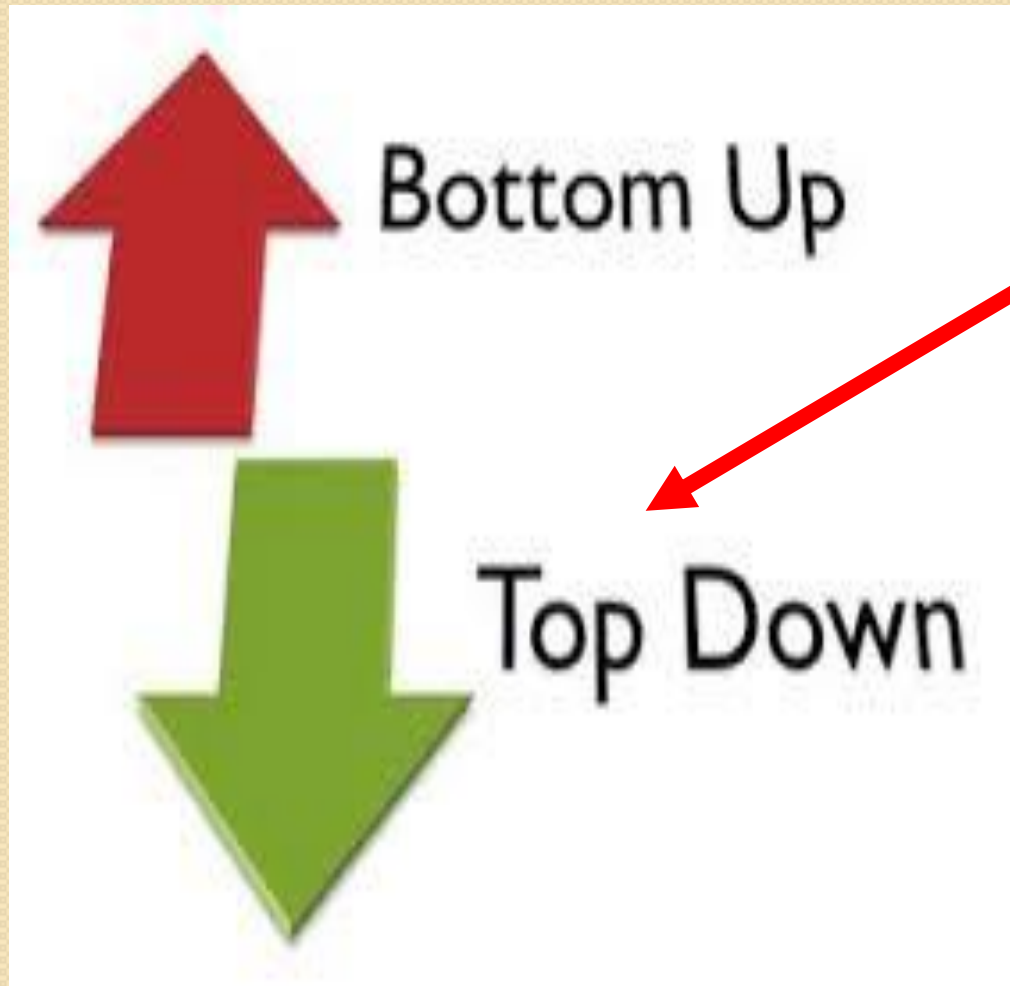



Implications for therapy...



How can we regulate
emotions?

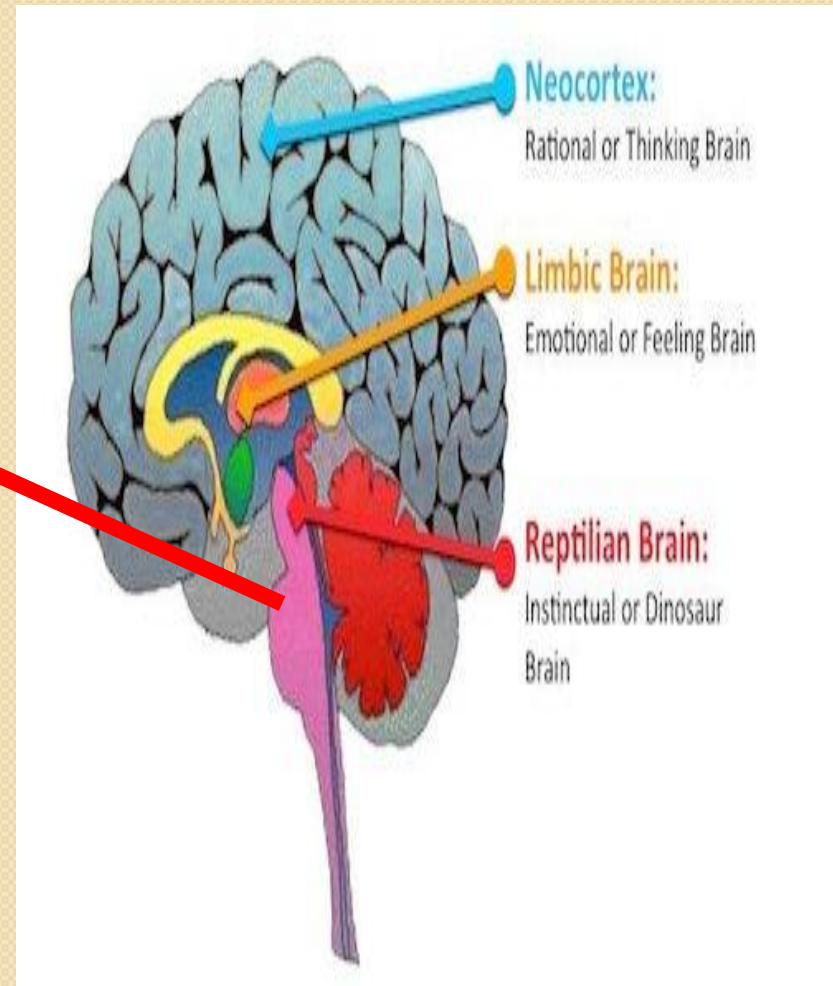
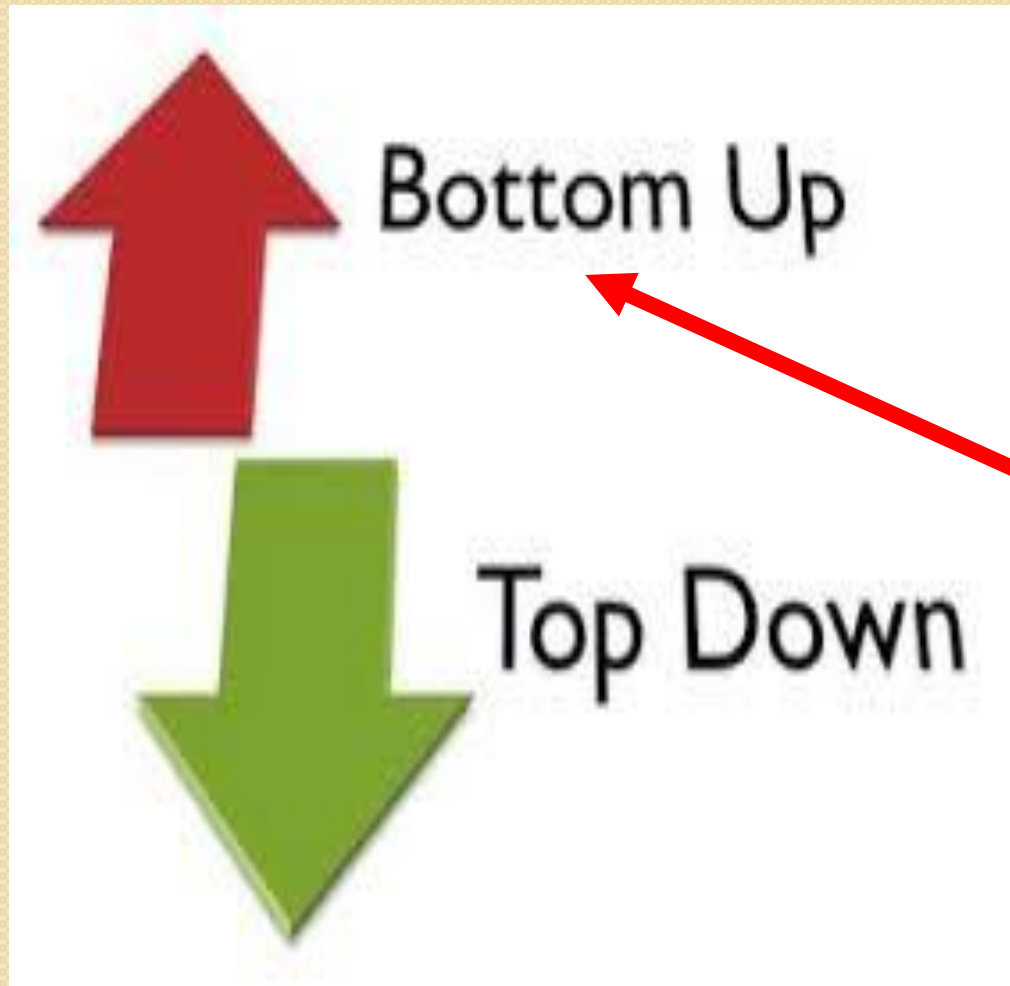
How can we regulate emotions?





I **know** that it was not my
fault, but I can't stop
feeling it...

How can we regulate emotions?





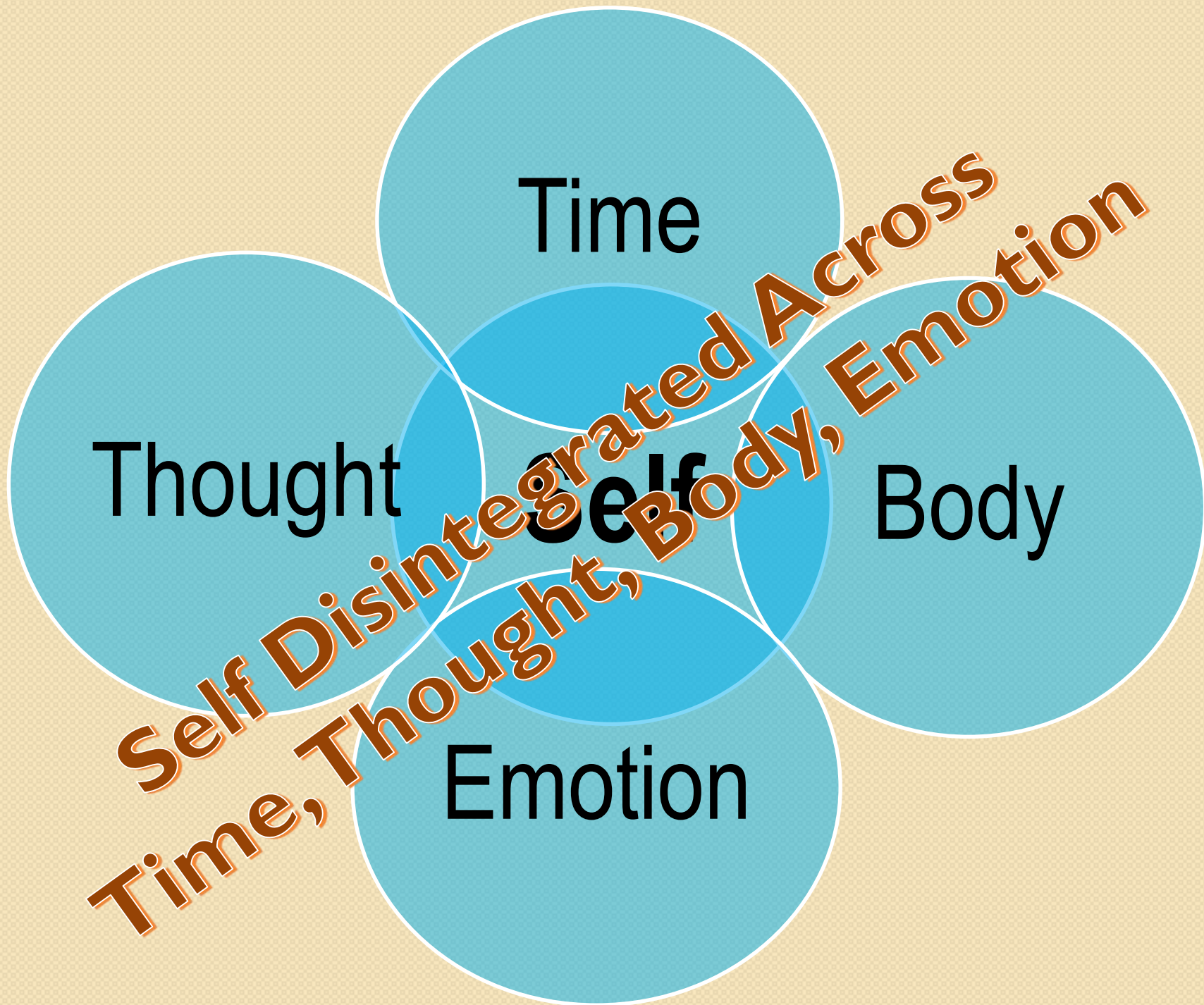
Bottom Up Regulation

Personalized Approach to Treatment...




The four dimensions of consciousness and the sense of self...





I am ...



An organism must be able to experience
its own existence as a sentient being
before it can experience the existence
and salience of anything else in the
environment...

Craig, 2009

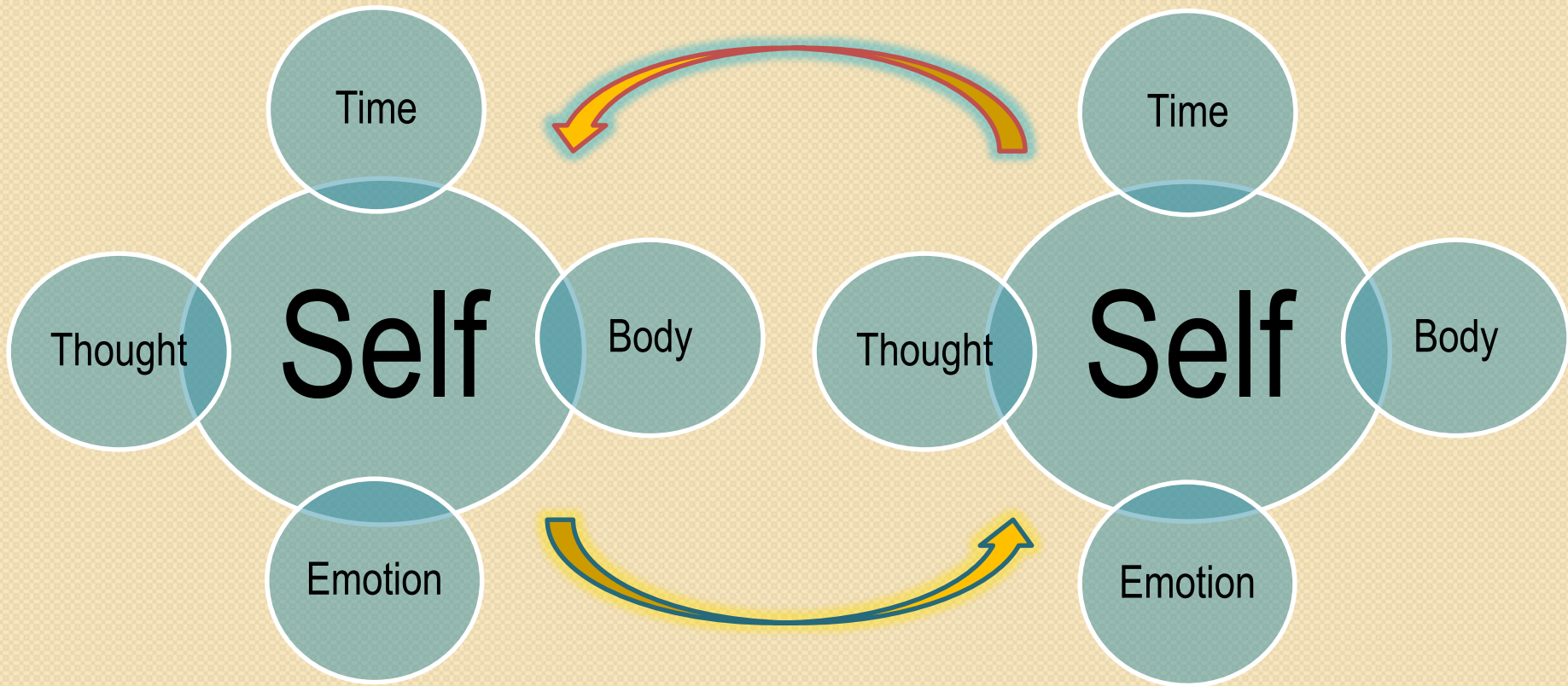


Without a Self there is no Other...



Isolation and Estrangement...

Mentalizing: Allowing Experiences of Time, Thought, Body, and Emotion to be Shared between Two Individuals



Tim

- **Interviewer:** What would it be like to make eye contact?
- **Tim:** It feels, really scary. I feel like they're going to see a kind of stain on my soul. I feel a sense of shame about being in the situation in Vietnam, and I also feel shame about some of the things that I witnessed and I didn't do anything about- case in point, watching idly while they threw a grenade in a hole with a guy and knowing full well what the outcome of that was going to be...

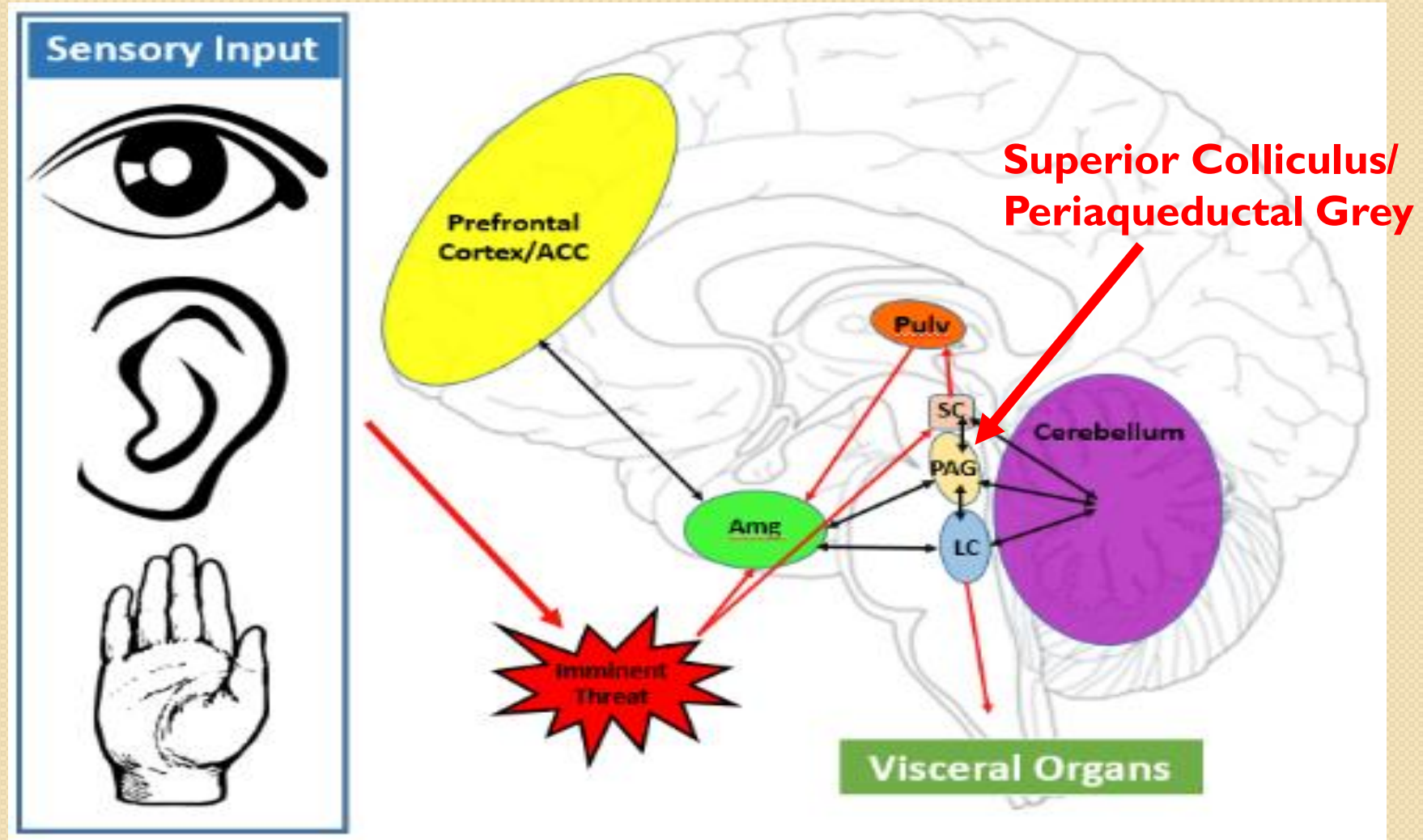
Teresa

“Making eye contact meant that you wanted to be noticed. Any kind of eye contact was seen as defiance, or as aggression, and it was also stating that I existed, and Mom did not want me to exist. It was not a good thing for me to exist because she didn’t like me - she didn’t want me. I was definitely not anything she wanted. To make any kind of eye contact was to bring attention to myself, and it would be met 99% of the time with being slugged or hit in some way. This is why I hid most of the time. Before I was probably three years old, I learned not to make eye contact, not to move, not to speak, and not to do anything. I learned: ‘keep your eyes down all the time’”.

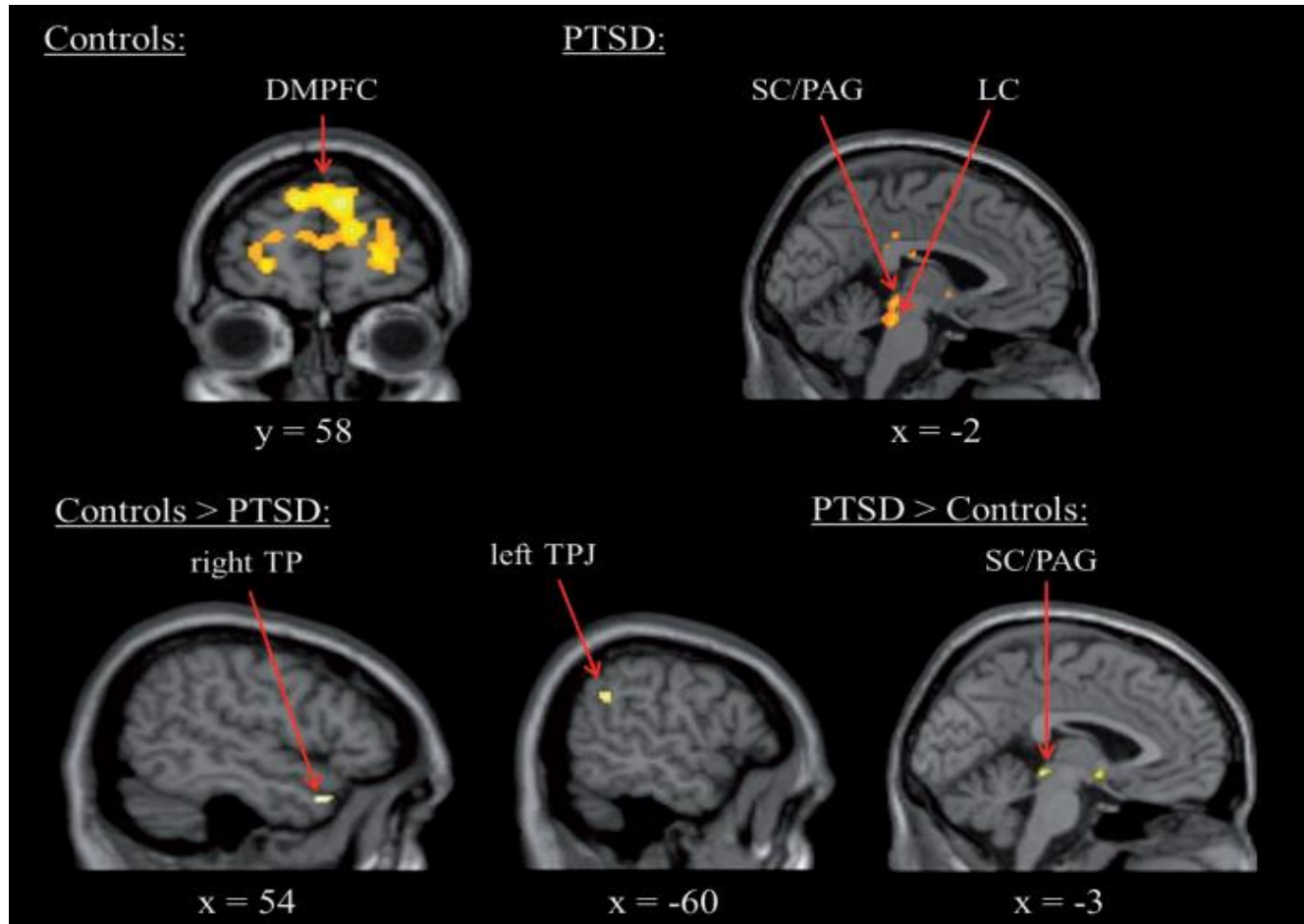


The Neurobiology of Eye Contact

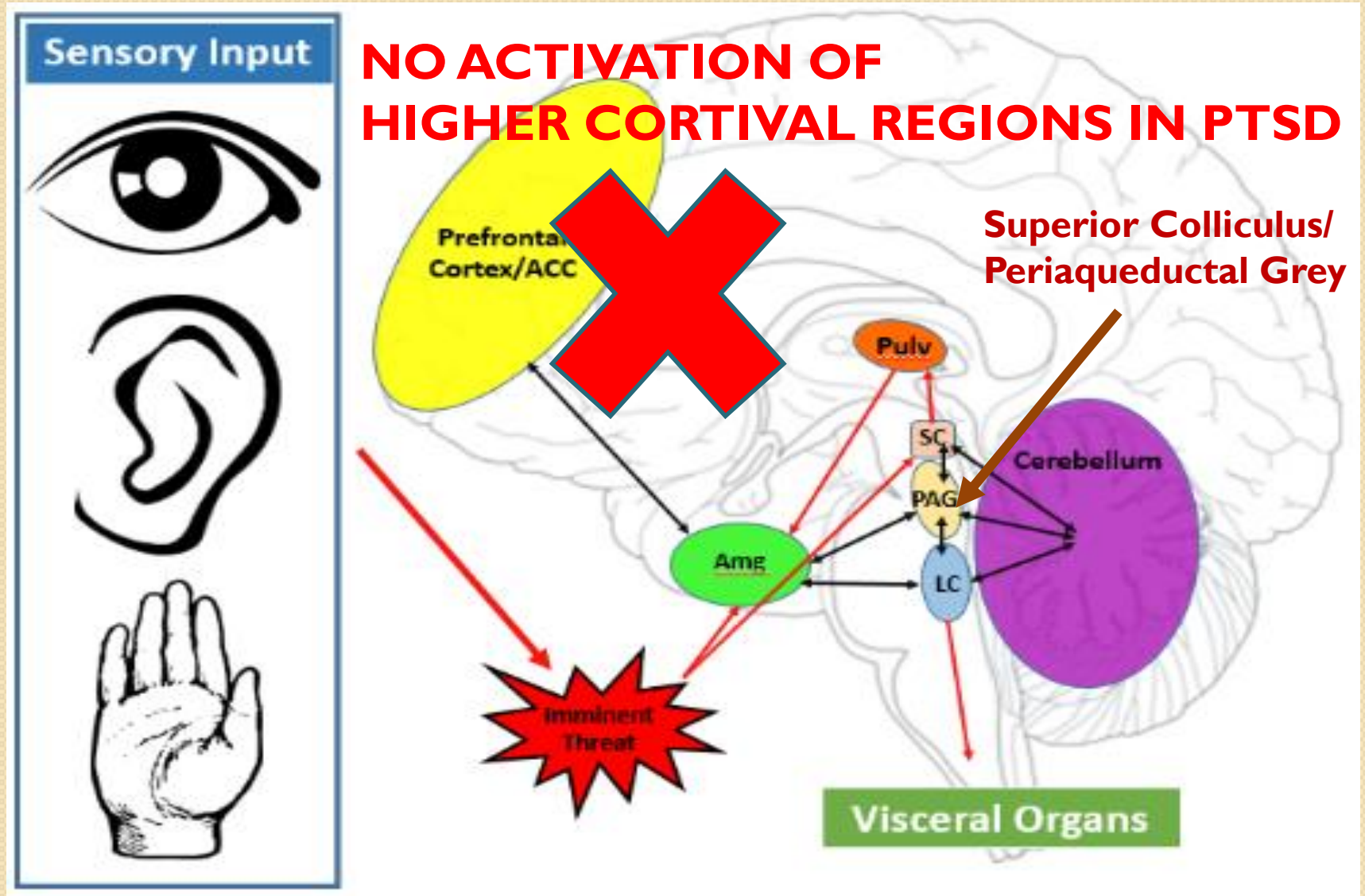
Eye Contact and the Innate Alarm System



Direct Gaze > Avert Gaze (Angry, Happy and Neutral)




Eye Contact & The Innate Alarm System





Implications for treatment,
obtaining social support, and the
intergenerational transmission of
trauma...

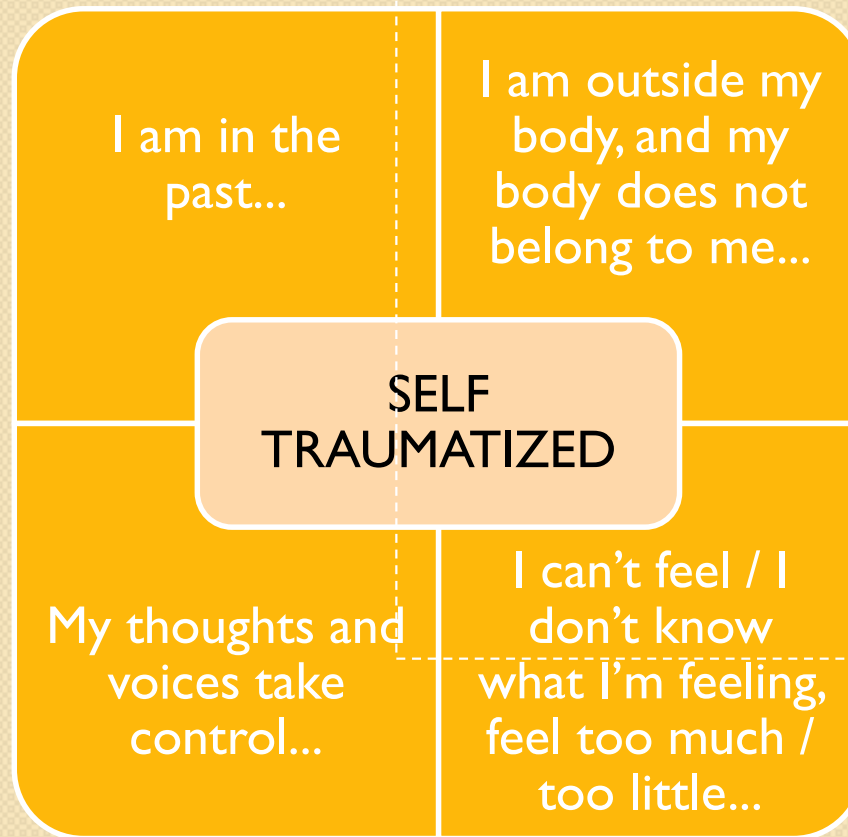
Healing the Traumatized Self: The Rebirth of the Self




The goal of psychotherapy is to help the traumatized individual establish a sense of self that is integrated across time, thought, body, and emotion and thereby is capable of the agentic pursuit of joy, pleasure, and triumph both within oneself and within relationships.

4D-Model and Sense-of-Self: From Trauma to Recovery

Not integrated
across time,
thought, body,
and emotion







“I was running on terror, and the only way that I can describe it, in retrospect, was that it was a kind of animal survival psyche. My sense of self was pretty undefined and diffuse, as if the nerve endings had no stopping place, and so without a skin or without a boundary, and without the other which creates that boundary, there isn't a self.”

4D-Model and Sense-of-Self: From Trauma to Recovery





“It just happened that, there I was, established in that universe as a separate human being, not particularly unique, sort of ordinary and with other human beings who were living their lives out too. This was all like, miraculous, and I could only know it was miraculous in the absence of all the fear.... I could make eye contact, it didn’t hurt anymore - because it had been physically painful to make eye contact with another human being - that just was not an issue anymore...



...I would look at myself in the mirror
(laughs)...hadn't done [that] before (laughs)... I
don't know that I can say too much more about it,
except that in the absence of abiding terror, a
self can occur. A self *does* occur, and self-in-
relationship occurs, because the other comes
into view: smelled and felt and known. And then
the other is known as having their own inherent
self".



THANK YOU!