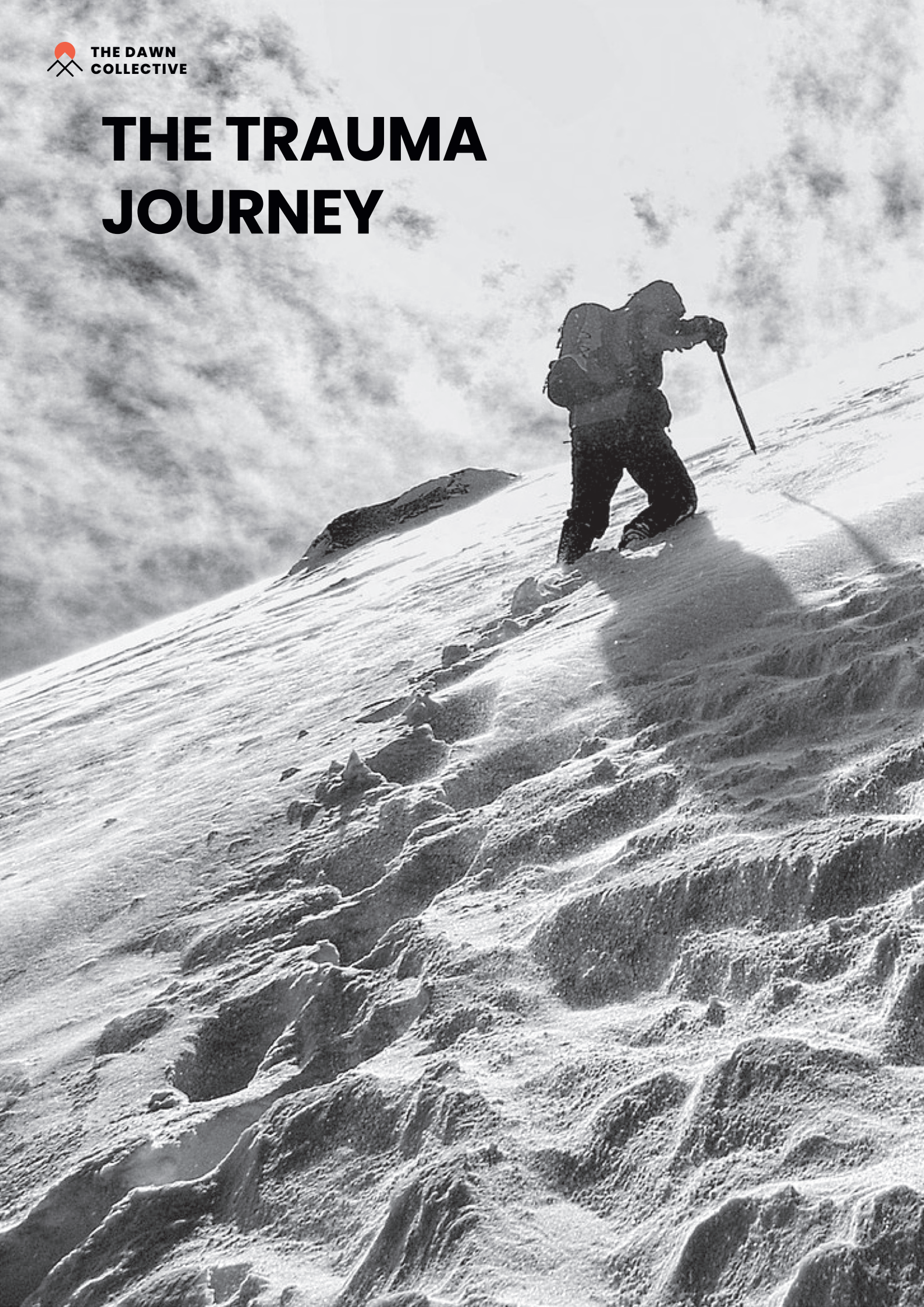


THE TRAUMA JOURNEY



Trauma Healing: From Fragmentation and Suffering to Flexibility and Growth

Authors: Dr Luke Robinson, Andrew Markell, Colleen Farrelly

Abstract:

This white paper presents a paradigm shift in trauma research and treatment, offering new hope for millions affected by post-traumatic stress. Recent studies have transformed our understanding of trauma, revealing that post-traumatic responses are dynamic, self-sustaining processes occurring in the present, rather than mere echoes of past events. This perspective allows us to understand trauma as a self-reinforcing physiological feedback loop, akin to panic and anxiety attacks, where fear of one's own stress responses becomes the primary driver.

Our paper delves into the critical balance between the Prefrontal Cortex (PFC) and the Amygdala in processing body state sensations, explaining how disruption leads to chronic hyperarousal and fragmented sense-making. We argue for a shift from traditional, historically focused talk therapies and psychedelics to innovative approaches emphasizing body state awareness and self-regulation training.

We introduce the application of Renormalization Group (RG) theory from physics to trauma psychology, providing a novel framework for understanding the persistence of fragmented, self-reinforcing fear loops and the challenges in developing a coherent sense of self. This approach illuminates the importance of strengthening integrated information processing and enhancing the ability to shift between local and global perspectives.

Central to our discussion is the game-changing role of biofeedback tools in addressing the ongoing cycle of fear and physiological arousal associated with trauma. We show how these tools, when skillfully applied, can facilitate rapid recovery and even catalyze post-traumatic growth—a phenomenon characterized by lasting shifts in self-awareness, purpose, and meaning.

This white paper not only elucidates the underlying neurophysiological mechanisms of trauma but also outlines practical, effective interventions for healing. Our framework for understanding post-traumatic growth offers a north star, suggesting that trauma recovery can lead to not just healing, but significant personal development.

By bridging cutting-edge neuroscience with practical therapeutic applications, this paper provides essential insights for researchers, those working with trauma sufferers, and anyone seeking a deeper understanding of trauma and its transformative potential. It promises to reshape the landscape of trauma treatment, offering a path to more effective, efficient, and empowering healing processes.

Introduction

Renormalization Group (RG) theory, borrowed from physics, provides an exciting framework to understand the neurophysiological experience of trauma. It also helps us to understand what happens when traumatic memories fail to integrate and instead persist in a fragmented, self-reinforcing fear loop [1].

Because this negative feedback is self-reinforcing, people suffering from trauma have a very difficult time developing a coherent and healthy sense of self. Strengthening the RG flow for integrated information processing in this situation becomes critically important. This involves enhancing higher brain functions to work in tandem with the amygdala, fostering the ability to fluidly shift between local and global perspectives.

Our scientifically grounded approach addresses the underlying physiological and neurological mechanisms behind runaway trauma responses. Rooted in a learning process, it focuses on restoring self-confidence in one's ability to self-regulate and engage challenging life conditions. It recognizes that trauma, when healed, can catalyze increased resilience, self-awareness, and personal development, often leading to transformative growth and a deeper sense of purpose.

A central principle of this approach to trauma healing is the development of practical and concrete self regulation skills that enable individuals to manage high amygdala arousal and integrate experiences into a cohesive sense of self. This collaboration between higher brain functions and the amygdala is crucial for managing the "zoom in and zoom out" process of labeling experiences and determining suitable real-world actions and physiological preparedness that are not predetermined by fear and anxiety.

Additionally, we shed light on the potential risks associated with using psychedelics in trauma healing, a treatment modality gaining favor in certain areas of the United States. Due to inherent person-to-person variability in brain chemistry, especially associated with the PFC-amygdala feedback loop, it becomes extremely difficult with psychedelics to predict safety. Given that we are dealing with highly vulnerable people, this uncertainty amplifies risks in a situation that in our view must be absolutely risk free.

While psychedelics may offer a temporary expanded sense of self and hope by altering perception, they do not provide the concrete, practical skills needed for long-term healing. These substances don't teach individuals how to work effectively with high amygdala arousal or manage the inevitable stressors of lived experience. Without the development of self-regulation skills, individuals are likely to revert to previous patterns of hyperarousal and feel trapped in the same feedback loops they sought to escape.

This mismatch between a temporary expanded perspective and the absence of lasting

integration and self-regulation skills can lead to unrealistic expectations about recovery and control over one's life. When the effects of psychedelics wear off and challenges resurface, individuals may experience a sense of failure or hopelessness, increasing the risk of depression. Variations in brain chemistry further contribute to why a significant number of trauma sufferers treated with psychedelics can have negative outcomes [2-5].

Trauma strips individuals of their sovereignty and self-confidence, undermining their lives and often the lives of their loved ones. When trauma is pervasive, as it is today, entire communities and even societies can struggle to grow and meet the challenges of life. When individuals suffering from trauma are trained in a grouping of tools and practices rooted in a coherent understanding of what is happening in their bodies and minds, they can finally take possession of their lives once again. They can navigate skillfully both their internal and external environments, and expand with confidence and resilience into the face of adversity.

I. Understanding Trauma Physiologically

A. The Core of Trauma: Fear of Physiological Dysregulation and Self

At its core, trauma can be understood as physiological changes inducing anxiety symptoms and fear, characterized by:

- Hypervigilance towards internal bodily sensations.
- Misinterpretation of normal physiological responses as dangerous.
- Avoidance of situations that might trigger intense physiological states.
- Profound fear of one's own reactions and potential loss of control.

This perspective shifts the focus from past events to present-moment experiences, aligning trauma more closely with anxiety disorders like panic disorder or generalized anxiety symptoms [7].

B. Key Physiological and Neurological Factors

Several interrelated factors contribute to the development and maintenance of trauma as an expression of long-term anxiety symptoms:

- Autonomic Nervous System (ANS) Dysregulation: Trauma can lead to persistent dysregulation of the ANS, manifesting as a bias towards sympathetic activation (fight-or-flight) and reduced parasympathetic tone. This imbalance results in a chronic state of physiological arousal and difficulty returning to a calm state [4].
- Alexithymia and Interoception: Many individuals with trauma responses experience alexithymia, a difficulty in identifying and describing emotions. This is closely linked to impaired interoception—the ability to accurately sense and interpret bodily sensations. The combination can lead to misinterpretation of normal bodily sensations as signs of danger [15].
- Neural Circuit Imbalances: Trauma profoundly affects key neural circuits, particularly the balance between the amygdala and the PFC (prefrontal cortex). There's typically hyperactivation of the amygdala coupled with reduced regulation activity of the PFC, resulting in heightened reactivity to potential threats and difficulty in down-regulating emotional responses [6].

C. The Renormalization Group (RG) Perspective on Trauma

Trauma dysregulates the ability of the PFC to integrate incoming signals with one's life narrative. RG theory provides a unique lens to conceptualize trauma as a disruption in the brain's ability to "renormalize" or integrate experiences across different scales of perception and meaning:

- Microscale: Moment-to-moment bodily sensations and emotions.
- Mesoscale: Daily experiences and interactions.
- Macroscale: Overall life narrative and sense of self.

A health integration flow across these levels is shown in *Figure 1* and *Figure 2a*. In a healthy state, experiences at each of these levels inform and shape each other, creating a coherent and flexible sense of self. Trauma disrupts this integration, leading to fragmented traumatic memories and a disconnected sense of self [1], the impact of trauma is highlighted in *figure 2b*.

Information processing requires simultaneous consideration of local and global perspectives—a concept sometimes known as "glocal"—to effectively contextualize experiences and make informed decisions. This integration supports rapid situational awareness, learning, and the development of a more cohesive sense of self and purpose. It's not about choosing between local or global perspectives; both are necessary for effective action, decision-making, and contextually appropriate responses.

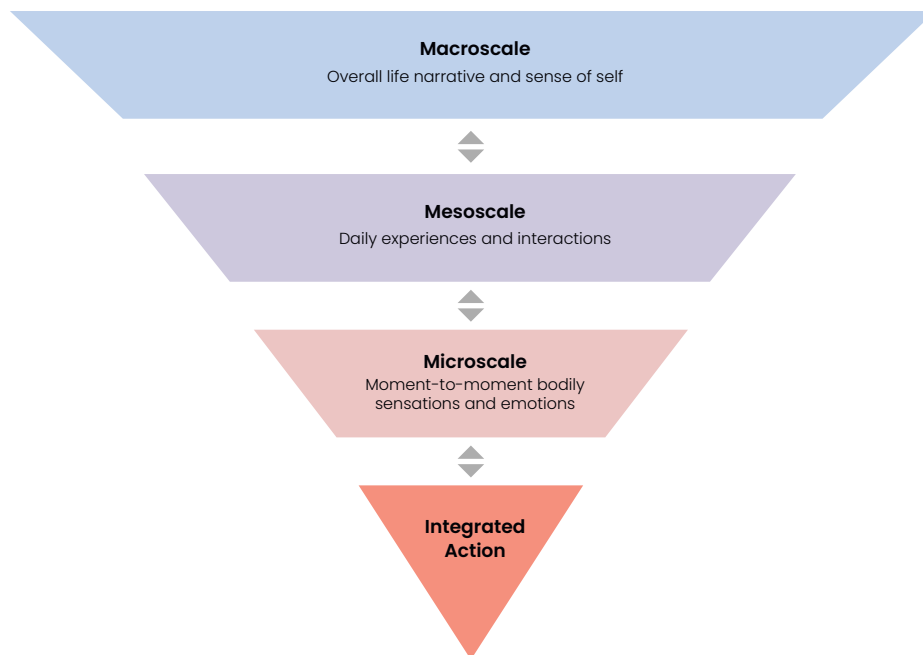


Figure 1: Renormalization Group (RG) Flow Diagram – Multiscale Information Processing in Healthy Individuals. This diagram illustrates bidirectional information flow across three scales: 1. Microscale: Moment-to-moment bodily sensations and emotions, 2. Mesoscale: Daily experiences and interactions, 3. Macroscale: Overall life narrative and sense of self. Arrows represent smooth information exchange between scales, supporting adaptive behavior and psychological well-being.

In a trauma-affected brain as seen in *Figure 2b* below, there is enhanced activity in emotional and sensory processing areas. the red regions. Dotted lines between the higher levels of brain function represent reduced connectivity, indicating disrupted top-down processing. This imbalance reflects a disruption in RG flow, where the brain struggles to effectively transition between local and global scales of awareness and context interpretation.

As a result, the trauma-affected brain experiences a breakdown in multi-scale integration, leading to scale invariance violations. This means that localized, trauma-related contexts disproportionately influence global awareness and behavior. Consequently, individuals may overgeneralize threats, applying the emotional weight of specific traumatic experiences to unrelated, often non-threatening situations. This altered brain function explains the challenges trauma survivors face in contextualizing their experiences and maintaining a balanced perspective on their environment.

Non-Activated Brain & Nervous System

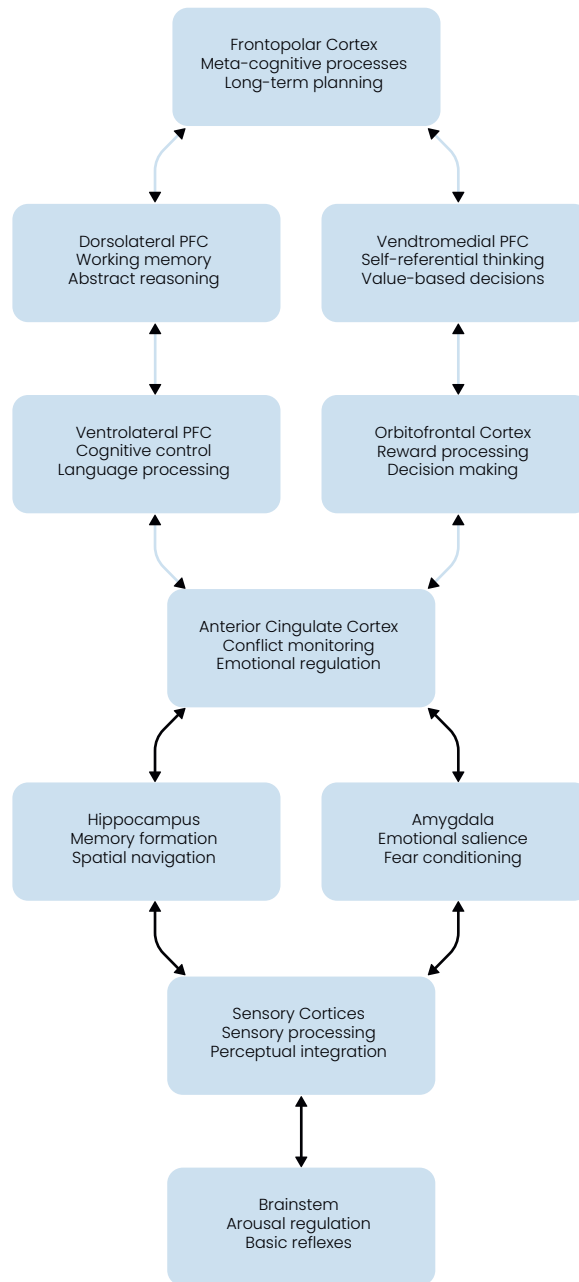


Figure 2a: This figure depicts a brain that is not in a heightened state of activation. Solid lines represent normal connectivity throughout the brain, with consistent light blue coloring indicating balanced activity across all regions. This illustrates healthy Renormalization Group (RG) flow, where information and awareness can smoothly transition between immediate, local contexts and broader, global perspectives. In RG flow terms, the non-activated brain demonstrates smooth scale transitions, allowing for adaptive integration of information from immediate, concrete experiences to abstract, global awareness. This enables flexible navigation between specific sensory inputs, emotional responses, and broader conceptual understanding of the world and self.

Activated brain and nervous system that is in a heightened trauma state

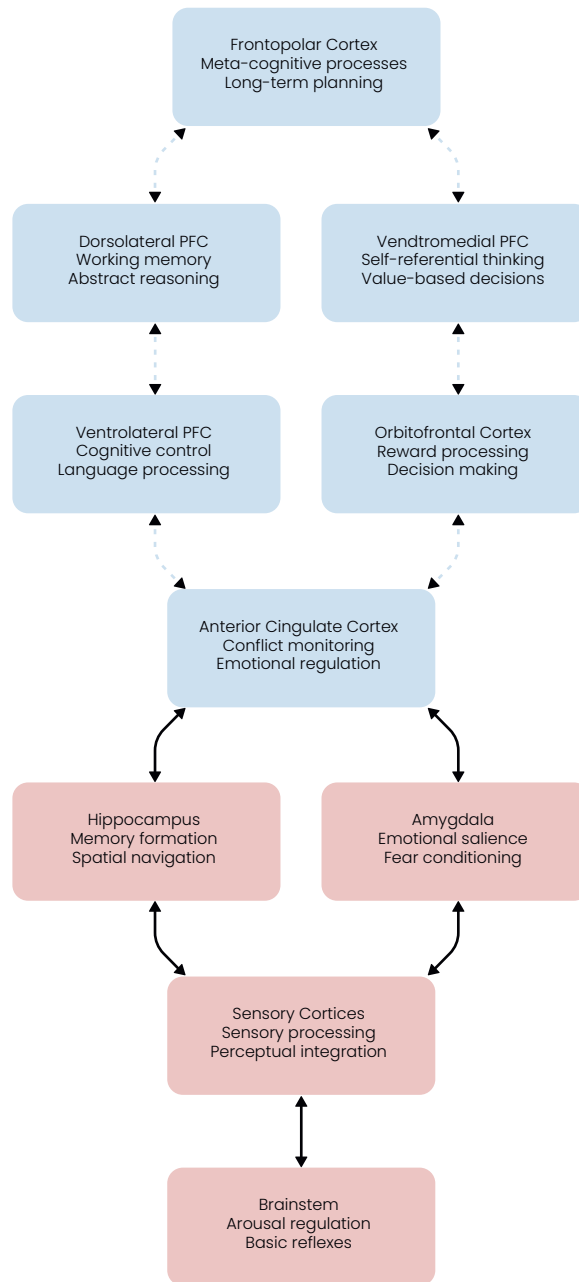


Figure 2b: This figure shows a brain in a heightened state of activation due to trauma. Dotted lines in the upper part of the brain represent reduced connectivity between higher-level brain regions, visualizing the impaired communication in prefrontal areas. This can lead to difficulties in executive function, emotional regulation, and complex cognitive tasks, corresponding to decreased top-down control and regulation. Light red coloring in the lower regions (Hippocampus, Amygdala, Sensory Cortices, and Brainstem) represents enhanced activity in emotional, memory, and sensory processing areas. This can contribute to symptoms like hypervigilance, intrusive memories, and heightened emotional responses. Solid lines between lower regions suggest maintained or enhanced connectivity in these areas.

II. The Development of Trauma Responses

A. The Moment of Trauma

Trauma often begins with a single overwhelming event or a series of chronic stressors. In these moments:

- The ANS (anatomic nervous system) becomes severely dysregulated, with an extreme sympathetic response.
- The ability to process and integrate the experience is overwhelmed.
- The normal renormalization process by which we make sense of experiences is disrupted.

B. Immediate Aftermath: Seeds of Anxiety

In the hours and days following a traumatic event:

- The individual may experience intense, unpredictable physiological reactions.
- There's often a sense of disconnection from one's body and emotions (dissociation).
- The brain struggles to contextualize the traumatic memory, leading to fragmented, intrusive recollections [8].

Over time, without effective intervention, trauma responses often deepen:

- Hypervigilance towards bodily sensations intensifies.
- Avoidance behaviors expand, leading to increasing social isolation and limited life experiences.
- The ability to accurately interpret bodily sensations (interoception) further deteriorates.
- Negative beliefs about the self, others, and the world become entrenched.
- A profound fear of one's own reactions develops, leading to a constricted life and sense of self.

From an RG perspective, this deepening represents a further disruption in the ability to integrate experiences across different scales, from moment-to-moment physiological states to overarching life narratives and sense of self due to the activation of the amygdala. Traumatic experiences often trigger overactivation of the amygdala, which can shut down the higher brain functions necessary for integrated awareness and self-regulation. This overactivation disrupts the pathways needed to balance emotional responses appropriate to different situations or memories [6].

III. The Turn Towards Healing: A Body-Aware Approach

A. Recognizing the Need for Change

As local and global integration is lost, the journey towards healing often begins when:

- The impact on quality of life becomes undeniable.
- Existing coping mechanisms prove insufficient.
- A window of opportunity—such as support from loved ones or access to new resources—opens up [9].

B. Recognizing Trauma as Physiological Dysregulation

The first step in effective treatment is recognizing trauma responses as an injury that catalyzes physiological dysregulation, anxiety, and fear of self. This shift in perspective:

- Reduces stigma by framing symptoms as understandable responses to disrupted bodily regulation.
- Opens up new avenues for treatment focused on restoring physiological regulation and interoceptive accuracy.
- Provides hope by drawing parallels with other treatable symptoms.

C. Building Self-Regulation Skills

The first crucial step in trauma recovery is building confidence in one's ability to self-regulate. This phase focuses on restoring the ability to "renormalize" experiences across different scales.

Key Components:

- **Interoceptive Training:** Learning to accurately sense and interpret bodily sensations. This involves guided exercises to enhance awareness of subtle physiological changes, reducing the misinterpretation of normal bodily functions as dangerous [9].
- **Autonomic Nervous System Regulation:** Techniques to balance sympathetic and parasympathetic activation. This includes:
 - **Breathing Regulation:** Specific breathing techniques, such as diaphragmatic breathing and rhythmic breathing patterns, can activate the parasympathetic nervous system, reducing physiological arousal. For example, slow-paced breathing has been shown to reduce anxiety and promote relaxation [10].
 - **Heart Rate Variability (HRV) Training:** HRV biofeedback helps individuals learn to modulate their heart rate patterns, improving overall autonomic balance and stress resilience. This involves using technology to visualize heart rate patterns and learning to influence these patterns through breathing and focus techniques [11].

- Standing Meditation and Present-Moment Awareness: Practices that enhance the ability to stay grounded and expansive in current experiences, reducing rumination on past trauma or future anxieties. These practices have been shown to reduce activity in the amygdala and increase activity in the PFC, supporting better emotion regulation [12].
- Expanding Under Pressure: A dysregulated person struggling to integrate and renormalize has lost the ability to expand under pressure in the face of life conditions. Practices that support the skill acquisition required to move from contracting under pressure to expanding are essential to healing.

Skill Acquisition and Neurological Recruitment: The acquisition of self-regulation skills enables neurophysiological recruitment—enhancing physiological and neural capacity—which in turn supports further skill development. As this positive feedback loop grows, integration and healing accelerate [13].

D. The Role of Technology: Innovative Biofeedback Solutions

Central to this approach is the use of advanced biofeedback technology, such as smartphone apps paired with wearable sensors. These tools:

- Provide real-time physiological monitoring, helping individuals recognize and understand their body's reactions, enhancing interoceptive accuracy.
- Offer guided exercises to support the development of self-regulation skills, particularly in ANS (anatomic nervous system) regulation and HRV (heart rate variability) training.
- Use artificial intelligence to personalize interventions based on individual patterns.
- Track progress over time, offering encouragement and adjustments as needed through advanced analytics.

E. Limitations and Dangers of Psychedelics

1. Risks Associated with Psychedelic Treatments:

Ibogaine, a popular psychedelic treatment for trauma, comes with many risks. It modulates various receptors, including nicotinic acetylcholine receptors, kappa and mu opioid receptors, serotonin receptors, and N-methyl-D-aspartate receptors. Genetic variations in these receptors mean sensitivity to effects varies across individuals. Additionally, hormonal differences, including sex hormones, contribute to variable responses. These factors contribute to adverse effects in ibogaine trials, including prolonged QT activity in the heart and psychological/neurological effects [2-5].

2. Limitations of Psychedelics in Long-Term Healing:

Psychedelics are often framed as a 'silver bullet' treatment. This framing fails to consider the neurological and physiological impacts of trauma on the body and mind. It also overlooks the central importance of skill acquisition and the recruitment of new neural and nervous system capacity for healing. Recruitment of this nature requires work, commitment, discipline, and appropriate instruction that persists over months and years.

While psychedelics may offer a temporary expanded sense of self and hope by altering perception, they do not provide the concrete, practical skills needed for long-term healing. These substances don't teach individuals how to work effectively with high amygdala arousal or expand into the inevitable stressors of lived experience. Without the development of self-regulation skills, individuals are likely to revert to previous patterns of hyperarousal and feel trapped in the same feedback loops they sought to escape.

3. Depression Risk:

This mismatch between a temporary expanded perspective and the absence of lasting coping mechanisms can lead to unrealistic expectations about recovery and control over one's life. When the effects of psychedelics wear off and challenges resurface, individuals may experience a sense of failure or hopelessness, increasing the risk of depression. Variations in brain chemistry further contribute to why a significant number of trauma sufferers treated with psychedelics can have negative outcomes [2].

4. Conclusion on Psychedelics:

Given the risks from variable brain chemistry, the critical need for safety, and the lack of practical skills for high-stress situations, we argue that the growing focus on psychedelics in trauma healing poses significant risks without providing enduring practical integration mechanisms when needed. Developing practical self-regulation skills that enhance the collaboration between higher brain functions and the amygdala is crucial for trauma recovery. This approach ensures that individuals can fluidly navigate between local and global perspectives, leading to integrated awareness and effective action. Reliance upon psychedelics without consistent long term skill-building may offer temporary relief but poses risks for long-term healing and mental health.

IV. The Healing Journey: A Case Study

To illustrate this approach, let's follow the journey of Air Force Pararescueman (PJ) John Martinez, a veteran who experienced trauma during a combat deployment.

1. The Moment of Trauma

During a mission to rescue injured soldiers, John's unit was ambushed. In the chaos, John witnessed the death of his closest friend. In that moment:

- John's ANS went into extreme sympathetic activation, triggering an intense fight-or-flight response.
- His ability to process the experience was overwhelmed, leading to fragmented memory encoding.
- The normal integration of this experience into his sense of self was severely disrupted.

2. The Aftermath: Seeds of Anxiety

In the weeks following the incident:

- John experienced unpredictable bouts of intense anxiety, particularly in response to loud noises or crowded spaces.
- He struggled with intrusive memories and nightmares about the ambush.
- John began to fear his own reactions, worried he might "lose control" at any moment.

3. Trauma Takes Hold As months passed:

- John developed intense anxiety about his bodily sensations, particularly his racing heart and shortness of breath.
- He began avoiding social situations and struggled to maintain close relationships.
- His sense of self became fragmented, feeling disconnected from his pre-trauma identity.

4. From an RG perspective, John's experiences at the microscale, mesoscale, and macroscale became increasingly fragmented and disconnected.

5. The Turning Point: Reconnecting with the Body and Self

Recognizing the need for help, John enrolled in a trauma recovery program that framed his experiences as anxiety symptoms and utilized advanced biofeedback technology. Key aspects of his recovery included:

- Interoceptive Training: Learning to accurately identify and interpret his physiological states, reducing fear of bodily sensations.
- Breathing Regulation and HRV Training: Modulating his ANS, particularly in triggering situations.

- Standing Meditation Practices: Staying grounded and expansive in the present moment, reducing the power of traumatic memories.
- Expanding Under Pressure: Developing the skills to move from contracting under pressure to expanding, essential for healing.
- Skill Acquisition and Neurological Recruitment: Enhancing his physiological and neural capacity, accelerating integration and healing [14].
- Gradual Reprocessing of the Traumatic Memory within a foundation of physiological safety, integrating it into his broader life narrative.

6. Reintegration and Growth

As John's ability to self-regulate improved:

- He regained confidence in handling stressful situations without losing control.
- The traumatic memory became less intrusive and more integrated into his life story.
- He developed a deeper understanding of himself and a renewed sense of purpose, incorporating his experiences into a more resilient identity.

7. From an RG perspective, John's recovery represented a restoration of his ability to integrate experiences across scales, leading to a more coherent and resilient sense of self.

V. Beyond Recovery: The Science of Post-Traumatic Growth

Research has identified several domains of post-traumatic growth [14]:

- Appreciation of Life: Greater gratitude and changed priorities.
- Improved Relationships: Deeper connections and increased empathy.
- Personal Strength: Recognition of resilience and capability.
- New Possibilities: Identification of new paths or opportunities.
- Spiritual and Existential Change: Deeper understanding of life's meaning.

From an RG perspective, post-traumatic growth represents not just a return to baseline functioning but an enhanced ability to integrate experiences across scales, leading to a more flexible, resilient, and meaningful life.

VI. Implications for Leaders and Organizations

For those responsible for individuals at risk of trauma exposure:

- Implement Trauma-Informed Policies: Recognize trauma as anxiety symptoms centered on physiological dysregulation and fear of self.
- Provide Access to Biofeedback Technology and Training: Offer self-regulation techniques, including breathing regulation and HRV training.

- Incorporate Interoceptive Training and Standing Meditation Practices: Integrate these into regular routines.
- Foster a Supportive Culture: Normalize discussions about physiological responses to stress and the potential for growth through adversity.
- Offer Education on Neurobiology: Provide education on the neurobiology of trauma and the process of recovery and growth.

By adopting these approaches, organizations can support individual recovery and foster environments conducive to resilience and post-traumatic growth.

Conclusion: A Journey of Integration and Transformation

Understanding trauma through the lens of anxiety symptoms and Renormalization Group theory offers an essential framework for recovery and growth. Healing is not about pushing away difficult experiences but about integrating them into a fuller, richer understanding of ourselves and the world.

The journey from trauma to growth is challenging, but with the right understanding and tools, it can lead to profound positive transformation. By focusing on restoring the ability to integrate experiences across different scales—from moment-to-moment bodily sensations to our overall life narrative and sense of self—we can support not just recovery but the realization of human potential in the face of adversity.

Developing practical self-regulation skills that enhance the collaboration between higher brain functions and the amygdala is crucial for trauma recovery. This practice ensures that individuals can fluidly navigate between local and global perspectives, leading to integrated awareness and effective action. Training in this way also confers a great deal of sovereignty and self-confidence to the individual, decidedly shifting what was once a lonely journey full of self doubt to one of power.

For leaders and organizations, supporting this journey is both a moral imperative and a practical investment in human potential. The resilience, empathy, and wisdom gained through the process of post-traumatic growth can profoundly benefit individuals and communities in ways that our world desperately needs right now.

Trauma undermines human potential. The healing of trauma brings a form of wisdom and power that is mythical. From the deepest of suffering, we can rise.

References

- [1] Gell-Mann, M., & Low, F. E. (1954). Quantum electrodynamics at small distances. *Physical Review*, 95(5), 1300.
- [2] Ona, G., Rocha, J. M., Bouso, J. C., Hallak, J. E., Borrás, T., Colomina, M. T., & Dos Santos, R. G. (2022). The adverse events of ibogaine in humans: an updated systematic review of the literature (2015–2020). *Psychopharmacology*, 239(6), 1977–1987.
- [3] Biosca-Brull, J., Ona, G., Alarcón-Franco, L., & Colomina, M. T. (2024). A transcriptomic analysis in mice following a single dose of ibogaine identifies new potential therapeutic targets. *Translational Psychiatry*, 14(1), 41.
- [4] Marton, S., González, B., Rodríguez-Bottero, S., Miquel, E., Martínez-Palma, L., Pazos, M., ... & Carrera, I. (2019). Ibogaine administration modifies GDNF and BDNF expression in brain regions involved in mesocorticolimbic and nigral dopaminergic circuits. *Frontiers in Pharmacology*, 10, 193.
- [5] Lea, T., Amada, N., Jungaberle, H., Schecke, H., Scherbaum, N., & Klein, M. (2020). Perceived outcomes of psychedelic microdosing as self-managed therapies for mental and substance use disorders. *Psychopharmacology*, 237, 1521–1532.
- [6] Linson, A., & Friston, K. (2019). Reframing PTSD for computational psychiatry: computational explorations of the causes and consequences of heightened prior precision. *Cognitive Neuropsychiatry*, 24(5), 347–368.
- [7] Shin, L. M., & Liberzon, I. (2010). The neurocircuitry of fear, stress, and anxiety disorders. *Neuropsychopharmacology*, 35(1), 169–191.
- [8] Brewin, C. R., Gregory, J. D., Lipton, M., & Burgess, N. (2010). Intrusive images in psychological disorders: characteristics, neural mechanisms, and treatment implications. *Psychological Review*, 117(1), 210.
- [9] Khalsa, S. S., et al. (2018). Interoception and mental health: a roadmap. *Biological Psychiatry: Cognitive Neuroscience and Neuroimaging*, 3(6), 501–513.
- [10] Zaccaro, A., et al. (2018). How breath-control can change your life: a systematic review on psycho-physiological correlates of slow breathing. *Frontiers in Human Neuroscience*, 12, 353.
- [11] Lehrer, P. M., & Gevirtz, R. (2014). Heart rate variability biofeedback: how and why does it work? *Frontiers in Psychology*, 5, 756.

[12] Hölzel, B. K., et al. (2011). How does mindfulness meditation work? Proposing mechanisms of action from a conceptual and neural perspective. *Perspectives on Psychological Science*, 6(6), 537–559.

[13] Tang, Y.-Y., Hölzel, B. K., & Posner, M. I. (2015). "The neuroscience of mindfulness meditation." *Nature Reviews Neuroscience*, 16(4), 213–225. doi:10.1038/nrn3916

[14] Henson, C., Truchot, D., & Canevello, A. (2021). What promotes post-traumatic growth? A systematic review. *European Journal of Trauma & Dissociation*, 5(4), 100195.

[15] Frewen, P., Dozois, D., Neufeld, R., & Lanius, R. (2008). Meta-analysis of alexithymia in posttraumatic stress disorder. *Journal of Traumatic Stress*, 21(2), 243–246.

