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Hypothesis

Linguistic Dual-Focus Trauma Integration (LDTI): A Conceptual Framework for Parallel Linguistic– Emotional Processing

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Abstract

Trauma-related disorders are characterized by intrusive memories, affect dysregulation, and impaired verbal integration of emotional experience. Although trauma-focused psychotherapies demonstrate clinical effectiveness, the mechanisms coordinating linguistic–cognitive control with emotional–imaginal activation during trauma recall remain incompletely specified. Linguistic Dual-Focus Trauma Integration (LDTI) is introduced as a conceptual, hypothesis-generating framework proposing the parallel engagement of automated linguistic processing and controlled trauma-related imagery. LDTI integrates principles from dual-representation models of traumatic memory, working-memory interference theory, and neurobiological accounts of prefrontal–limbic dysregulation. The framework isolates automated linguistic working-memory load as a modality-specific regulatory mechanism during controlled trauma imagery activation. Unlike narrative reconstruction, cognitive restructuring, or present-oriented grounding statements, the linguistic component is intentionally neutral and non-interpretative and is not designed to modify beliefs or maximize emotional exposure. Beyond trauma-related disorders, LDTI is tentatively extended to conditions characterized by intrusive imagery, reduced executive control, or impaired affect regulation. LDTI is presented without claims regarding clinical efficacy, safety, or comparative effectiveness.

Keywords: trauma-related disorders; post-traumatic stress disorder; trauma memory; working memory; dual-task processing; linguistic processing; affect regulation

1. Introduction

Trauma-related disorders, including post-traumatic stress disorder (PTSD) and complex post-traumatic stress disorder (ICD-11), represent a major public health concern due to their high prevalence, chronic course, and substantial impact on psychosocial functioning. Core symptoms such as intrusive memories, affect dysregulation, dissociation, and avoidance are widely understood as reflecting disruptions in the processing and integration of traumatic experiences into autobiographical memory (American Psychiatric Association, 2013; World Health Organization, 2018). Despite significant advances in trauma-focused psychotherapy, fundamental questions remain regarding the mechanisms by which emotionally charged experiences become accessible to cognitive–linguistic processing and are integrated into coherent narrative memory.

Contemporary theoretical models emphasize that traumatic memories are often stored in a fragmented and predominantly non-verbal form. Dual representation theories propose a dissociation between verbally accessible memory representations and situationally accessible sensory–affective memory traces, particularly under conditions of extreme stress (Brewin et al., 1996; Brewin, 2014). Neurobiological research has further highlighted altered interactions between limbic structures and

prefrontal regulatory networks following trauma, contributing to intrusive re-experiencing and impaired top-down control (LeDoux, 1996; Lanius et al., 2010).

Established trauma-focused interventions, including trauma-focused cognitive behavioral therapy, narrative exposure therapy, and eye movement desensitization and reprocessing, have demonstrated clinical efficacy across multiple randomized and controlled studies (Resick & Schnicke, 1992; Neuner et al., 2004; Shapiro, 2017). However, these approaches differ substantially in their underlying theoretical assumptions regarding the relative contributions of emotional activation, cognitive control, and narrative processing to therapeutic change. Ongoing theoretical and clinical debate concerns whether effective trauma processing is optimally achieved through sequential phases of stabilization followed by exposure, or through the concurrent engagement of cognitive and affective systems during treatment (van der Kolk, 2014; Brewin, 2014).

In parallel, working-memory interference models propose that concurrent cognitive activity can attenuate the vividness and emotional intensity of mental imagery during trauma recall (Baddeley, 2012; Maxfield, 2008). These effects have been discussed mainly in relation to generic dual-task paradigms. However, the specific role of automated language-based activity has received comparatively little theoretical attention. In contrast to effortful or externally guided tasks, automated, internally generated linguistic repetition may provide a sustained, modality-specific regulatory load during concurrent trauma imagery activation.

The present article introduces Linguistic Dual-Focus Trauma Integration (LDTI) as a theoretically grounded, hypothesis-generating framework that proposes the parallel engagement of automated linguistic activity and controlled trauma-related imagery. By outlining proposed mechanisms, procedural elements, and conceptual boundaries, this work seeks to provide a foundation for future experimental and clinical research on parallel linguistic-emotional processing in trauma-related psychopathology.

LDTI uniquely isolates automated, internally generated linguistic activity as a sustained regulatory working-memory load during trauma imagery activation, thereby formalizing language as an active mechanistic component rather than a secondary narrative or reflective process.

2. Materials and Methods

This manuscript presents a conceptual and hypothesis-generating framework and does not report original empirical data, experimental interventions, or analyses involving human or animal participants. Accordingly, no materials, datasets, biological samples, or software code were generated or analyzed in the course of this work.

The methodological approach consists of a structured theoretical synthesis of established models from trauma psychology, cognitive neuroscience, and working-memory research. Key concepts were derived through integrative review and comparative analysis of peer-reviewed literature addressing trauma memory representations, affect regulation, dual-task paradigms, and prefrontal-limbic interactions. The proposed framework was developed by systematically aligning these theoretical domains and articulating their convergence within a coherent procedural model. The framework is not proposed as a clinical protocol and is not intended for immediate therapeutic application.

Because no empirical study was conducted, ethical approval was not required. No human or animal subjects were involved. No datasets were generated or deposited in public repositories. There are no restrictions on the availability of materials, as none were created for this work.

Generative artificial intelligence tools were not used for study design, data collection, analysis, or interpretation. Language editing and formatting support tools were used solely for stylistic and linguistic refinement, which does not require disclosure under current journal guidelines.

3. Conceptual Framework and Hypotheses

3.1. Conceptual Framework Outcomes

The primary result of this work is the formulation of Linguistic Dual-Focus Trauma Integration (LDTI) as a structured conceptual framework integrating insights from trauma memory theory, working-memory research, and affect regulation models. LDTI is defined by the deliberate parallel engagement of automated linguistic activity and controlled trauma-related imagery, with the aim of promoting integrative re-encoding processes under conditions of maintained cognitive control. The term 'integration' is used here in a mechanistic and representational sense and does not imply symptom reduction or clinical improvement.

Key conceptual components identified include:

- (i) the use of automated, rhythmically repeated self-generated sentences as a form of linguistic cognitive anchoring;
- (ii) the controlled activation of trauma-related imagery within a tolerable affective window;
- (iii) the simultaneous engagement of language-related executive networks and limbic-affective systems; and
- (iv) the modulation of imagery vividness and affective intensity through working-memory competition.

3.2. Research-Oriented Procedural Abstraction

The following procedural abstraction serves solely to operationalize theoretical constructs for experimental investigation.

A structured, research-oriented procedural model was derived from conceptual synthesis. This model delineates sequential phases intended to guide future operationalization rather than to function as a clinical protocol:

1. Diagnostic and conceptual preparation: Clarification of the trauma-related target material and assessment of the individual's capacity for affect tolerance and self-observation.
2. Development and automation of a stabilizing sentence: Selection and rehearsal of a short, rhythmically repeatable, self-generated sentence until it can be produced automatically with minimal cognitive effort.
3. Parallel activation phase: Simultaneous repetition of the automated sentence while trauma-related imagery is internally activated in a controlled manner.
4. Observation and regulation: Continuous monitoring of affective intensity, imagery vividness, and cognitive stability, with modulation as needed to remain within a tolerable range.
5. Reflective integration: Verbal reflection on subjective experience after the parallel activation phase, supporting narrative coherence without explicit cognitive restructuring.
6. Repetition and consolidation: Iterative application across sessions to stabilize the parallel processing pattern and support integration.

3.2.1. Characteristics of the Automated Sentence

The automated sentence constitutes a central element of the LDTI framework. It is intentionally designed to be neutral in content, emotionally non-activating, and minimally demanding in terms of semantic processing. The sentence does not contain trauma-related material, evaluative statements, or elements of cognitive restructuring. Its function is not to modify beliefs or emotions, but to provide linguistic cognitive anchoring through rhythmic, self-generated speech.

Unlike non-linguistic dual tasks (e.g., visuospatial or motor tasks), automated linguistic repetition directly engages language-related executive networks that are implicated in autobiographical memory integration. This positions language not merely as a source of generic cognitive load, but as a modality-specific regulatory process during trauma imagery activation.

The sentence is deliberately kept short and repetitive to allow automation and to avoid excessive working-memory load. This neutrality is essential to prevent emotional amplification and to support cognitive stability during the controlled activation of trauma-related imagery. Examples are deliberately trivial to avoid suggestibility.

Illustrative examples (for conceptual clarification only) include: “This is a sentence.” These examples are not intended as prescriptive formulations but serve to illustrate the non-suggestive and non-emotional nature of the automated linguistic component.

The parallel engagement of linguistic repetition and imagery is explicitly constrained to a tolerable affective window. LDTI does not aim to maximize emotional activation or exposure intensity. Instead, the neutral linguistic component is intended to counterbalance affective load and reduce the risk of dissociation or cognitive destabilization. This emphasis on neutrality and regulation differentiates LDTI conceptually from exposure-based or emotionally amplifying interventions.

3.3. Hypothesis Generation and Testable Predictions

Based on the proposed framework, several testable hypotheses can be formulated for future empirical investigation, including:

Linguistically automated tasks will differentially modulate trauma-related imagery compared to non-linguistic dual-task conditions under comparable working-memory load.

Parallel linguistic–emotional engagement will be associated with increased prefrontal activation and reduced limbic reactivity compared to imagery-only conditions, as reflected in altered subjective vividness and physiological arousal during trauma recall.

Sustained linguistic anchoring will reduce dissociative responses during controlled affective activation.

4. Discussion

The present article introduces Linguistic Dual-Focus Trauma Integration (LDTI) as a conceptual and hypothesis-generating framework for the parallel engagement of linguistic–cognitive and emotional–imaginal processes during trauma recall. Rather than reporting empirical outcomes, the results consist of a structured theoretical synthesis that integrates established models of trauma memory, working-memory dynamics, and affect regulation. From this perspective, LDTI formalizes a parallel-processing configuration that has remained implicit in existing trauma-focused approaches.

4.1. Conceptual Differentiation from Established Trauma-Focused Approaches

The LDTI framework is conceptually situated within the broader field of trauma-focused psychotherapeutic approaches but differs in several theoretically relevant aspects. These differences are descriptive rather than evaluative and do not imply superiority, comparative effectiveness, or clinical recommendation.

Eye Movement Desensitization and Reprocessing (EMDR) combines trauma-related imagery with externally guided bilateral sensory stimulation. One proposed mechanism underlying EMDR effects is the taxation of working-memory resources during trauma recall, which may reduce the vividness and emotional intensity of traumatic imagery (Shapiro, 2017; Maxfield, 2008). In contrast, LDTI does not rely on externally imposed sensory stimulation. Instead, it proposes internally generated, linguistically automated speech as the primary source of sustained cognitive load during controlled trauma-related imagery activation.

Narrative Exposure Therapy (NET) emphasizes the chronological reconstruction and contextual embedding of autobiographical trauma memory through repeated narrative elaboration (Neuner et al., 2004). LDTI, by contrast, is not organized around narrative sequencing or biographical reconstruction. Rather than aiming at narrative completeness, it focuses on moment-to-moment parallel engagement of linguistic activity and trauma-related imagery, independent of temporal ordering.

Trauma-focused cognitive behavioral therapies typically combine exposure-based techniques with explicit cognitive restructuring aimed at modifying maladaptive trauma-related beliefs and

appraisals (Resick & Schnicke, 1992). LDTI does not incorporate cognitive restructuring, belief modification, or evaluative self-statements. The linguistic component is intentionally neutral and non-interpretative and serves a stabilizing rather than corrective function during affective activation.

Imagery-based rescripting approaches actively modify traumatic imagery by introducing alternative endings, perspectives, or symbolic transformations (Arntz, 2011). LDTI does not employ imagery modification or rescripting. Trauma-related imagery is activated in its existing form and constrained within a tolerable affective window through concurrent linguistic anchoring, rather than being altered in content.

Taken together, LDTI can be understood as a conceptually distinct framework that isolates the role of internally generated linguistic working-memory load as a regulatory factor during trauma-related imagery activation. This positioning builds on established models of working memory and trauma memory representation while focusing specifically on the stabilizing function of automated linguistic activity during affective engagement (Baddeley, 2012; Brewin, 2014).

Previous research has consistently demonstrated that traumatic memories are often stored in fragmented, predominantly sensory-affective representations that are insufficiently integrated into verbally accessible autobiographical memory (Brewin et al., 1996; Brewin, 2014). Neurobiological models further suggest that heightened limbic activation combined with reduced prefrontal regulatory control contributes to intrusive re-experiencing and dissociative responses (LeDoux, 1996; Lanius et al., 2010). Within this context, LDTI proposes that automated, rhythmically repeated speech may provide a form of linguistic cognitive anchoring that may support sustained prefrontal engagement while affective imagery is deliberately activated. This proposed mechanism is consistent with working-memory interference models, which posit that concurrent cognitive tasks can modulate the vividness and emotional intensity of mental imagery by competing for limited processing resources (Baddeley, 2012; Maxfield, 2008).

LDTI is positioned as a modular framework that may help disentangle the specific contribution of language-based processes within dual-task and trauma-processing paradigms.

4.2. Limitations

Several limitations must be emphasized. LDTI has not been empirically tested, and no conclusions regarding clinical efficacy, safety, or comparative effectiveness can be drawn. The framework also places considerable demands on self-observation and affect regulation, suggesting that careful preparation and case selection would be essential in any future application. These limitations underscore the importance of empirical validation before any clinical implementation is considered.

Future research should examine LDTI-derived hypotheses using experimental working-memory paradigms, psychophysiological measures, and neuroimaging approaches to investigate prefrontal-limbic interactions during parallel linguistic-emotional engagement. Pilot feasibility studies may further clarify tolerability, boundary conditions, and individual differences in response. Through such investigations, LDTI may contribute to a more mechanistic understanding of how language-based cognitive processes interact with affective memory systems in trauma-related psychopathology.

The proposed framework does not address therapist effects, interpersonal factors, or contextual influences on trauma processing, which remain important targets for future investigation.

4.3. Conceptual Perspectives

From a conceptual perspective, LDTI may be relevant to other conditions characterized by intrusive imagery, affect dysregulation, and impaired cognitive control. These considerations are strictly theoretical and intended to inform future mechanism-oriented research.

In obsessive-compulsive disorder (OCD), intrusive thoughts and images are associated with dysregulation within cortico-striato-thalamo-cortical circuits (Stern et al., 2012; Menzies et al., 2007).

Parallel linguistic activation may support top-down modulation of intrusive processes through enhanced executive engagement.

In trauma-associated addiction, implicit cue reactivity and craving have been linked to prefrontal regulatory dysfunction (Hyman & Sinha, 2009; Goldstein & Volkow, 2011). Simultaneous cognitive-linguistic engagement and affective imagery may conceptually inform research on mechanisms of impulse control and cue modulation.

In impulse-control and emotionally unstable conditions, exaggerated amygdala reactivity and reduced prefrontal regulation have been observed (Coccaro et al., 2007; Siever, 2008). LDTI may theoretically contribute to the study of affective self-regulation through dual-system engagement.

In dissociative disorders, impaired integration between limbic and cortical networks is a core feature (Lanius et al., 2010). Automated speech may provide cognitive stability while controlled imagery allows affective access within tolerable limits. These considerations are theoretical and do not constitute treatment recommendations.

LDTI is intended as the theoretical foundation for subsequent experimental and clinical feasibility studies currently in conceptual development.

5. Conclusions

This article presents Linguistic Dual-Focus Trauma Integration (LDTI) as a theoretically grounded, hypothesis-generating conceptual framework addressing parallel linguistic–emotional processing in trauma-related psychopathology. By integrating insights from trauma memory models, working-memory theory, and neurobiological research on prefrontal–limbic interactions, LDTI offers a structured perspective on how automated linguistic activity and controlled affective imagery may be coordinated during trauma recall.

LDTI is not proposed as a validated clinical intervention, and no claims regarding efficacy, safety, or comparative effectiveness are made. Instead, its primary contribution lies in clarifying potential mechanisms and in providing a coherent conceptual structure that can guide future experimental, neurobiological, and clinical research. By explicitly focusing on the role of language-based cognitive processes within dual-task and trauma-processing paradigms, LDTI aims to support more precise hypothesis testing and methodological differentiation in this field.

6. Patents

The author declares that no patents have resulted from the work reported in this manuscript.

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Abbreviations

The following abbreviations are used in this manuscript:

LDTI	Linguistic Dual-Focus Trauma Integration framework
PTSD	Post-Traumatic Stress Disorder
EMDR	Eye Movement Desensitization and Reprocessing
IRRT	Imagery Rescripting and Reprocessing Therapy
NET	Narrative Exposure Therapy
TF-CBT	Trauma-Focused Cognitive Behavioral Therapy
MDPI	Multidisciplinary Digital Publishing Institute

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