

# Temporal Geometry in Practice

*A Clinical and Applied Companion to the Temporal Neuroscience Index*

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## Abstract

This companion translates the Temporal Neuroscience Index (TNI) [7] and its shared formal home, Supplement II - Adaptive Systems Formal Supplement [8], into a clinical and applied vocabulary. It does not introduce new formal objects, diagnostic categories, or treatment recommendations. Instead, it offers a descriptive geometry for temporal experience: how horizon, width, jitter, coherence, branch richness, and ordering sensitivity can be used to describe trauma, recovery, neurodiversity, and support planning without reducing persons to pathology. The paper preserves the weak-form posture of TNI: parameters are interpretive and descriptive,  $\psi$  is a derived ordering-sensitivity readout rather than a sixth coordinate, and no claim is made about quantum processes in the brain. The applied value of the framework is that it lets practitioners, coaches, researchers, and individuals describe temporal experience in structural terms - narrowed horizons, fractured continuity, jitter, reduced branch richness, or re-expanded possibility - while preserving non-diagnostic, non-prescriptive boundaries.

Keywords: Temporal Neuroscience Index; subjective time; trauma; neurodiversity; temporal geometry; clinical companion; non-diagnostic framework; memory reconsolidation; interoception; psychological time

## 1. Purpose and Non-Diagnostic Guard

This companion translates the temporal-geometry framework of TNI [7] - including its shared formal supplement, Supplement II [8] - into meaningful human use without over-medicalizing. It is an applied reading of the same descriptive geometry developed formally in TNI and Supplement II; it introduces no new formal objects and should not be read as a clinical instrument.

The guard is explicit and load-bearing. The temporal regimes described here are descriptive, not diagnoses. This companion is not a diagnostic tool, not a clinical replacement, and not a claim of quantum processes in the brain. Where it uses the TNI parameters - Horizon (H), Width (W), Jitter (J), Coherence (C), Branch Richness (B), and ordering sensitivity  $\psi$  - it uses them as descriptive coordinates of temporal experience, not as validated measures or clinical categories.

This paper does not recommend, prescribe, or rank interventions. Clinical decisions belong to qualified professionals operating under their own evidence base, ethics, scope of practice, and regulatory context.

## 2. Trauma as Temporal Geometry

Trauma can be described in the framework's terms as a narrowed, ordering-sensitive configuration of the temporal field - a regime in which, characteristically:

- J increases: high reactivity, threat-driven timing noise.
- C decreases: fragmented narrative and broken continuity.
- H decreases: a foreshortened or unstable future.
- B decreases: reduced perceived alternatives and narrowed branching possibility.

This interpretation is consistent with cognitive accounts of PTSD that emphasize a persistent sense of current threat, disturbance of autobiographical memory, poor contextualization, strong associative memory, and intrusive re-experiencing [3]. The TNI contribution is not to replace those models, but to offer a structural vocabulary for the temporal pattern they describe.

Because coherence is low and horizon is short, the framework locates this configuration in the regime where ordering sensitivity  $\psi$  is predicted to be high: where the field is narrowed and near capacity, the order and timing of

experiences and supports can matter disproportionately. This is a prediction of the weak-form TNI model, not an established clinical measurement.

This geometry, rather than any pathology label, offers a way to describe familiar phenomenology - feeling stuck in time, repetitive loops, disproportionate reactions, and difficulty imagining change - in structural rather than diagnostic language.

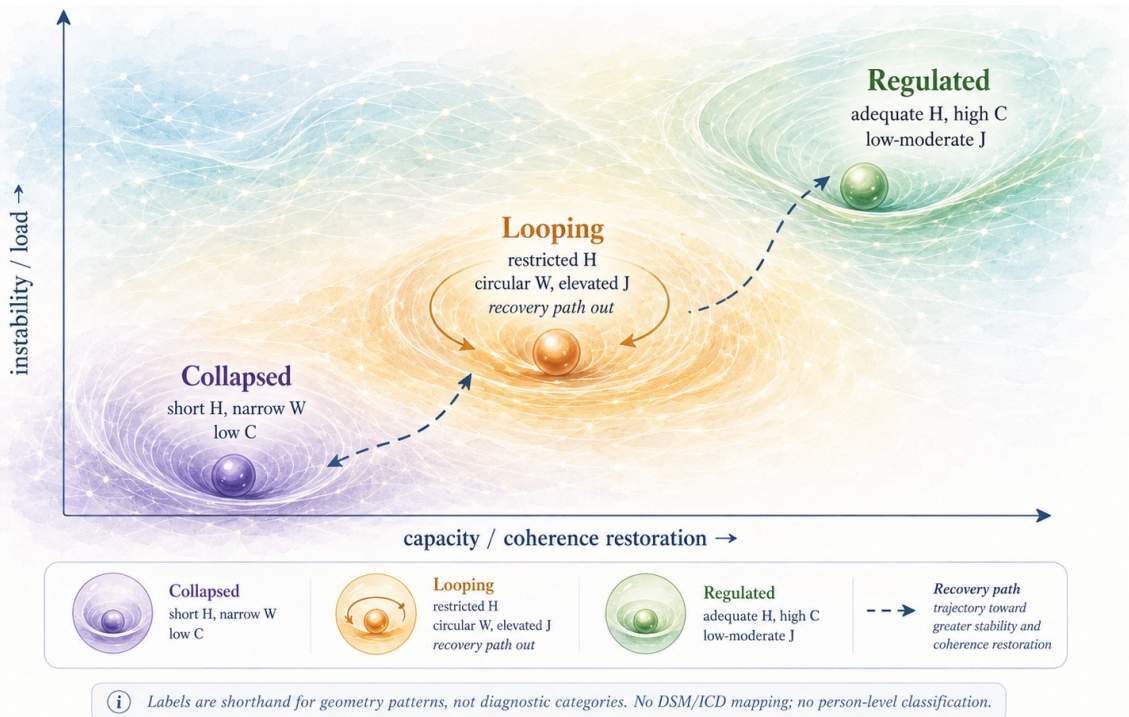


Figure 1. Regime map: descriptive geometry zones. Regulated, looping, and collapsed are attractor regions, not diagnoses. Labels are shorthand for geometry patterns, not diagnostic categories; no DSM/ICD mapping and no person-level classification.

### 3. Healing as Geometric Re-Expansion

Healing, in this description, is not erasing the past. It is reshaping the constraints that hold the temporal field in its narrowed configuration - a re-expansion of geometry rather than a deletion of history. Each broad class of support maps to a possible geometric effect:

Support class	Descriptive geometric effect
Regulation	J decreases
Meaning-making	C increases
Safety	H increases
Choice restoration	B increases

Because the framework predicts that ordering sensitivity is high in narrowed, near-capacity regimes, it also predicts that the order and timing of supports should matter there - that where psi is high, modest, well-sequenced shifts may reopen disproportionately large regions of reachable future. This remains a structural prediction, not a clinical prescription.

#### 3.1 How Healing Happens: Multilayer Mechanisms

Healing is a multi-level process involving biological, psychological, relational, and environmental systems. The framework provides a scaffold for describing how each mechanism may influence temporal geometry. The geometric effects below are interpretive mappings, not measured parameter shifts.

Somatic regulation. Somatic and interoceptive approaches can be described as supporting stabilized autonomic oscillations, restored interoceptive synchrony, and expanded safety signaling. In TNI language, these are read as

reduced jitter, increased coherence, and expanded width or horizon. Interoceptive-awareness work provides an evidence-adjacent anchor for linking body-signal awareness with emotion regulation [1].

Safe relationships. Safe relationships provide co-regulation, reduce threat priors, and support narrative reconstruction. In the framework, they are read as gains in coherence, horizon, and perceived branch richness.

Memory reconsolidation. Reconsolidation research supports the general idea that reactivated memories can enter a modifiable state under certain conditions [4], and human fear-learning work suggests that new information delivered during a reconsolidation window can alter later fear responses [5]. The companion uses this literature cautiously: memory reconsolidation is read as one possible mechanism by which fragmented or threat-dominant memory traces may become more integrated, but this paper does not prescribe a reconsolidation therapy protocol.

Predictive model updating. Predictive-processing and active-inference traditions frame perception and action as inference under uncertainty. In this companion, updating danger-based priors is read as widened future width and increased flexibility of future-state distributions.

Psychedelic-assisted therapy. Some theoretical work interprets psychedelic effects as relaxing high-level priors and increasing sensitivity to bottom-up information flow [6]. Within this companion, such claims are treated only as an interpretive analogy for temporary widening, altered branch structure, and possible prior revision. Clinical use is governed by its own evidence base, legality, risk profile, and professional standards, not by this geometry.

Across these mechanisms, the common direction is a shift of temporal geometry toward greater expansiveness and stability - a way of describing what recovery may look like in the framework's terms, always to be checked against the person's actual course.

## 4. Clinical and Therapeutic Applications

### 4.1 Assessment of Temporal Dysregulation

Many mental-health presentations include a temporal component that is rarely described directly. Depression may collapse the future; anxiety may accelerate perceived urgency; trauma may fragment time into threat-driven micro-intervals; ADHD and autism can involve nonlinear or multi-scale temporal flow. The neurodevelopmental timing literature supports the cautious claim that interval timing and temporal processing vary in development and in conditions such as ADHD and autism, but also warns against treating timing variation as a sole cause or universal deficit [2].

The framework's vocabulary lets a practitioner:

- Offer a structured descriptive vocabulary for the temporal field - a shared language for what the person is experiencing - rather than relying solely on unstructured subjective description.
- Distinguish state from trait patterns, such as stress-induced jitter versus a more stable high-jitter default.
- Track described changes over time as support progresses.
- Name salient features, such as a strongly foreshortened horizon or high jitter interfering with continuity.

This is a descriptive aid that may support personalized care and shared understanding. It is explicitly not a measurement instrument and not a diagnostic determination: no validated TNI measure yet exists, and the vocabulary's role here is to structure conversation and observation, not to replace clinical assessment.

### 4.2 Planning Support

Support often targets specific symptoms but not the temporal geometry described alongside them. The framework orients each strategy toward a parameter:

- Increase Horizon (H): long-term planning tasks, future-self work, narrative integration.
- Increase Width (W): creativity exercises, value clarification, behavioral activation.
- Reduce Jitter (J): somatic therapies, vagal-toning practices, mindfulness, rhythmic practices.
- Increase Coherence (C): grounding, relational regulation, cognitive restructuring.
- Increase Branch Richness (B): expanding choices, agency building, exposure to novelty.

The model thus offers a scaffold for organizing targeted and phase-specific strategies around a shared descriptive vocabulary. It does not determine which support is clinically indicated for a specific person.

### 4.3 Trauma Recovery

The framework gives a geometric description of trauma: the future foreshortens (H down), options narrow (W down), threat-driven noise increases (J up), coherence breaks down (C down), and possible futures feel limited (B down). Healing is then described as re-expansion of temporal geometry: restored openness, re-established continuity, reduced hypervigilance, a more predictable sense of self, and expanded agency. The value of the description is not that it replaces clinical models, but that it gives people a non-moral, non-pathologizing map for what has happened to their sense of time and possibility.

## 5. Neurodiversity: Different Default Geometries, Not Deficits

Different neurotypes correspond to different default geometries, not deficits. Some systems may favor wide width and high branch richness; others may favor strong coherence and stable horizon; stress pushes all systems toward narrowing. The framework supports difference without hierarchy.

Temporal cognition varies across neurodivergent groups in structured ways, and the framework provides a non-pathologizing descriptive language for mapping strengths, vulnerabilities, and state shifts. Examples include ADHD-linked richness of branches or jitter, autistic coherence and overload sensitivity, novelty expansion, or overload narrowing. These examples are interpretive and should never be treated as diagnostic rules. The timing literature itself emphasizes variability, non-universality, and interaction with other cognitive functions rather than a single deficit explanation [2].

Practitioners can use this vocabulary to locate the support question more precisely: Is the person struggling because the future is too narrow, because too many branches are active at once, because the sequence is unstable, because coherence is fractured, or because the environment exceeds capacity? The answer changes the support strategy.

## 6. Why This Helps People

The framework reframes suffering as understandable, navigable, non-moral, and reversible in degrees. Stated in its most compressed form, within the descriptive scope of this companion: time is experienced through constraint; trauma is narrowed possibility; and healing is horizon expansion.

The reorientation it offers - "Nothing is wrong with you - your system adapted to constraints" - is the applied core of the paper. The sentence is not a denial of suffering. It is a relocation of suffering from moral failure to adaptive geometry. A system adapted to threat, overload, or contradiction may narrow, jitter, loop, or collapse because those were once the coherent moves available. Support begins by respecting that adaptation, then helping the system find more room to move.

The point of a clinical companion is not to turn the framework into another label. It is to give people a map that preserves dignity: what narrowed, what fragmented, what is still open, and what might expand next.

## 7. Limitations and Non-Claims

- This companion is descriptive and interpretive, not diagnostic.
- It does not introduce a validated TNI measurement instrument.
- It does not recommend, prescribe, or rank interventions.
- It does not claim quantum processes in the brain.
- It does not assert that temporal geometry explains all trauma, neurodiversity, or recovery.
- It does not replace existing clinical models, evidence-based practice, professional judgment, or lived experience.
- It uses clinical and neurodevelopmental literature as anchors for analogy and application, not as proof that the TNI framework is empirically validated.

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