

Taken directly from the book, "The body keeps the score: Brain mind and the body in the healing trauma" by Bessel Van Der Kolk. NY: Viking, 2014. Page numbers from the text are inserted at the end of some paragraphs.

Trauma, by definition, is unbearable and intolerable. Most rape victims, combat soldiers, and children who have been molested become so upset when they think about what they experienced that they tried to push it out of their minds. Trying to act as if nothing happened, and move on. It takes tremendous energy to keep functioning while carrying the memory of terror and being ashamed of the weakness and vulnerability.

In later years I encountered a similar phenomena in victims of child abuse: most of them suffer from agonizing shame about the actions they took to survive and maintain a connection with the person who abused him. This was particularly true if the abuser was someone who was close to the child someone who the child dependent upon, this is so often the case. The result can be confusion about whether one was a victim or willing participant, which in turn leads to bewilderment about the difference between loving terror, pain and pleasure. We will turn to this dilemma throughout the book¹⁴.

We learn from these tests that traumatized people have a tendency to superimpose their trauma on everything around them and have trouble deciphering whatever is going on around them. There appear to be little in between.

Imagination is absolutely critical to the quality of our lives. Imagination enables us to leave a routine, everyday existence by fantasizing about travel, food, sex etc. and having the last word on all things that make life interesting. It fires our creativity, releases boredom easily alleviates our pain. It enhances our pleasure and enriches our most intimate relationships.

Trauma results in a fundamental reorganization of the way mind and brain manage perceptions. It changes not only how we think and what we think about, but also our very capacity to think. We have discovered that helping victims of trauma find the words to describe what is happened to them is profoundly meaningful. Usually it is not enough. Yet telling the story doesn't necessarily alter the automatic physical and hormonal responses of bodies that remain hypervigilant, prepared to be assaulted or violated at any time. For real change to take place the body needs to learn that the danger has passed and to live in the reality of the present. Our search to understand trauma has led us to think differently not only about the structure of the mind but also by the processes by which it heals.

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There are seemingly paradoxical findings that the levels of the stress hormone cortisol are low with PTSD. These discoveries only started to make sense when a research clarified that normally cortisol puts an end to the stress response by sending all clear safety signal and that in PTSD, the body's stress hormones do, in

fact, not return to baseline after the threat has passed.

Ideally our stress hormone system should provide a lightning fast response to threat, but then quickly returns to equilibrium. In PTSD patients however the stress hormone system fails at this balancing act. Fight/flight/freeze signals continue after the danger is over, and they do not return to normal. Instead they continue to secrete stress hormones which is experienced as agitation and panic and in the long term this reeks havoc with their health.³⁰

Many traumatized people seem to seek out experiences that would repel most of us. Patients often complain about a sense of emptiness and boredom when they're not angry or under duress or involved in some dangerous activity.³¹

Experimented with combat veterans who agreed to watch parts of Platoon, the graphic war movie while having their hand submerged in very cold water. They compare this with another group who watched a neutral movie with their hand in the same cold water. Seven of the eight veterans watching Platoon kept their hands in the water 30 percent longer watching Platoon.

We then calculated that the amount of analgesia produced by watching 15 minutes of a combat movie was equivalent to that produced by being injected with 8 mg of morphine, about the same dose a person would receive in the emergency room for crushing chest pain.

We concluded that strong emotions can block pain as a result of the release of morphine-like substances manufactured in the brain. This suggested that for many traumatized people, re-exposure to stress provides a similar relief from anxiety.³³

Prof. Jeffrey Gray gave a talk about the amygdala, a cluster of brain cells that determines whether a sound, image, or body sensation is perceived as a threat. Gray's data shows that the sensitivity of the amygdala is dependent, at least in part, on the amounts of Neurotransmitter serotonin in that part of the brain. Animals with low serotonin levels were hyper-reactive to stressful stimuli like loud sounds, while higher levels of serotonin doused their fear systems making them less likely to become aggressive or frozen in response to potential threats. ³³

Other researchers have shown that dominant male monkeys have much higher levels of brain serotonin than low ranking animals but that their serotonin levels drop when they were prevented from maintaining eye contact with the monkeys they once lorded over. In contrast, low ranking monkeys who were given serotonin supplements emerge from the pack to assume leadership. The social environment interacts with brain chemistry. Manipulating a monkey into a lower position in the dominance hierarchy makes his serotonin drop, while chemically enhancing serotonin elevated the rank of former subordinates.

Broca's area is one of the speech centers of the brain, which is often affected in

stroke patients when the blood supply to that region is cut off. Without a functioning Broca's area you cannot put your thoughts and feelings into words. Photographs of combat soldiers show a Hollow man staring neatly into a void. 43

Even years later, traumatized people often have enormous difficulty telling other people what has happened to them. Their bodies re-experience terror, rage, and helplessness, as well as the impulse to frighten or flee, but these feelings are almost impossible to articulate. Trauma, by nature drives us into the edge of comprehension, cut off from language based on common experience or an unimaginable experience.

Sooner or later most survivors come up with what men here who have called their "cover story" that offers some explanation for the symptoms and behavior for public consumption. These stories, however, are really for public consumption. The inner truth of the experience is it is an enormously difficult to organize one's traumatic experience into a coherent account – a narrative with a beginning, middle, and an end.

In contrast to the deactivation of the Broca's area , another region, Brodmann's area 19, lit up in our participants. This is a region in the visual cortex that registers images when they first entered the brain. We were surprised to see brain activation in this area so long after the original experience of the trauma.44

Imaging also revealed that during flashbacks, our subject lit up only on the right side. Today there's a huge body of scientific and popular literature about the difference between the right and left brains. Back in the early 90s I heard some people began to divide the world between left Brainers, and right Brainers. However, our scans clearly show that images of past trauma activate the right hemisphere of the brain and de-activate the left.

The left and right sides of the brain also processed imprints of the past in dramatically different ways. The left brain remembers facts, statistics, and the vocabulary of events. We all want to explain our experiences and put them in order. The Right brain stores memories of sound, touch, smell and the emotional state. It reacts automatically to voices, facial features and gestures and places experienced in the past. What it recalls is viewed like intuitive truth– the way things are. Even as we describe a loved ones virtues to a friend, our feelings may be more deeply stirred by how her face recalls the aunt we loved at the age of four.45

Deactivation of the left hemisphere has a direct impact on the capacity to organize experience into logical sequences and to translate shifting feelings and perceptions into words. Broca's area, which blacks out during flashbacks, is on the left side. Without sequencing we can't identify cause and effect, grasp the long term effects of her actions, or create coherent plans for the future. People who are very upset sometimes say they are losing their minds. In technical terms they're experiencing the loss of executive functioning.

When something reminds traumatized people of the past, their right brain reacts as though the traumatic event were happening in the present. After the emotional storm passes, they may look for something or somebody to blame for it. They behave the way they did because you were 10 minutes late because you burnt the potato or because you never listen to me.

We know that there is another possible response to threats, which our scans are capable of measuring. Some people simply go into denial. Their bodies register a threat, but their conscious minds go on as if nothing is happened. However, even though the mind may learn to ignore the messages from the emotional brain, the alarm signals don't stop. The emotional brain keeps working, and stress hormones keep sending signals to the muscles to tense for action or immobilize in collapse..46

For hundreds of years or more, every textbook of psychology and psychotherapy has advised us a method of talking about distressing feelings can resolve them. However, as we've seen, the experience of trauma itself gets in the way of being able to do that.

No matter how much insight and understanding we develop, the rational brain is basically impotent to talk the emotional brain out of its own reality.

It is difficult for people who've gone through the unspeakable to convey the essence of their experience. It is so much easier for them to talk about what is been done to them – to tell a story of victimization revenge– than to notice, feel, and put into words the reality of their internal experience. 47

Our scans had revealed how their dread persisted and could be triggered by multiple aspects of daily experience. They had not integrated their experience into the ongoing stream of their life. They continue to be there and did not know how to be here– fully alive in the present. 47

Traumatized people become stuck, stop in their growth because they can't integrate new experiences into their lives.

After trauma, the world is experienced with a different nervous system. Survivors' energy now becomes focused on suppressing inner chaos, at the expense of spontaneous involvement in their lives. These attempts to maintain control over unbearable physiological reactions can result in a whole range of physical symptoms, including fibromyalgia, chronic fatigue and other auto immune diseases. 53

This explains why it is critical for trauma treatment to engage the entire organism, body, mind, and brain.53

When the brain's alarm system is turned on, it automatically triggers preprogrammed physical state plans in the oldest parts of the brain. The nerves and chemicals that make up our basic brain structure have a direct connection with our body. When the old brain takes over, it partially shuts down our higher brain, our conscious mind, and propels the body to run, fight, or on occasion freeze.

By the time we are fully aware of our situation, our body may already be on the move. If the fight/flight/freeze response is successful and we escaped the danger, we recover our internal equilibrium and gradually regain our senses.⁵⁴

If for some reason the normal response is blocked— for example when people are held down, trapped, or otherwise prevented from taking effective action, such as in a war zone, car accident, domestic violence, or a rape— The brain keeps secreting stress chemicals. In the brains, electrical circuits continue to fire in vain.⁵⁴

Trauma survivors are prone to continue the action or rather the futile attempt at action which began when the thing happened. Being able to move into doing something to protect oneself is a critical factor in determining whether or not a horrible experience will leave long-lasting scars. ⁵⁵

The brainstem and the hypothalamus which sits directly above it, together control the energy levels of the body. They coordinate the functioning of the heart and lungs and also the endocrine and immune systems, ensuring that these basic life-sustaining systems remain within the relatively stable internal balance known as homeostasis. ⁵⁶

It is amazing how many psychological problems involve difficulties with sleep, appetite, touch, digestion and arousal.

Any effective treatment for trauma has to address these basic housekeeping functions of the body.

The brain is formed in a use-dependent manner. This is another way of describing neuroplasticity. When a circuit fires repeatedly it can become a default setting— the response was likely to occur. If you feel safe and loved, your brain becomes specialized in exploration, play, and cooperation. If you are frightened and unwanted, it specializes in managing feelings of fear and abandonment.

The reptile brain and limbic system make up the emotional brain. The emotional brain is at the heart of the central nervous system. A key task is to look out for your welfare. If it detects danger or special opportunity— such as a promising partner— it alerts you by releasing a squirt of hormones. The sensations will interfere with whatever your mind is currently focused on and get you moving— physically and mentally— in a different direction. Even at their most subtle, these sensations have a huge influence on the small and large decisions we made throughout our lives: What we choose to eat, where we like to sleep and with whom, what music we prefer,

whether we like to garden, sing in the choir, and whom we befriend and whom we detest.

The emotional brain's cellular organization and biochemistry are simpler than those of the neo cortex, our rational brain, and it assesses incoming information in a more global way. As a result it jumps to conclusions based on raw similarities, in contrast with the rational brain, which is organized to sort through a complex set of options. The emotional brain initiates preprogrammed escape plans, like the fight or flight responses. These muscular and physiological reactions are automatic, set in motion without any thought for planning on our part, leaving our conscious, rational capacities to catch up later, often well after the threat is over. 57

In the second year of life, the frontal lobes, which make up the bulk of our neocortex, begin to develop a rapid pace. The ancient philosophers call seven years "the age of reason". For us first grade is the prelude of things to come, A life organized around frontal lobe capacities: sitting still; keeping sphincters in check; being able to use words rather than acting out; understanding abstract and symbolic reasoning; planning for tomorrow; and being in tune with teachers and classmates.58

It soon became clear that mirror neurons explain many previously unexplainable aspects of the mind, such as empathy, imitation, synchrony, and even the development of language. One writer compared mirror neurons to its neural Wi-Fi. We pick up not only another person's movement by her emotional state and intentions as well. When people are in sync with each other they tend to stand or sit in similar ways. Their voices take on the same rhythms. But our mirror neurons also make us vulnerable to others' negativity so that we respond to their fury with anger or are dragged down by the depression. Trauma almost invariably involves not being seen, not being mirrored, and not being taken into account.59

Treatment needs to reactivate the capacity to safely mirror, and be mirrored, by others, but also to resist being hijacked by others' negative emotions.

Realizing that other people can think and feel differently from us is a huge development step for two and three year olds. They learn to understand the motives, so they can adapt and stay safe in groups that have different perceptions, expectations, and values.

Our frontal lobes can also stop us from doing things that will embarrass us or hurt others. You don't have to eat every time we are hungry. Or blow up every time we're angry. But it is exactly on that edge between impulsive and acceptable behavior where most of our troubles begin. The more intense the visceral, sensory input from the emotional brain, the less capacity the rational brain has to put a damper on it.60

Danger is part of our normal life and the brain is in charge of detecting it and organizing our response. Sensory information about the outside world arrives through our eyes, nose, ears, and skin. These sensations converge in the thalamus,

an area inside the limbic system that acts as the “Cook” In the brain.

The thalamus stirs all the input from our perceptions into a fully blended autobiographical soup, an integrated, coherent experience of “this is what is happening to me”.⁶⁰

These sensations are then passed on in two directions—down to the amygdala, two almond-shaped structures that lie deeper in the limbic, unconscious brain, and up to the frontal lobes, where they reach our conscious awareness. However processing by the thalamus can break down. Sights, sounds, smells, and touch are encoded as isolated, dissociated fragments, and normal memory processing disintegrates. Time freezes so the present danger feels like it will last forever.⁶⁰

The central function of the amygdala, which I call the brain’s smoke detector, is to identify whether input is relevant for our survival. It does so quickly and automatically, with the help of feedback from the hippocampus, and nearby structures that relate the new input to past experiences. If the amygdala sees a threat— a potential collision with an oncoming vehicle, a person on the street who looks threatening— it sends an instant message down to the hypothalamus and the brainstem. ⁶⁰

While the smoke detector is usually pretty good picking up danger clues, trauma increases the risk of misinterpreting whether a particular situation is dangerous or safe. You can only get along with other people if you can accurately gauge whether their intentions are benign or dangerous. Even a slight misreading can lead to painful misunderstandings in relationships at home or at work.

Faulty alarm systems lead to blowups or shutdowns in response to innocuous comments over facial expressions.

If the amygdala is the smoke detector of the brain, think of the frontal lobes— and specifically the medial prefrontal cortex (MPFC), located directly above our eyes—is the watchtower, offering a view of the scene from on high. The amygdala doesn’t make such judgments; it just gets you ready to fight back or escape even before the frontal lobes get a chance to weigh in with their assessment. ⁶²

As long as frontal lobes are working properly, we’re unlikely to lose her temper. Our watchtower also tells us that other people’s anger and threats are a function of their emotional state. When the system breaks down we become like conditioned animals: the moment we detect danger, we automatically go into fight – or – flight mode.

In PTSD, the critical balance between the amygdala, which is the smoke detector and the MPFC, which is the watchtower, shifts radically, which makes it harder to control emotions and impulses. ⁶³

Imaging studies of human beings in emotional states reveal that intense fear, sadness, anger will increase the activation of subcortical brain regions involved in emotions and significantly reduce the activity in various areas in the frontal lobe, particularly the MPFC.⁶³

Achieving control of stress depends upon achieving a balance between the smoke detector and the watchtower. You can learn to regulate them from the top down or from the bottom up. ⁶³

Knowing the difference between top down and bottom up regulation is central for understanding and treating traumatic stress.⁶⁴

We can access the ANS through breath, movement, or touch. Breathing is one of the few body functions under conscious and autonomic control.⁶⁴

Our emotions assign value to experience and thus are the foundation of reason. Our self experience is the product of the balancing between rational and emotional brains. When these two systems are in balance, we feel "like ourselves". However, when our survival is at stake, the systems can function relatively independently.

Psychologists try to help people using insight and understanding to manage their behavior. However, neuroscience research shows that very few psychological problems are the result defects in understanding: Most originate in pressures from deeper regions in the brain that drive our perception and attention.⁶⁴

When the alarm bell of the emotional brain keeps signaling that you are in danger, no amount of insight will silence it. I'm reminded of the comedy in which a seven-time recidivist in an anger management program extols the virtue of the techniques he's learned: "They are great and work terrific- as long as you were not really angry."

Disassociation is the essence of trauma. The overwhelming experience is split off and fragmented, so that the emotions, sounds, images, thoughts, and physical sensations related to the trauma take on a life of their own. The sensory fragments of memory intrude into the present, where they are literally relived. As long as the trauma is not resolved, the stress hormones that the brain secretes to protect itself keeps circulating, then the defensive movements and the emotional responses keep getting replayed.⁶⁶

Flashbacks in reliving are in some ways worse than trauma itself. A traumatic event has a beginning and end – at some point it is over. But with people with PTSD of flashback can occur at any time whether they're awake or asleep.⁶⁷

People who suffer from flashbacks often organize their lives around trying to protect against them. They may go to the gym, douse themselves with drugs, or try to cultivate an illusionary sense of control in highly dangerous situations.⁶⁷

Not being able to deeply take in what's going on around them makes it impossible to feel fully alive. It becomes harder to feel the joys and aggravations of ordinary life, harder to concentrate on the tasks at hand. Not being fully alive in the present keeps them more firmly imprisoned in the past. 67

Veterans may react to the slightest cue, such as hitting a bump in the road as if they were in a war zone. They startle easily becoming enraged or numb. Victims of childhood sexual abuse may anesthetize their sexuality and then feel intensely ashamed if they become excited by sensations or images that recall her molestation, even with the sensations of natural pleasures associated with particular body parts. Intense and barely controllable urges make people feel crazy- and makes them feel they don't belong to the human race. Feeling numb during birthday parties for your kids makes people feel like monsters. As a result shame becomes the dominant emotion and hiding the truth the central preoccupation. 67

Therapy is the beginning of bringing the emotions that were generated by trauma, being able to feel, the capacity to observe oneself, online. However, the bottom line is that the threat - perception system of the brain has changed, and the people's physical reactions are dictated by the imprint of the past. 67

The trauma that started "out there" is now played out on the battlefield of their own bodies, usually without a conscious connection between what happened back then and what is going on right now inside. The challenge is not so much learning to except the terrible things that happened but learning how to gain mastery over one's internal sensations and emotions. Sensing, naming, and identifying what is going on inside is the first step to recovery. 68

See the section a diagram on the smoke detector goes on overdrive

The timekeeper. The two white areas in the front of the brain pictured in the fMRI scan on page 68 are the right and left dorsolateral Prefrontal cortex (DLPFC). When those areas are deactivated, people lose their sense of time and become trapped in the moment, without a sense of past, present, or future. 69

Two brain systems are relevant for the mental processing of trauma: those dealing with emotional intensity and context. Emotional intensity is defined by the smoke alarm, the amygdala, and its counterweight, the watchtower, or medial prefrontal cortex. The context and meaning of an experience are determined by the system that includes the DLPFC and the hippocampus. The DLPFC is located to the side in the front brain while the MPFC is in the center. The structures along the midline of the brain are devoted to your inner experience of yourself, those on the side are more concerned with your relationship with your surroundings. 69

The DLPFC tells us how our present experience relates to the past and how it may affect the future- you can think of that as the timekeeper of the brain. Knowing that whatever is happening is finite and will sooner or later come to an end makes most

experiences tolerable. The opposite is also true– situations become intolerable if they feel interminable.⁶⁹

People can recover from trauma only when the brain structures that were knocked out during the original experience are fully online. Visiting the past in therapy should be done while people are, biologically speaking, firmly rooted in the present and feeling as calm, safe, and grounded as possible. Grounded means that you can feel your butt in your chair, see the light coming through the window, feel the tension in your body, and hear the wind stirring outside. Being anchored in the present while revisiting the trauma opens the possibility of deeply knowing that the terrible events belong to the past. For that to happen, the brain's watchtower, cook and timekeeper need to be online. Therapy won't work as long as people keep being pulled back into the past. ⁷⁰

The thalamus functions as a cook– a relay station that collects sensations from the ears, eyes, and skin and integrates them into a soup that is our autobiographical memory. Breakdown of the thalamus explains why trauma is primarily remembered not as a story, a narrative with a beginning middle and end, but as isolated sensory imprints: images, sounds, and physical sensations that are accompanied by intense emotions, usually terror and helplessness. ⁷⁰

In normal circumstances the thalamus also acts as a filter or gatekeeper. This makes it an essential component of attention, concentration, and new learning– all of which are compromised by trauma. Your thalamus helps you distinguish between sensory information that is relevant and information that you can safely ignore. And people with PTSD have their floodgates wide open. Lacking a filter, they are on constant sensory overload. Anyone who deals with traumatized people is sooner or later confronted with blank stares, absentmindedness, the outward manifestation of the biological freeze reaction, or depersonalization. Depersonalization is one symptom of the massive dissociation created by trauma. The challenge is for people to become alert and engaged. This is where a bottom up approach becomes essential. It is actually changing the patients physiology, his or her relationship to the body sensations. We can help people evoke or notice bodily sensations by tapping acupuncture points, or tossing the ball back-and-forth, or dancing or music. Numbing is the other side of the coin in PTSD. While relieving trauma is dramatic, frightening, and potentially self-destructive, over time a lack of presence can even be more damaging. This is a particular problem for traumatized children. Acting out kids tend to get attention; blanked out ones don't bother anybody and lose their future bit by bit.

The challenge of trauma treatment is not only dealing with the past but, even more, enhancing quality of day-to-day experience. One reason that traumatic memories become dominant in PTSD is that it's so difficult to feel truly alive right now. When you can't be fully here, you go to places where you didn't feel alive– even if those places are filled with horror and misery.

Desensitization makes you less reactive but if you cannot feel satisfaction from ordinary everyday things then life will pass you by. 73

Darwin observes that the fundamental purpose of emotion is to initiate movement that will restore the organism to safety and physical equilibrium. 75

If the organism is stuck in survival mode, its energies are focused on fighting off unseen enemies, which leaves no room for nurture, care, and love. As long as the mind is defending itself against invisible assaults, our closest bonds are threatened, along with our ability to imagine, play, learn and pay attention to other people's needs. 76

We'll do anything to make those awful visceral sensations go away, whether it is clinging desperately to another human being, rendering ourselves insensible with drugs or alcohol, or taking a knife to the skin to replace overwhelming emotions with definable sensations. How many mental health problems start with attempts to cope with the unbearable physical pain of emotions? 76

Polyvagal theory provided us with a more sophisticated theory of the biology of safety and danger, one based on the subtle interplay between the visceral experiences of our own bodies and the voices and faces of the people around us. It explains why a kind face or a soothing tone of voice can dramatically alter the way we feel. It clarified why knowing we are seen and heard by important people in our lives can make us feel calm and safe and why being ignored or dismissed can precipitate rage reactions or mental collapse. It helped us understand why focused attunement with another person can shift us out of disorganized and fearful states. 78

Polyvagal theory makes us look beyond the effects of fight or flight and put social relationships front and centre in our understanding of trauma. Human beings are astoundingly attuned to subtle emotional shifts in people and animals around them. Our mirror neurons register their inner experience and our own bodies make internal adjustments to whatever we notice. When the message we receive from others is that "you're safe with me", we relax. We also feel nourished, supported and restored as we look into the face and eyes of the other. 78

Being able to feel safe with other people is probably the single most important aspect of mental health; safe connections are fundamental to meaningful and satisfying lives. **Social support is the most powerful protection against becoming overwhelmed by stress and trauma.** 79

Critical issue is not just presence but reciprocity: being truly heard and seen by the people around us, feeling that we are held in someone's mind and heart. For our physiology to calm down, heal and grow we need a visceral feeling of safety. 79

After trauma, the world is experienced with a different nervous system that has an altered perception of risk and safety. Neuroception (Porges) describes the capacity to evaluate relative danger and safety in the environment. We need to help them find ways to reset their physiology, so their survival mechanisms stop working against them. 80

Shares example of a plane crash. Some people stayed calm and resourceful, two lost consciousness, two went into panic.

According to Porges, **the autonomic system regulates three fundamental physiological states**. The level of safety determines which one is activated at a time. Whenever we feel threatened we **first** become involved in **social engagement**, calling out for help or support. If no one comes to our aid, we activate **fight or flight**. If this fails and we can't get away we become **immobile**, shut down or freeze or collapse. 80

The social engagement system depends on nerves that have their origin in the brain stem regulatory centres- primarily the vagus also known as the 10th cranial nerve- together with adjoining nerves that activate the muscles of the face, throat, middle ear and voice box or larynx. When the Ventral Vagal complex (VVC) runs the show, we smile, when others smile, we nod our heads and we frown when friends tell us of their misfortunes. **When the VVC is engaged, it sends signals down to our heart and lungs, slowing down our heart rate, and increasing the depth of our breathing**. We feel calm and relaxed, centered or pleasurable aroused. 81

Any threat to our safety or social connections triggers changes in the areas innervated by the VVC. When upset, our facial expressions change, tone of voice. If no one helps- then fight or flight. If we can't escape then we activate the Dorsal Vagal Complex. This system affects our stomach, kidneys, intestines and reduces metabolism. Our heart rate plunges, we can't breathe and our gut stops or empties. We disengage, collapse or freeze. 82

Immobilization, generated by the **reptilian brain**, characterizes many **chronically** traumatized people, as opposed to the **mammalian** panic and rage that make more **recent** trauma survivors so frightened and frightening. Time is a factor in this. 83

Young infants have their reptilian brains run most of the show, alternating between sympathetic and parasympathetic arousal. As parents smile and cluck at them, we stimulate the growth of synchronicity in the developing VVC. This helps bring babies' emotional arousal systems into sync with their surroundings. The VVC controls sucking, swallowing, facial expression and the sounds produced by the larynx. All senses of pleasure and safety which create the foundation for all future social behaviour. 84 Being in tune with others via the VVC is enormously rewarding.

Immobilization is at the root of most traumas. When that occurs the DVC takes over: you lose touch with yourself and your surroundings and you dissociate, faint and collapse. 84.

The natural state of mammals is to be somewhat on guard (Porges). To feel emotionally close, our defensive system must temporarily shut down. In order to play, mate and nurture our young, the brain needs to turn off its natural vigilance. 84

Many traumatized individuals are too hyper-vigilant to enjoy ordinary pleasures of life, while others are too numb to absorb new experiences or to be alert to real dangers.

ACHIEVING ANY SORT OF DEEP INTIMACY- A CLOSE EMBRACE, SLEEPING WITH A MATE AND SEX- REQUIRES ALLOWING ONESELF TO EXPERIENCE IMMOBILIZATION WITHOUT FEAR (Porges) 85.

How to deactivate defensive maneuvers? Simple, rhythmically attuned movements. Schools should not cut out PE, chorus, recess and anything involving movement, play and joyful engagement.

The polyvagal theory helped us to understand why things like theatre, yoga, and movement worked so well. We became more conscious of combining top-down approaches to activate social engagement with bottom-up methods, to calm the physical tension in the body. Interpersonal rhythms, visceral awareness, vocal and facial communication help shift people out of fight/flight states, reorganize their perceptions of danger and increase their capacity to manage relationships. 86

The body keeps the score. If the memory of trauma is encoded in the viscera, in heartbreaking and gut-wrenching emotions, in autoimmune disorders and skeletal-muscular problems, and if mind/brain/visceral communication is the royal road to emotion regulation, this demands a shift in our therapeutic assumptions. 86

Many people with trauma have an extreme disconnection from the body. Some could not feel whole areas of their bodies or recognize themselves in a mirror. 89

What is your brain doing when it has nothing particular on your mind? It turns out you pay attention to your self: The default state activates the brain areas that work together to create your sense of "self".

The DSN (default state network) regions are the Mohawk of self-awareness: midline structures of the brain from the posterior cingulate (gives us physical sense of where we are- our internal GPS), Connected to the MPFC, the watchtower. The insula relays messages from the viscera to the emotional centres; and the parietal

lobes which integrate sensory information; and the anterior cingulate which coordinates thinking and feeling. All these areas contribute to consciousness. 91

With PTSD there was no activation of these survivors of this midline, only a slight activation of the posterior cortex (GPS). Patients with trauma had learned to shut down the brain areas that transmit visceral feelings and emotions that accompany and define terror. Yet these same areas are responsible for register the range of our emotions and sensations that form the foundation of our self- who we are. **To shut off terrifying emotions, they also deadened their capacities to feel fully alive.** 92

The disappearance of medial prefrontal activation could explain why so many traumatized people lose their sense of purpose and direction. Impaired inner reality. **How could they make decisions,** or put any plan into action, if they couldn't define what they wanted, **what the sensations in their bodies, the basis of all emotions, were trying to tell them?** 92

To feel present you have to know where you are and be aware of what is going on with you. If the self-sensing system breaks down, we need to find ways to reactivate it. 92

Agency (feeling in charge of your life) begins with interoception- our awareness of our subtle sensory, body-based feelings: the greater that awareness, the greater our potential to control our lives. Knowing **what** we feel is the first step to knowing why we feel that way. If we are aware of the constant changes in our inner/outer environment, we can mobilize to manage them. We can't do this unless our watchtower (MPFC) learns to observe what is going on inside us. This is why mindful practice which strengthens the MPFC, is a cornerstone of recovery from trauma.96

Trauma robs victims of their inner compass and their imaginations which they need to create something better. If you have a comfortable connection with your inner sensations- if you can trust them to give you accurate information- you will feel in charge of your body, your feelings and your self. Traumatized people feel chronically unsafe inside their bodies. They become experts at ignoring visceral warning signs. They learn to hide from their selves. 96-97

Panic symptoms are maintained largely because an individual develops a fear of bodily sensations associated with panic attacks. Sensations escalate into a full body emergency. People's lives will be held hostage to fear until the visceral experience changes. 97

By ignoring or distorting the body's messages, we become unable to detect what is truly dangerous or safe and nourishing. Self-regulation depends on having a friendly relationship with your body. Without it you have to rely on external regulation- drugs, alcohol, compulsive compliance with the wishes of others. 97

Alexithymia- Greek for not having words for feelings. Many traumatized children and adults simply cannot describe what they are feeling because they can't identify what their physical sensations mean. They tend to register emotions as physical problems rather than as signals. Instead of being sad, angry, they experience muscle pain, bowel problems, etc. 98-99

No matter what happens- the same numbness. Living in a tunnel- the same reaction. Bubble baths or rape is the same feeling. The more people were out of touch with their feelings, the less activity they had in the self-sensing regions of their brain. 99

Trauma victims cannot recover until they become familiar with and befriend the sensations in their bodies. Physical self-awareness is the first step to releasing the tyranny of the past. 101

The mind needs to be reeducated to feel physical sensations, and the body needs to be helped to tolerate and enjoy the comforts of touch. Individuals who lack emotional awareness are able, with practice, to connect their physical sensations to psychological events. Then they can slowly reconnect with themselves. 101

Chronically traumatized people are unable to make eye contact. Our PFC helps us to assess people who come towards us. However those with PTSD did not activate any parts of their PFC in the presence of a stranger- they were not curious. They just activated the Periaqueducatal Gray, that generates startle, hypervigilance, cowering and other self-protective behaviours. 102 **There was no activation of any part of the brain involved in social engagement. They simply went into survival mode directly.**

The roots of resilience...are to be found in the sense of being understood by and existing in the mind and heart of a loving, attuned and self-possessed other. (Diana Fosha, reported in van der Kolk, p.105.

Some of the children had hardly developed a sense of self- they couldn't even recognize themselves in a mirror. ...for abused children, the whole world is filled with triggers. As long as they can imagine only disastrous outcomes to relatively benign situations, anyone walking into a room, any stranger, any image on a screen or on a billboard might be perceived as a harbinger of catastrophe. In this light the bizarre behavior of the kids at the children's centre made perfect sense. 108.

Most research is me-search (Beatrice Beebe in van der Kolk, 109). Secure attachment develops when caregiving includes emotional attachment. The brain coordinates rhythmic body movements and guides them to act in sympathy

with other people's brains. Infants hear the musicality from their mother's talk, even before birth. 111

Newborns can focus their eyes only on objects within 8 to 12 inches- just enough to see the person who is holding them. 112

When caregivers are in sync on an emotional level, they're also in sync physically. Babies can't regulate their own emotional states, much less the changes in heart rate, hormone levels and nervous system activity that accompany emotions. When a child is in sync with his caregiver, his sense of joy and connection is reflected in his steady heartbeat, and breathing and low level of stress hormones. His body is calm and so are his emotions. 112

Physical interactions like holding by mother, lay the groundwork for a baby's sense of self- and, with that, a lifelong sense of identity. The way a mother holds her child underlies the ability to feel the body as the place where the psyche lives. This visceral and kinesthetic sensation of how our bodies are met lays the foundation for what we experience as real. 113

...But things can go seriously wrong when mothers are unable to tune into their baby's physical reality. If a mother cannot meet her baby's impulses and needs, the baby learns to become the mother's idea of what the baby is. Having to discount its inner sensation and trying to adjust to the caregiver's needs, means the child perceives that something is wrong the way it is. Children who lack physical attunement are vulnerable to shutting down the direct feedback from their bodies, the seat of pleasure, purpose and direction. 114

The need for attachment never lessens. Most human beings cannot tolerate being disengaged from others for any length of time. People who cannot connect through work, friendships, or family usually find other ways of bonding as through illness, lawsuits, or family feuds. Anything is preferable to that godforsaken sense of irrelevance and alienation. 115

In a study of attachment patterns in over 2000 infants in normal, middle-class environments, 62% were found to be secure, 15 percent avoidant and 9 anxious (ambivalent) and 15 percent disorganized. 117

Once a mother comes to see the child not as her partner in an attuned relationship, but as a frustrating, enraging, disconnected stranger, the stage is set for subsequent abuse. 120

Hostile/intrusive behavior from mothers was not the most powerful predictor of instability in the adult children. Emotional withdrawal had the most profound and lasting impact. Emotional distance and role reversal (mothers expecting kids to look after them) were specifically linked to aggressive behavior against self and others as young adults. 120

Infants who are not truly seen and known by their mothers are at high risk to grow into adolescents who are unable to know and to see. 121

Children are also programmed to be fundamentally loyal to their caretakers, even if they are abused by them. Terror increases the need for attachment, even if the source of comfort is also the source of terror. 133

Trauma is not stored as a narrative, with an orderly beginning, middle and end. Flashbacks contain fragments of the experience, isolated images, sounds and body sensations that initially have no context other than fear or panic. 135

The most important predictor of resilience (the capacity to bounce back from adversity) was the level of security established with their primary caregiver during the first two years of life. Resilience in adulthood could be predicted by how lovable mothers rated their kids at age two. 161

Economists have calculated that every dollar invested in high quality home visitation, day care and preschool programs results in seven dollars of savings on welfare payments, health care costs, substance abuse treatment and incarceration plus higher tax revenues due to better-paying jobs.167

When something terrifying happens we retain an intense and largely accurate memory of the event for a long time. The more adrenaline you secrete, the more precise your memory will be. But only up to a certain point. Confronted with horror of inescapable shock, this system becomes overwhelmed and breaks down. 176

When memory traces of the original sounds, images and sensations are reactivated, the frontal lobe shuts down, including the region necessary to put feelings into words, the region that creates our sense of location in time, and the thalamus which integrates the raw data of incoming sensations.

At this point, the emotional brain, which is not under conscious control and cannot communicate in words, takes over. The emotional brain (the limbic and brain stem) expresses its altered activation through changes in emotional arousal, body physiology and muscular action.

Under ordinary circumstances, these two memory systems- rational and emotional- collaborate to produce an integrated response. But high arousal not only changes the balance, but also disconnects other brain areas necessary for the proper storage and integration of incoming information, such as the hippocampus and the thalamus. As a result the imprints of traumatic experiences are organized not as coherent logical narratives but in fragmented sensory and emotional traces: images, sounds and physical sensations. 176

Ordinary memory is adaptable; our stories are flexible and can be modified to fit the circumstances. Ordinary memory is essentially social; it's a story that we tell for a purpose. But there is nothing social about traumatic memory. Reenactments are frozen in time, unchanging, and they are always lonely, humiliating and alienating experiences. 180

The Unbearable Heaviness of Remembering Chapter 12, 185

Memories that are retrieved tend to return to the memory bank with modifications. As long as a memory is inaccessible, the mind is unable to change it. But as soon as story starts being told, particularly if it is told repeatedly, it changes- the act of telling itself changes the tale. The mind cannot help but make meaning out of what it knows, and the meaning we make of our lives changes how and what we remember. 191

Traumatic memories are fundamentally different from the stories we tell about the past. They are dissociated: The different sensations that entered the brain at the time of the trauma are not properly assembled into a story, a piece of autobiography. 194

Remembering the trauma with all its affects does not necessarily resolve it. Language cannot substitute for action. Words can be transformative but it does not always abolish flashbacks or improve concentration, stimulate vital involvement in your life or reduce hypersensitivity to disappointments and perceived injuries. 194

The essence of trauma is that it is overwhelming, unbelievable, and unbearable. Each patient demands that we suspend our sense of what is normal and accept that we are dealing with a dual reality; the reality of a relatively secure and present that lives side by side with a ruinous, ever-present past. 195

Chapter 13, Healing from Trauma: Owning your Self 203

Trauma robs you of the feeling that you are in charge of yourself- self-leadership. The challenge of recovery is to re-establish ownership of your body and mind- of your self. This means feeling free to know what you know and to feel what you feel without becoming overwhelmed, enraged, ashamed or collapsed.

This involves finding a way to become calm and focused, learning to maintain that calm in response to images, thoughts, sounds or physical sensations that remind you of the past and finding a way to be fully alive in the present and engaged with people around you and not having to keep secrets from yourself, including secrets about the ways you have managed to survive 204.

To regain control over the self, you need to revisit the trauma but only after you feel safe and will not be re-traumatized by it. First you need to be able to cope with the feelings and sensations.

The engine of the PTSD reactions are in the emotional brain: physical reactions such as gut-wrenching sensations, heart pounding, reedy voice, etc.

The rational brain can think about where feelings come from but it cannot abolish emotional sensations or thoughts. Understanding **why** does not change **how** you feel. 205

Limbic system therapy. We need to restore the proper balance between our rational and emotional brains so you can feel in charge. When we are pushed outside our window of tolerance, we become either hyper or hypoaroused. We become reactive and disorganized. In this state we cannot learn from experience. We need executive functioning restored and with it self-confidence and playfulness and creativity. 205

We need to repair faulty alarm systems and restore the emotional brain to being a quiet background presence that looks after body housekeeping such as eating, sleeping, protecting. 205

The only way we can consciously access the emotional brain is through self-awareness- engaging the medial prefrontal cortex. We have to become aware of our inner experience and learn to befriend what's going on inside ourselves. 205

Eighty percent of the fibers of the vagus nerve (connects the brain with many internal organs) are afferent- they run from the body into the brain. This means we can directly train our arousal system by the way we breathe, chant and move. In one study, 10 weeks of yoga can help PTSD symptoms of patients. 207

Learning how to breathe calmly and remaining in a state of relative physical relaxation even while accessing painful and horrifying memories is an essential tool for recovery. When you deliberately take a few slow, deep breaths, you will notice the effects of the parasympathetic brake on your arousal. The more you stay focused on your breath, the more you will benefit, particularly if you pay attention until the very end of the out breath and then wait a moment before you inhale again. 207

Emotional regulation still remains the domain of preschool and kindergarten teachers who deal with immature brains and impulsive behaviours regularly and who are often very adept at managing them. 207

The core of recovery is self-awareness. Notice that, what happens, next? Avoiding feeling sensations in our bodies increases our vulnerability of being overwhelmed by them. 208

Body awareness puts us in touch with our inner world. Simply noticing annoyance, anxiety, shifts our perspective and opens up options other than automatic reactions. Mindfulness puts us in touch with the transitory nature of our sensations and feelings. We recognize the ebb and flow of our sensations and increase our control

over them. Traumatized people are often afraid of feeling. Their own physical sensations become the enemy. 208

Physical sensations are transient and respond to slight shifts in body position, changes in breathing and shifts in thinking. The next step is to label them. Practicing mindfulness calms down the sympathetic system so that you are less likely to be thrown into fight or flight. Learning to observe and tolerate your feelings open up the possibility of control. We can tolerate a lot of discomfort as long as we stay conscious that these constantly shift. When you feel more calm and curious it is helpful.

How are particular thoughts registered in your body? Your body organizes particular emotions and memories in the body. Knowing where opens up the possibility of releasing sensations and impulses you once blocked in order to survive. 209

Jon Kabat-Zinn describes mindfulness, “One way to think of this process of transformation is to think of mindfulness as a lens, taking scattered and reactive energies of your mind and focusing them into a coherent source of energy for living, for problem-solving, for healing. 209

Mindfulness has been shown to activate the brain regions involved in emotional regulation and lead to changes in the regions associated with body awareness and fear. 209

Good social support networks constitute the single most powerful protection against being traumatized. 210 Safety and terror are incompatible.

To recover, mind, body and brain need to be convinced that it is safe to let go. You need to feel safe at a visceral level and allow yourself to connect that sense of safety with memories of past helplessness. 210 Our attachment bonds are the greatest protection against a threat.

Much of the wiring of the brain is devoted to being in tune with others. Recovering means reconnecting with human beings. That’s why trauma occurring within relationships is often more difficult to treat. 210

Human contact and attunement are the wellspring of physiological self-regulation. You need a guide who is not afraid of your terror and who can contain your darkest rage, someone who can safeguard the wholeness of you while you explore the fragmented experiences that you had to keep secret from yourself for so long. Most traumatized people need an anchor and a great deal of coaching to do this work. 211

Therapists need to help survivors to stabilize and calm down, lay traumatic memories and reenactments to rest, reconnect patients with their fellow men and women. There is no “treatment of choice” for trauma. 212.

Trauma results in a breakdown of attuned physical synchrony. Most natural way to calm down our distress is by being touched, hugged and rocked. This helps with excessive arousal and makes us feel intact, safe, protected and in charge. 215

Touch is the most elementary tool we have to calm down. Bodywork is important. Helplessness and immobilization keep people from utilizing their stress hormones to defend themselves. Activation patterns meant to promote coping are turned back against the organism and now keep fueling inappropriate fight/flight and freeze responses. This persistent emergency response must come to an end. The body needs to be restored to baseline of safety and relaxation from which it can be mobilized to take action in response to real danger. 217

Sensorimotor psychotherapy (Pat Ogden and Peter Levine) . The story of the trauma takes a backseat to exploring physical sensations and discovering the location and shape of the imprints of past trauma on the body. Before talk, patients are helped to build up internal resources that foster safe access to sensations and emotions that overwhelmed them. Gently moving in and out of accessing internal sensations and traumatic memories. 217-218.

Once patients become aware of their trauma-based physical experiences they are likely to discover powerful physical impulses- like hitting, running, pushing- that arose during the trauma but were suppressed to survive. They may be manifest in subtle body movements like twisting, turning and backing away. Amplifying these movements begins the process of bringing the incomplete trauma-related action tendencies to completion and lead to resolution eventually of the trauma. Feeling the pleasure of taking effective action restores a sense of agency and of being able to actively defend and protect themselves. 218 The pleasure of completed action.

Telling the story is important; without stories memory becomes frozen. Without memory you cannot imagine how things can be different. When people remember an ordinary event, they do not also relive all the sensations associated with that event. When people recall their trauma, they have the experience. They are engulfed by the sensory and emotional elements of the past. When you experience trauma two key areas in the brain may go blank- the area that provides a sense of time and perspective which makes it possible to know “that was then, this is now” and another area that integrates the images, sounds and sensations of trauma into a coherent story. When these aren’t working you experience not an event, but fragments of images, sounds and sensations of trauma. 219

A trauma can be successfully processed only if all those brain structures are kept online. 220

Chapter 14: Language- miracle or tyranny. 230

Traumatic events are almost impossible to put into words. The essence of a therapeutic relationship: finding words where words were absent before and as a

result being able to share our deepest pain and deepest feelings with another human being. This is one of the most profound experiences we can have, and such resonance, in which hitherto unspoken words can be discovered, uttered and received, is fundamental to healing the isolation of trauma- especially if other people in our lives have ignored or silence us. Communicating fully is the opposite of being traumatized. 235

We can get past the slipperiness of words by engaging the self-observing, body-based self-system, which speaks through sensations, tone of voice and body tensions. **Being able to perceive visceral sensations is the very foundation of emotional awareness.** When a patient tells me that he was eight when his father deserted his family, I am likely to stop and ask him to check in with himself. Where is it registered in his body? When you activate your gut feelings and listen to your heartbreak-when you follow the interoceptive pathways to your innermost recesses- things begin to change. 238

Chapter 17 279 Putting the Pieces Together

For many children, it is safer to hate themselves than to risk their relationships with their caregivers by expressing anger or running away. Abused children grow up feeling that they are fundamentally unlovable; that was the only way their young minds could explain why they were treated so badly. 279

They survive by denying, ignoring and splitting off large chunks of reality: they forget the abuse; they suppress their rage or despair; they numb their physical sensations. If abused, you are likely to have a childlike part living inside you that is frozen in time, still feeling self-loathing and denial. 279