

An Analysis of Pathomechanisms in Post-Traumatic Stress Disorder (PTSD) through the Enhanced Ten-Step Model of Judgemental Philosophy: Focusing on Resonance Disruption, Procedural Fixation, and the Role of Modulatory Systems

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Abstract

This paper presents a novel theoretical framework for understanding Post-Traumatic Stress Disorder (PTSD) by integrating its core psychopathologies with the "Enhanced Ten-Step Model of Judgemental Philosophy". We posit that the fragmented traumatic memories, persistent re-experiencing, avoidance, and hyperarousal characteristic of PTSD can be comprehensively analyzed as dysfunctions within the sequential processing pathway and the parallel/modulatory systems of this model. Specifically, we propose that PTSD involves a critical disruption in Implicit Resonance (Step 2), Explicit Resonance (Step 5), and Memory Consolidation (Step 7), leading to a failure of traumatic experiences to be adaptively integrated. Furthermore, the over-reliance on a "Reptilian Procedural Memory Loop" observed in PTSD is conceptualized as a maladaptive dominance of the Unconscious Memory Consolidation module and automated Behavioral Execution (Step 8), driven by dysregulations in the Affective Processing, Value Assessment & Motivation System, and Prediction & Prediction Error modules. This paper re-examines hypotheses from a prior empirical study on PTSD, focusing on the interaction between a procedural memory loop and an "Implicit Memory Consolidation" loop, through the lens of the Enhanced Ten-Step Model. We explore how interventions like EMDR and REM sleep enhancement might facilitate recovery by restoring healthy Resonance and modulating these interacting systems. This integrated approach aims to reframe PTSD not merely as a memory or fear disorder, but as a profound disruption in the individual's capacity for meaning-making and adaptive judgment, highlighting the clinical utility and explanatory power of the Enhanced Ten-Step Model of Judgemental Philosophy.

1. Introduction

Post-Traumatic Stress Disorder (PTSD) is a debilitating condition that can arise following exposure to a traumatic event, characterized by intrusive memories, avoidance of

trauma-related stimuli, negative alterations in cognitions and mood, and marked alterations in arousal and reactivity. While existing theories like Dual Representation Theory (DRT), Ehlers & Clark's cognitive model, and Predictive Processing frameworks have provided valuable insights, they often fall short of offering a comprehensive mechanism that integrates sub-cortical procedural learning with higher-order cognitive and sleep-dependent memory consolidation processes.

Human judgment is a complex phenomenon, integrating sensory input with cognitive and emotional processes to guide behavior and social interaction. The "Ten-Step Model of Judgemental Philosophy" (Kim, 2025) originally proposed a sequential framework for this process. However, recognizing the limitations of a purely sequential model in capturing the brain's complex, parallel operations, the "Enhanced Ten-Step Model of Judgemental Philosophy" was developed. This enhanced model retains a main sequential processing pathway but critically integrates core parallel and modulatory systems—such as Affective Processing, Value Assessment & Motivation, Executive Functions / Cognitive Control, Prediction & Prediction Error, and Unconscious Memory Consolidation—that operate concurrently and influence the main stages.

This paper aims to apply the Enhanced Ten-Step Model of Judgemental Philosophy to elucidate the multifaceted pathomechanisms of PTSD. We will specifically analyze how the interaction between a "Reptilian Procedural Memory Loop" and an "Implicit Memory Consolidation" loop, as proposed in a prior PTSD study, can be understood within the broader architecture of the Enhanced Ten-Step Model. By mapping PTSD symptomatology onto specific dysfunctions within this model's sequential stages and modulatory systems, particularly focusing on the concept of Resonance and its disruption, we seek to provide a more holistic understanding of PTSD and its potential treatments. This endeavor also serves to explore the empirical applicability and explanatory power of the Enhanced Ten-Step Model in a significant clinical context.

2. Theoretical Background

2.1. The Enhanced Ten-Step Model of Judgemental Philosophy

The Enhanced Ten-Step Model of Judgemental Philosophy (Figure 1 in Kim, 2025) posits that judgment unfolds through a Main Sequential Processing Pathway modulated by several Core Parallel and Modulatory System Modules.

2.1.1. The Main Sequential Processing Pathway This pathway consists of ten primary

stages:

- **Step 1: Sensory Encoding:** Initial processing of sensory information from the environment. In PTSD, this stage may be hyper-receptive to threat-related cues.
- **Step 2: Implicit Resonance:** Automatic evaluation of stimulus significance or salience. PTSD may involve an exaggerated Implicit Resonance to trauma-related stimuli, potentially reflected in altered P300 responses.
- **Step 3: Constructivity-Coherence Verification:** Assessing the consistency of incoming information with existing knowledge structures and internal models. Traumatic experiences often shatter existing schemas, leading to profound incoherence.
- **Step 4: Curiosity:** The drive to seek information or resolve uncertainty. This may be blunted or hyper-focused on threat in PTSD.
- **Step 5: Explicit Resonance:** Conscious awareness and deeper processing of significant information. In PTSD, this stage might be overwhelmed by intrusive traumatic memories (flashbacks) or defensively inhibited.
- **Step 6: Meta-cognition:** Monitoring and evaluating one's own cognitive processes and judgments. PTSD is often associated with negative self-appraisals and distorted meta-cognitive beliefs.
- **Step 7: Memory Consolidation:** Stabilizing and integrating memories over time, often sleep-dependently. This is a critical stage hypothesized to be dysfunctional in PTSD, leading to poorly integrated trauma memories.
- **Step 8: Behavioral Execution:** Implementing judgments through action. In PTSD, this may manifest as automated avoidance behaviors or impulsive reactions.
- **Step 9: Inter-brain Resonance:** Alignment of neural activity during social interaction. PTSD can severely impair social functioning and interpersonal Resonance.
- **Step 10: Normative Codification & Transmission:** The process by which individual judgments contribute to the formation and propagation of social norms. Traumatic experiences can alter an individual's relationship with societal norms.

2.1.2. Core Parallel and Modulatory System Modules These modules interact with the

main pathway:

- **Unconscious Memory Consolidation Module:** Extracts patterns and forms memories without conscious awareness (e.g., implicit learning, procedural memory). This module is highly relevant to the "Reptilian Procedural Memory Loop" in the PTSD study, potentially underpinning automated threat responses and avoidance behaviors.
- **Affective Processing Module:** Evaluates the emotional significance of stimuli, generates emotional states, and modulates cognitive processes. In PTSD, this module is hyperactive in response to trauma cues, leading to intense fear, anxiety, and dysregulated emotional states that permeate all judgment stages.
- **Value Assessment & Motivation System Module:** Assesses subjective value, processes reward/punishment signals, and drives goal-directed behavior. PTSD can involve a skewed value system where threat is overvalued and safety/reward undervalued, leading to avoidance motivation and anhedonia.
- **Executive Functions / Cognitive Control Module:** Manages higher-order cognitive processes like working memory, attention, inhibition, and planning. Deficits in this module in PTSD can impair the ability to inhibit intrusive thoughts, regulate emotions, and shift from maladaptive coping strategies.
- **Prediction & Prediction Error Module:** Generates predictions about sensory inputs and outcomes, calculates discrepancies (prediction errors), and updates internal models. In PTSD, this module may be biased towards threat prediction, with a failure to update these predictions despite new safety information, leading to persistent hypervigilance and anxiety.

2.2. PTSD: Existing Theories and Neurobiological Insights

As outlined in the prior PTSD study, DRT explains flashbacks through a dissociation between verbal (VAM) and sensory-based (SAM) memories but doesn't fully address sub-cortical procedural responses or sleep-dependent consolidation. Ehlers & Clark's model emphasizes negative appraisals and safety behaviors but lacks a detailed account of procedural loops and sleep's role. Predictive Processing offers an abstract framework of error processing but often doesn't specify trauma-unique mechanisms. The PTSD study aimed to bridge these gaps by proposing a mechanism involving the interplay of a Reptilian Procedural Memory Loop and an Implicit Memory Consolidation loop.

3. An Integrated Judgemental Philosophy Model of PTSD Pathomechanisms

3.1. Traumatic Experience and the Distortion of the Judgement Process

A traumatic event constitutes a profound challenge to the Main Sequential Processing Pathway.

- **Step 1 (Sensory Encoding) & Step 2 (Implicit Resonance):** The initial encoding of the traumatic event is overwhelming, leading to an immediate and intense Implicit Resonance signifying extreme salience and threat. This can lead to a state of hyper-processing for threat-related cues.
- **Step 3 (Constructivity-Coherence Verification):** The traumatic experience often shatters pre-existing beliefs about the self, others, and the world, leading to a profound failure in Constructivity-Coherence Verification. The experience cannot be easily assimilated into existing cognitive schemas.
- **Step 5 (Explicit Resonance):** The conscious processing of the trauma (Explicit Resonance) is often fragmented, terrifying, and resisted. This can manifest as intrusive flashbacks (unwanted, vivid Explicit Resonance of sensory fragments) or dissociative states (a shutdown of Explicit Resonance).
- **Step 7 (Memory Consolidation):** Critically, the traumatic memory fails to undergo adaptive Memory Consolidation. Instead of being integrated into the autobiographical memory system as a past event with appropriate context and affect, it remains poorly contextualized, affectively charged, and easily triggered. This is where the Implicit-Memory Consolidation Resonance loop from the PTSD study becomes central, representing a failure in this healthy consolidation.

3.2. Overactivation of Procedural Memory and the Role of Parallel/Modulatory Systems

The "Reptilian Procedural Memory Loop" described in the PTSD study (characterized by increased StartReact responses) can be conceptualized within the Enhanced Ten-Step Model as an over-reliance on the Unconscious Memory Consolidation Module and Behavioral Execution (Step 8) driven by specific modulatory system dysfunctions:

- **Unconscious Memory Consolidation Module:** This module rapidly encodes procedural responses (e.g., fight, flight, freeze, avoidance) during the trauma. These become highly automatized and resistant to extinction.

- **Affective Processing Module:** Intense fear and distress conditioned during the trauma become chronically associated with trauma-related cues. This module signals extreme negative valence, biasing other systems towards threat responses.
- **Value Assessment & Motivation System Module:** Trauma-related cues acquire extremely high negative value, driving strong avoidance motivation. Conversely, cues for safety or reward may be devalued.
- **Prediction & Prediction Error Module:** A persistent state of threat anticipation is established. The system may fail to generate or process safety signals effectively, leading to a lack of corrective prediction errors. Even in safe contexts, threat predictions dominate.
- **Executive Functions / Cognitive Control Module:** Deficits in this module hinder the top-down regulation of fear responses, the inhibition of maladaptive procedural routines, and the flexible updating of threat appraisals.

The interaction is such that a failure in adaptive Memory Consolidation (Step 7) and healthy Resonance (Steps 2 & 5) leads to a compensatory, but ultimately maladaptive, reliance on primitive, procedural defense mechanisms mediated by the Unconscious Memory Consolidation module and associated modulatory systems.

3.3. Sleep, Memory Consolidation, and Resonance

Sleep plays a crucial role in Memory Consolidation (Step 7). The PTSD study hypothesizes that PTSD patients show reduced sleep consolidation indicators (e.g., slow-wave-spindle coupling, SWR frequency). Within the Enhanced Ten-Step Model, this signifies a disruption in the neural processes necessary for transforming raw trauma engrams into integrated, contextualized memories that can achieve healthy Resonance.

- Dysfunctional sleep-dependent Memory Consolidation prevents the emotional charge of the trauma from being attenuated and the memory from being properly integrated with existing autobiographical knowledge.
- This failure in adaptive consolidation means the memory retains its capacity to trigger intense Implicit Resonance and fragmented, distressing Explicit Resonance (flashbacks) upon encountering reminders.
- The lack of successful, integrative Memory Consolidation (healthy Resonance at the memory level) perpetuates the reliance on the hyperactive Affective

Processing Module and the rigid Unconscious Memory Consolidation Module (procedural defenses).

4. Reinterpreting PTSD Research Hypotheses and Methodology through the Lens of Judgemental Philosophy

The hypotheses and methodology of the PTSD study can be reframed using the Enhanced Ten-Step Model:

- **H1 (Increased procedural loop dependence):** Increased StartReact responses in PTSD reflect an overactive Unconscious Memory Consolidation Module and a shift towards automated Behavioral Execution (Step 8), likely due to impaired top-down control from the Executive Functions / Cognitive Control Module and distorted input from the Affective Processing and Prediction & Prediction Error modules.
- **H2 (Reduced sleep consolidation):** Decreased sleep consolidation indicators point to a direct impairment in Memory Consolidation (Step 7), hindering the development of adaptive, integrated Resonance with the traumatic experience.
- **H3 (Negative correlation):** The negative correlation between procedural dependence and consolidation indicators suggests that as adaptive Memory Consolidation (and thus healthy Resonance) fails, there is a compensatory shift towards maladaptive, procedural coping mechanisms.
- **H4 (Treatment effects):** EMDR and REM sleep enhancement improving consolidation and reducing procedural dependence can be understood as interventions that:
 - Boost Memory Consolidation (Step 7), facilitating healthier Explicit Resonance with the trauma.
 - Modulate the Affective Processing Module (e.g., desensitization via EMDR's bilateral stimulation potentially engaging mechanisms related to Inter-brain Resonance principles or altering prediction error processing).
 - Allow the Prediction & Prediction Error Module to update by processing the trauma in a safe context.
 - Reduce reliance on the Unconscious Memory Consolidation Module by

fostering more adaptive coping strategies managed by Executive Functions / Cognitive Control.

- **Methodology:**
 - **SRTT+StartReact:** Measures the output of the Unconscious Memory Consolidation Module and efficiency of Behavioral Execution (Step 8) under threat priming.
 - **Sleep EEG:** Directly assesses the functioning of Memory Consolidation (Step 7).
 - **Contextual Fear Conditioning:** Probes the Prediction & Prediction Error Module, Affective Processing Module, and Implicit Resonance (Step 2, e.g., P300 as an indicator of stimulus significance).

5. Expected Results and Discussion

The expected results from the PTSD study —confirming procedural over-dependence, consolidation deficits, their negative correlation, and positive treatment effects—would strongly support this integrated Judgemental Philosophy model of PTSD.

- **Deepened Understanding of PTSD:** This framework moves beyond seeing PTSD as a simple fear conditioning or memory encoding deficit. It portrays PTSD as a systemic failure in the entire judgment and meaning-making process, where the inability to achieve adaptive Resonance with a traumatic experience cascades through multiple cognitive, emotional, and behavioral systems. The trauma is not just "unprocessed"; it actively distorts the functioning of the Main Sequential Processing Pathway and its Core Parallel and Modulatory System Modules.
- **The Centrality of Disrupted Resonance:** Resonance, in its implicit, explicit, and memory consolidation facets, is key. Its disruption means the traumatic experience fails to "return" to the individual in an integrated, meaningful way. Instead, it returns as intrusive fragments, overwhelming affect, and maladaptive behaviors.
- **Therapeutic Implications:**
 - Interventions should aim to restore healthy Resonance. This involves not

just reprocessing the memory but also addressing dysfunctions in the modulatory systems.

- EMDR's efficacy might stem from its ability to facilitate reprocessing (Memory Consolidation, Explicit Resonance) while simultaneously modulating affective arousal (Affective Processing Module) and perhaps engaging novel forms of Inter-brain Resonance through bilateral stimulation, or by creating a context for prediction error learning.
- Sleep-focused interventions directly target Memory Consolidation (Step 7).
- Therapies could also target the Executive Functions / Cognitive Control Module (e.g., training attentional control, emotional regulation) and the Prediction & Prediction Error Module (e.g., exposure therapies that update threat predictions).
- **Significance for Judgemental Philosophy:** Successfully applying the Enhanced Ten-Step Model to a complex psychiatric disorder like PTSD would demonstrate its robustness, explanatory power, and potential to generate testable hypotheses in clinical science. It would underscore how disruptions in these fundamental judgment processes can have profound consequences for mental health and an individual's ability to navigate their world meaningfully.
- **Limitations and Future Directions:** This model is complex and requires further empirical testing to validate the specific roles and interactions of each component in PTSD. Future research could use neuroimaging and behavioral paradigms derived from the Enhanced Ten-Step Model to investigate these mechanisms more directly. Longitudinal studies are needed to track how these systems change over the course of PTSD development and recovery.

6. Conclusion

The Enhanced Ten-Step Model of Judgemental Philosophy offers a sophisticated and integrative framework for understanding the complex pathomechanisms of PTSD. By conceptualizing PTSD as a disorder characterized by profound disruptions in Resonance, memory consolidation, and the interplay between sequential judgment processes and parallel modulatory systems, this model provides a nuanced perspective that transcends simpler theories. The reinterpretation of a prior PTSD empirical study through this lens

illustrates how specific dysfunctions, such as an over-reliance on procedural memory loops and deficits in sleep-dependent memory consolidation, can be mapped onto the model's architecture. This approach not only deepens our understanding of PTSD but also highlights potential targets for therapeutic intervention aimed at restoring adaptive judgment and meaningful engagement with experience. Ultimately, this integration of judgemental philosophy with clinical psychopathology aims to foster a more holistic view of mental illness and recovery, emphasizing the human need for coherent and resonant experience. Continued research and empirical validation of this model hold promise for advancing both theoretical understanding and clinical practice in the field of traumatic stress.

References

- Kim, J. (2025). Ten-Step Model of Judgmental Philosophy: From Sensory Input to Social Normativeization. PhilArchive.
- References from the PTSD study (e.g., regarding DRT, Ehlers & Clark, specific experimental paradigms).
- References supporting the neural correlates of each module in the Enhanced Ten-Step Model.