

The neuropsychological underpinnings of the injured self-state: Developmental processes and their unconscious repercussions

Two questions:
1. Why are negative self-states so prevalent, powerful and convincing?
2. Why are emotional/behavioral patterns that no longer work for us, patterns that essentially cause us pain and self-loathing so entrenched and difficult to change?

- Of all the “brain bugs” we humans possess, we’ll focus on three interwoven process that render us susceptible to a wide range of vulnerable, injured, traumatized and angry self-states.
 1. The interaction of developmental and unconscious processes
 2. The unexpectedly mixed effects of our early intersubjective bonds
 3. The development of language, that when intertwined with dysregulated self-states lead to negative self-narratives.

A new model of unconscious processes sees them as embedded within the inseparable unity of brain, mind and body.

Unconscious processes are on-going and pervasive; they influence and underpin all modes of functioning.

Much of our perception and reaction to internal and environmental stimuli occur out of awareness.

- Rather than being an isolated "container" the unconscious is a brain/mind/body system that actively relates to the external and internal environment. That means that behavioral patterns are enacted out of our awareness.
- Unconscious processes are involved even when we are convinced we make deliberate choices enacting behavioral patterns without being aware that we are doing so.
- The unconscious is based on memory traces, learning and identification processes rather than on unconsciously rejected or repressed material. Much of this learning occurs unconsciously and is not remembered.
- Underlying unconscious patterns are visceral and emotional experiences – pleasant or dysregulated, intense or mild that underpin emotionally based learning, memory traces and defenses.
- The assumption that there is a self-agency that unconsciously determines what is "allowed" to stay conscious has been difficult to prove.
- As development continues new experiences are fitted into old neural networks. Such patterns can pursue complex goals and activities, emotional and interpersonal.

The conscious and unconscious realms

- The evolutionary need for a smooth, energy and time conserving ways of functioning created the unconscious realm. No deliberation in the face of danger or familiar situations.
- A second system developed, with slower, more deliberate, reflective functions.
- The older unconscious processes are still at the center of functioning, having acquired supremacy due to speed and habit. (Repeated patterns and automatic response patterns.)

The construction of neural networks

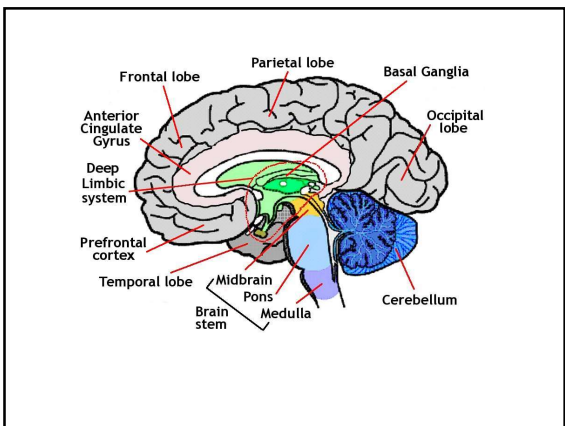
- Neural networks, maps (Damasio) or self-states are spread throughout the brain. They are characterized by different patterns of synchronized activity in response to sensory stimuli, internal states of arousal, reward and aversion-punishment.
- The reinforced combination of on-off firing of neuron clusters in response to stimuli create stable networks or maps integrating all of our mental and behavioral functions.

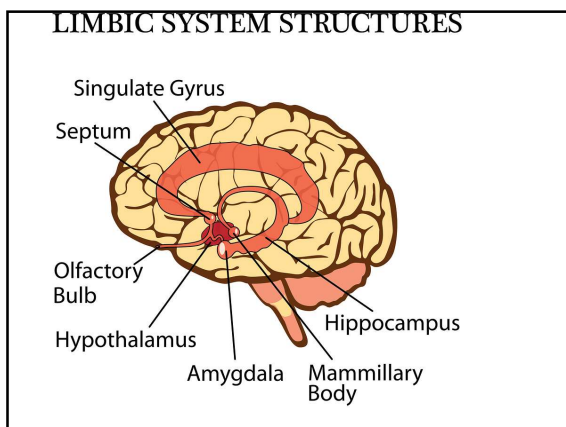
- The role of epigenetics
- Early connections and neural hubs are stronger
- What fires together wires together while weak connections are removed (Hebb).
- The influence of early experiences on creating and maintaining entrenched patterns

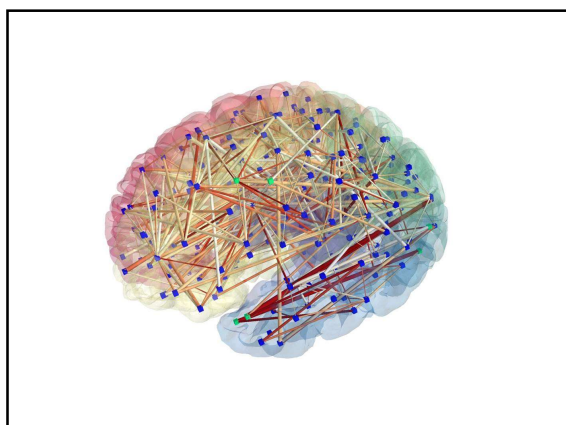
- Neural maps – our unconscious patterns – are an amalgam of all aspects of experience; physio/affective sensations, memory traces, perception tendencies, learning processes and cognitive interpretations. Defensive activity.
- These maps, schemas or networks—in this psychodynamic model they are mostly referred to as self-states—place perceptions and response tendencies under the influence of unconscious “know-how.” .

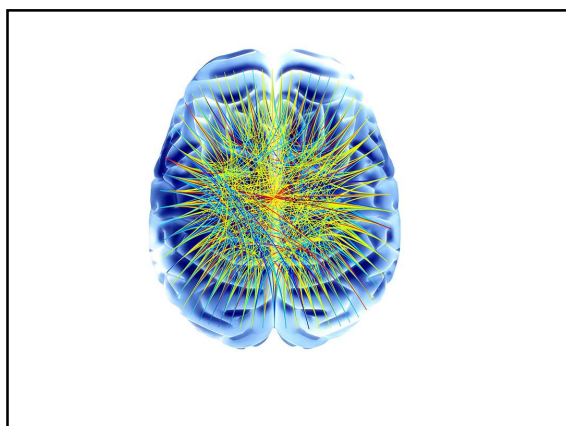
- Our consciously felt experiences merge with past learning and memories. Old practiced patterns mingle with current input. Out of awareness, present functioning is entirely rooted in one's past. This link creates a continuum of consciousness.
- Most encoded experiences remains inaccessible to explicit memory (pre-verbal memories). But the pattern they coalesce into finds expression and becomes known through enaction.

- **Cortical and subcortical regions**
- The role of subcortical regions; emphasizes that AFFECTS are the building blocks of all conscious and unconscious self-states.
- The integrated networks for learning: the cerebral cortex, in particular the prefrontal region, the basal ganglia and the cerebellum provide an important neural substrate for unconscious patterns (Bostan et al., 2018).









- The centrality of enaction to brain/mind/body functioning
- Guidance of action is a dominant function of the brain.
- The propensity to enact neural maps (brain/mind/body patterns) is guided by the motor functions of the brain which are intertwined with most other regions and functions.

- Implicit memory and childhood “lessons” stay unconscious.
- Because of the innate tendency of brain/mind networks to act on the environment and respond with existing “know how,” unconscious patterns have no choice but to be enacted and repeated.
- The role of the PFC as a moderating influence

- When reactions (enacted patterns) are based on internal models alone, they do not take into account aspects of current reality. There is little (or no) internalization of current conditions. **Projection and projective identification.**

• The roots of transference, countertransference and enactments

- The contribution of the prefrontal cortex – slowed-down, deliberate processes.
- The balance between the two realms greatly determines the level of unconscious repetition and enactments.

Affective systems and their impact during development

- Affects are bodily, visceral signals that are mediated by subcortical areas such as the PAG, the limbic system and the brain stem. They are consciously felt as emotions and feelings (Damasio; Panksepp; Schore).
- Due to the “ease with which dysregulated states are activated, traumatic experiences may be very individual and very varied. They can be placed on a continuum.

- The nature of the emotional brain provides context to both ends of this continuum:
- The devastating effects of a severely traumatic/abusive childhood, and
- The prevalence of injured self-states generated within cumulative developmental trauma, normative and even “good enough” care-taking environments. Peer related injuries.

- Pannksepp identified 7 affective systems: Seeking/expectancy, fear/anxiety, rage/anger, lust/sexual excitement, care/nurturance, panic/grief/sadness, play/social joy
- Of these, fear/anxiety, panic/grief/sadness and rage/anger are clearly dysregulating, leading to states of arousal and intense discomfort we all wish to get away from (Panksepp, Schore).

- Being highly reactive to aversive (unsafe, hurtful, neglecting, threatening, shaming) situations, the dysregulating systems exert the strongest influence on injured self-states – conscious and unconscious alike.
- Emerging data indicate that these dysregulating affects are easily triggered and reinforced.

- Dysregulating emotions are accompanied by autonomic arousal: including increased heart beat, higher blood pressure, and extreme, unpleasant sensation of imminent danger.
- They release arousal chemicals: norepinephrine, cortisol and glutamate (among others) that activate the sympathetic system and the brain stem: Fight, flight or freezing
- Aversive states also automatically marshal our defenses.

- Again, as an evolutionary necessity, cues about impending threat came to control processes involved in attention, learning and memory.
- Learning and memories that occur within the context of hyper-aroused emotions are remembered more efficiently and more vividly (Damasio, 2010; Pattwell, 2017).

- Stress and anxiety are not simply generated but pre-exist in a state of default, waiting to inform us of danger.
- Only when safety is detected, there is a PFC and vagal, parasympathetic inhibition of subcortical areas, especially the amygdala. Lack of safety triggers the default stress response, promoting chronic anxiety and sadness (Brosschot, 2016).
- To ensure survival, hyper-arousal and caution (avoidance) are passed down genetically.

The role of the amygdala in emotional reactivity and arousal

- The amygdala is a central mediator of fear, anxiety, stress, panic, sadness, anger and other emotions, as well as appetitive needs. It constantly assesses situations as to their potential threat.
- It is linked to higher regions and lower cortical areas.
- Two modes of affect perception and processing; the low and high roads
- (LeDoux, 2002).

• **The long-term effects of dysregulation**

- The limbic system (the amygdala and its circuits, the hippocampus) is highly plastic.
- The amygdala controls the alerting system, mediates emotional learning, implicit and explicit emotional memories.

- Emotions organize development by also impacting other psychological functions: attention, perception, learning, cognitive processes, and defenses to name the most basic ones.

- **Attention:** Infant and adults prioritize responses to threat. Such initial nascent response patterns become entrenched and automatic (Okon-Singer, 2016).
- Affect-biased attention and alert systems build on evolutionary-determined neuropsychological processes (Aue and Okon-Singer, 2015).
- Attention bias to threat and other negative emotions plays is associated with the emergence of anxiety and social withdrawal (**Morales et al. 2016**) and thus plays an important part in shaping behavior.

- Affect-biased attention is a pro-active predisposition for the development of affect-regulation (Todd et al., 2016).
- Habitual emotional filtering (avoidance? Over-reaction?) tunes and re-tunes reactions to emotional and interpersonal situations.

- The process of epigenetics is always at play. Fussy infants pay greater attention to fearful faces than less fussy ones (Acevedo et al., 2017). Kessel et al. (2013) found that emotional bias in attention is influenced by the care-giver's style as well. Although temperamentally inhibited kids allocate more attention to aversive cues, this was reduced among kids whose parents were encouraging and affectionate.

- Unconscious processes start early. Infants 3-4 months responded with greater stress to fearful and angry faces (Nava et al. 2017).The amygdala's response to fearful faces was greater when they were presented subliminally.
- The Amygdala contributes to both conscious and unconscious modes of perception and processing (Diano et al. 2017).

• The automaticity, sensitivity and speed of unconscious perception in regard to internal and external unpleasant emotional experiences all but guarantees that we cannot escape reacting to and becoming sensitized to injurious interactions. This is especially so within the intersubjective context of caregivers, peers, teachers and other adults (Grawe, 2007).

• In the context of epigenetics, more temperamentally anxious children react with greater frequency and intensity to aversive stimuli, especially within the intersubjective matrix.

• The emergence of a narcissitic disorder: painful injuries to the sense of self and rigid defenses against them.

• The amygdala: learning, memory and meaning

• Regions supporting learning and memory are highly sensitive to changes in levels of stress hormones – corticosterone released via the amygdala. (influencing the basal ganglia)

• Structural changes in the amygdala and related regions continue to occur into young adulthood, and these changes influence our developing perceptual, emotional and behavioral patterns (Ferrerri et al. 2016; Pattwell et al., 2017).

• In a learning process, an active amygdala early in life (genetic/environment) may enhance and exaggerate the influence of real or perceived threat and pain in a wide range of situations, especially interpersonal ones (Fererri et al. 2016; Gonzales-Salinas et al. 2018).

• learning in the context of negative experiences changes perceptual thresholds. Emotional responses can become associated with wider and wider stimuli, whereby stressors get generalized (Brosschot et al., 2016).

• Emotional experiences linger from minutes to hours, and can bias the encoding and recollection of more neutral stimuli that occur later (Shalev, Paz and Avidan, 2018; Tambini et al. 2016).

• Alterations in the amygdala–hippocampal functional connectivity persist for more than 2 hours following exposure to intense social stress (Vaisvasser et al. 2013). Implicit memory

- In response to cumulative stress, impairment in the hippocampus and PFC on the one hand and enhanced amygdala function on the other may increase heightened emotional responses and exaggerated sensitivity later in life (Krugers et al. 2017; Pattwell, 2017). Depressed mothers
- Mingling past and present such sensitivity will render the individual susceptible to perceived negative situations and encounters, and to low assessment of himself (Wilcox, C. et al., 2016).

- A wide range of stimuli can activate dysregulated states, and many of those may seem utterly benign to an outsider or even the parents.
- Physical pain, noise, antagonistic exchanges between parents, mother's depression, parents' mental illness, off the cuff hurtful remarks, lack of mirroring and validation, peer rejection, sibling hostility and many others, more and less benign.
- Children rely on implicit learning (Smalle et al., 2017).
- The paradox of our efficient learning abilities

- Acevedo et al (2017) found prominent activation of the amygdala in response to aversive and threat-related stimuli in sensory processing sensitive individuals (more cautious and reserved) as compared to controls. This is more so when associated with recollections of poor parenting. Memories of good parenting were related to less activation.
- Questions of child/parent match.

- Children 9-11 whose parents reported a great deal of marital strife and fighting were significantly more prone to assign negative value to neutral faces (Shernhorn, 2018).
- Children of controlling parents showed significantly less self-regulation in comparison to controls (Marusak et al., 2017).
- Low parental income is significantly linked to increased anxiety and feelings of insecurity (Diano et al., 2016).

- In these cases, as well as in many seemingly benign situations, the vigilant amygdala and the rest of the emotional systems will give rise to a state of arousal that automatically and unconsciously becomes associated with frustrated needs, humiliation and anger at being thwarted, shamed or not validated.
- The interaction of such reactive systems with abuse and cruelty is devastating neurologically and subjectively.

- As learning and memories mediated by stressful emotions coalesce, they become generalized and influence new experiences and memories. An unconscious self-state organized around vulnerability and injury, for example, inevitably impacts our perceptions, interpretations and interpersonal and intrapersonal behaviors, attitudes and expectations.

- The subjective meaning of dysregulated states.
- If we say that even for nonclinical population the amygdala has a great power to regulate the development and trajectory of emotional, cognitive, and behavioral processes, how do we experience such unconscious-conscious states?

- One important manifestation of such brain/mind/body processes is found in negative self-narratives which are the result of the integrated functions of body sensations, affects and cognition within a neural network/self-state.
- Through direct connections to the basal ganglia, the HPC and the PFC, the amygdala highlights particular interpretations, memories, and appraisals, which then become increasingly consolidated over time (Lewis and Todd 2007).

- Emotional learning and associations mediated by the amygdala not only regulate real time cortical activity but also sculpts developmental trajectories. Through such processes emotional events acquire lasting meaning.
- What is conveyed through narratives is the integration of the child's dysregulated state and his attempts to make some sense of his subjective feelings, to figure out what they mean.

- Through familiar ruminations and internal monologues, narratives about who we are give voice to all facets of an unconscious self-state.
- Self narrative express the interaction of body, affect and cognition. These functions are totally entwined and overlap in the brain (Lewis and Todd, 2007; Okon-Singer, 2016; Passoa, 2016).

- **The intersubjective roots of unconscious self-states**
- (Braten and Trevarthen's model, 2007).
- **Intersubjectivity** can be defined as the innately driven and mutually exchanged communications (conscious and unconscious) between two interacting subjectivities. Intersubjectively also embodies the innate need for emotional resonance and recognition - an aspect of the social brain (Cosolino, Schore).

- As a result, at all times, along the child's separateness and inherent temperament, there are always states that are attuned to and entangled with the care-giver's physical, emotional and vocal communications.
- The centrality of attunement in response to hyper or hypo states of arousal (Schore).

- Intersubjectivity changes over time but has one enduring feature: the child's other-centered focus.
- Primary, secondary and tertiary modes of intersubjectivity lead to shared, undifferentiated meaning.
- Developing verbal skills enhance the **DISTORTED** and in cases of abuse the utterly destructive meaning of emotional states.

- As higher-order developments continue, children increasingly see themselves as responsible co-authors of anything they feel and think, even though the experiences they are immersed in emanate from a parent. As language develops (m-other-centered) and becomes the symbolic carrier of emotions, narratives provide a link to a wide range of affects. **The centrality of shame.**
- Distortions are made worse by the slower developing prefrontal cortex and the left brain, the interpreter. (Gazzaniga).

- The parents' actions and communications become the child's own. The parent's language about herself is integrated as the child's own. This is especially so when the words that give expression to a parent's dysregulation are fused with affect.
- **Negative narratives are often generated by events and parental situations that have nothing to do with the child.**

• The searing injured or destabilizing insecure state that the child experiences are in essence his fault; narratives of being the “bad” objects, a helpless victim and the need to retaliate as not to be weak, extreme doubts about one’s competency, severe anxiety of the unknown and fear of and conviction of failure are common self-narratives of an injured self-state. Let alone within the context of abuse.

• As the term intersubjectivity implies, both parties consciously and unconsciously affect each other, and operate from an other-centered point of view. They both are engaged in a process of mutual influence. But within the parent-child dyad the child is the vulnerable one.

• Paradoxically, by being so essential for survival, the bonds of intersubjectivity can also carry within them the seeds for dysregulated self-states.

• Another important study found that universally, children do not understand that what the other says is only a belief or an idea; they take the actions and words of the other as concrete reality (Rebeca Saxe, 2016).

• A change in this conceptual understanding is acquired between 3 and 5, with the maturation of the temporo-parietal junction and the medial prefrontal cortex.

The NEUROPSYCHOLOGICAL CIRCUITS OF INTERSUBJECTIVITY

- The mirror neuron system
- Embodied Simulation – creating in our own brains the affects and intentions of those we observe (Galese, 2008; Iacoboni, 2008). The basis for direct empathy. *Attunement*
- The child’s brain/mind will simulate the parents’ psychological state, understand their intent and the emotions behind the spoken words.

- Research on the mirror neuron system seems to further explain the child’s absorption in a parent’s emotional states. The mirror neuron system has been shown to establish a neuropsychological link between interacting subjectivities that observe or relate to each other. (Observing others in pain, for example simulated in the observer’s neurons. Mirrored affects “arrive” at the amygdala, then the basal ganglia. (*Witnessing others in pain, others being threatened, abused?*))

Intergenerational transmission and unconscious patterns

- Parental unconscious/conscious emotional and behavioral patterns as well as their traumatic past and defenses can be transmitted without awareness. When internalized by the child, they are often perceived as coming from the child himself rather than the parent.

- The child of a traumatized parents will internalize essential aspects of their traumatized past, absorbing the destabilizing affect and the defenses against it.
- Consequently, the child's trauma-suffused unconscious map includes many shades of emotional and meanings, echoing the parent's unconscious.
- Daughters of sexually abused mothers were either both more promiscuous or avoidant than girls in the control group.

**The (Im)possibility of Change:
Challenging unconscious automaticity**

- What do we mean by "change or therapeutic change?"
- If we think that early learning, memories, defenses and regulation styles "stick" what do we hope to achieve and what is even "realistic?"
- A more adaptive ways to co-exist with difficult and injured self-states.

- There are about 450 therapeutic approaches. What they all have in common is the goal of achieving greater awareness, an internalized ability for affect regulation, and the related capacity for affect tolerance. Because of how early and preverbal they are, negative states of arousal often carry the viscerally-felt conviction that intense hyper-arousal will lead to psychic annihilation.

- The therapeutic environment is almost the only way for us to confront our most devastating states and identities within a safe place.
- The obstacle presented by a self-state that is interpersonally traumatized and “rejects” the other by a myriad of defenses that worked in the past.

- We use words, but are they enough to reach such early emotional states and the verbal convictions they created?
- Does something else has to happen beyond words?
- Body-based approaches, EMDR, biofeedback, etc...

- **The importance of therapeutic enactment**
- Recreating and experiencing the past in the present as a “lived” expression of early implicit states.
- Enactments reveal unconscious self-states
The therapeutic use of self-disclosure

- The recent move to more emotion/body based therapies is a testament to the realization that language and content alone are limited in fostering to embodied states.
- Considering the links between affect, cognition and body (intertwined) **enactments** provides an opportunity to reflect on a dysregulated pattern in real time. (For both patient and therapist.)

The importance of reflective awareness and mindfulness

- Reflective awareness, while experiencing a physio/affective state can lead to a greater ability to take current circumstances into account and not mindlessly enact old reactive patterns.
- This process can recalibrate the balance between cortical and subcortical regions, leading to greater integration.

- Mindfulness and reflective awareness don't just rely on words; reflecting on an amalgam of emotional memories or while in the midst of disturbing emotions allows us to gain distance from them and re-contextualize them. As a result we can make choices that avoids automaticity.
- Engaging the parasympathetic system through breathing – meditation.
- Just the act of reflection on an affective state, even just naming intense emotion serve to enhance regulation (Bateman and Fonagy, 2012; Jurist, 2008; Falkenstrom et al., 2014; Lane, 2008, Lane et al., 2014).

Questions to reflect on

- The role of homework in psychotherapy
- The role of actively teaching patients to develop awareness, theory of mind and body awareness.
- Would it help to explain some of our brain/mind/body processes to patients who struggle with repetitions or self-destructive behaviors?
