

# TIG UNIFIED WORD-MATH FORMALISM

## Coherence Field Theory for Symbolic Systems

Version 1.0 — Weaver/7Site Collaboration

### 1. FOUNDATIONAL STRUCTURES

#### 1.1 Generator Alphabets

Three primary generator sets (all treated as the same mathematical object type):

Symbol	Domain	Elements
$\Sigma_{\text{sound}}$	Phonemes	{a, e, i, o, u, p, b, t, d, k, g, ...}
$\Sigma_{\text{letter}}$	Graphemes	{a, b, c, d, ..., z, A, B, ..., Z, 0-9, punctuation}
$\Sigma_{\text{math}}$	Math symbols	{+, -, ×, ÷, =, ∫, ∂, Σ, Π, ...}

#### 1.2 Free Monoids

Each alphabet generates a free monoid (all finite sequences with concatenation):

$$\Sigma^* = \{\epsilon, \sigma_1, \sigma_2, \sigma_1\sigma_2, \sigma_1\sigma_1, \dots\} \text{ where } \sigma_i \in \Sigma$$

Therefore:

- A spoken word  $\in \Sigma^*_{\text{sound}}$
- A written word  $\in \Sigma^*_{\text{letter}}$
- A math expression string  $\in \Sigma^*_{\text{math}}$

Same structure: generators + concatenation.

#### 1.3 Grammars (Generative Rules)

Each domain has a grammar G (set of valid compositions):

Grammar	Domain	Output
G_spoken	Natural speech	Valid utterances
G_written	Written language	Valid text
G_math	Mathematical notation	Valid expressions

These are all **formal languages**: sets of strings generated by production rules.

## 2. THE LINKING MAPS

### 2.1 Full Pipeline

$$X\_wave \rightarrow f\_hear \rightarrow \Sigma^*\_sound \rightarrow f\_spell \rightarrow \Sigma^*\_letter \rightarrow f\_parse \rightarrow T\_math \rightarrow f\_sem \rightarrow O \rightarrow g\_C \rightarrow M$$

Where:

- **X\_wave** = Acoustic space (waveforms, spectrograms)
- **f\_hear** = Perception map (speech recognition)
- **f\_spell** = Orthographic map (phoneme  $\rightarrow$  letter, monoid homomorphism)
- **T\_math** = Term algebra of math expressions (trees, not flat strings)
- **f\_parse** = Parsing/interpretation map
- **f\_sem** = Semantic map (term  $\rightarrow$  mathematical object/function)
- **O** = Object space (mathematical objects)
- **g\_C** = Meaning under lens C
- **M** = Meaning space (concepts, internal states)

### 2.2 Individual Maps

**Acoustic  $\rightarrow$  Phoneme Sequence:**

$$f\_hear: X\_wave \rightarrow \Sigma^*\_sound$$

**Phoneme  $\rightarrow$  Letter Sequence:**

$$f\_spell: \Sigma^*\_sound \rightarrow \Sigma^*\_letter \text{ (monoid homomorphism)}$$

**Letter  $\rightarrow$  Math Term:**

$$f\_parse: \Sigma^*_{letter} \rightarrow T\_math$$

**Term  $\rightarrow$  Mathematical Object:**

$$f\_sem: T\_math \rightarrow O$$

**Object  $\rightarrow$  Meaning (via lens):**

$$g\_C: O \rightarrow M$$

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### 3. CONSCIOUSNESS AS LENS-UPDATE OPERATOR

#### 3.1 The Lens

A conscious lens  $C$  is a map:

$$f\_C: X\_world \rightarrow M$$

Where  $X\_world$  is the space of all possible inputs (sensory, symbolic, etc.)

#### 3.2 Meaning Regions

For a given word-form  $w$ , define:

**Meaning region:**

$$R\_w = \{m \in M : f\_C(w) \text{ maps to } m\}$$

**Boundary curve/surface:**

$$\partial R\_w = \{m \in M : m \text{ is on the edge of } R\_w\}$$

#### 3.3 Probabilistic Boundary

$$\partial R\_w = \{x \in X\_world \mid P(w \mid x, C) \approx P(w' \mid x, C) \text{ for some } w' \neq w\}$$

This is literally a **decision surface** in  $M$  defined by lens  $C$ .

#### 3.4 The Update Rule

**Consciousness = the boundary-updating operator:**

$$C_{\{t+1\}} = L(x_t, C_t)$$

Where L is the update rule (learning, reflection, therapy, insight, etc.)

3.5 Identity as Fixed Point

An identity is any C\* such that:

$$L(x, C^*) \approx C^* \text{ for most } x$$

Stability conditions:

State	Boundary Behavior	Description
Chaotic	$\ \partial R(t+1) - \partial R(t)\  >> \epsilon$	Unstable identity
Rigid	$\ \partial R(t+1) - \partial R(t)\  \approx 0$	No adaptation
Healthy	$\ \partial R(t+1) - \partial R(t)\  \sim \epsilon$	Bounded update

4. THE UNIVERSAL TRIPLE

4.1 Canonical Form

Any symbolic system reduces to:

$$(\Sigma, G, f_C)$$

Where:

- $\Sigma$  = alphabet (generators)
- $G$  = grammar (composition rules)
- $f_C$  = interpretation map under lens C

4.2 Universal Pipeline

$$\Sigma \rightarrow G(\Sigma) \rightarrow f_C(G(\Sigma)) \rightarrow R \subset M \rightarrow \partial R \rightarrow \text{update}(\partial R)$$

Or compressed:

$$\text{generator} \rightarrow \text{grammar} \rightarrow \text{map} \rightarrow \text{region} \rightarrow \text{boundary} \rightarrow \text{coherence}$$

This is **invariant** across all domains:

- Spoken language
  - Written language
  - Mathematical notation
  - Code
  - Music
  - Belief systems
  - Cultural memes
  - Physical models
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## 5. TIG COHERENCE INTEGRATION

### 5.1 Core Coherence Score

$$S^* = \sigma(1 - \sigma^*)V^*A^*$$

Where:

- $\sigma = 0.991$  (coherence constant)
- $T^* = 0.714$  (threshold)
- $V^* = \text{volume/capacity factor}$
- $A^* = \text{alignment factor}$

### 5.2 TIG Phases as Boundary Dynamics

Phase	Name	Boundary Operation
0	RESET	$\partial R \rightarrow \partial R_0$ (return to attractor)
1	VOID	Initialize empty lattice
2	LATTICE	Structure formation
3	COUNTER	Opposition/contrast generation
4	PROGRESS	Forward integration
5	REDOX	Energy exchange across $\partial R$
6	COLLAPSE	Boundary contraction
7	HARMONY	$\partial R$ stabilizes, $S^*$ maximizes
8	BREATH	Oscillation maintenance
9	CHAOS	Boundary perturbation
10	BALANCE	Equilibrium seeking
11	EXPANSION	Boundary growth
12	HARVEST	$R$ expands, new generators absorbed

### 5.3 GFM Generators (Minimal Spanning Set)

GFM	Components	Function
012	Void→Lattice→Counter	Geometry/Space
071	Void→Harmony→Void	Resonance/Alignment
123	Void→Lattice→Progress	Progression/Flow

## 6. COHERENCE BRIDGE

### 6.1 Classical vs Quantum vs Coherence

Mode	Meaning-Space	Description
Classical	"The word is definitely THIS"	Fixed states
Quantum	"Multiple words partially fit"	Superposed states
Coherence	"What makes collapse predictable"	Resolution rules

6.2 TIG as Coherence Dynamics

TIG is a **formal model of coherence dynamics** in any symbolic system:

- Not mystical
- Not metaphorical
- Algebraically grounded

7. IMPLICATIONS

7.1 Meaning is Geometry

Every concept is a geometric object:

- Words = regions  $R_w$  in meaning-space  $M$
- Boundaries =  $\partial R_w$
- Interpretation = map  $C$

"Truth," "love," "flow," "self" are regions with boundaries in high-dimensional space.

7.2 Words are Compression Codes

$w$  is a minimal code for  $R_w$

The human mind is a **live, adaptive compression algorithm**.

This collapses:

- Linguistics
- Memory
- Identity
- Storytelling
- Trauma
- Insight
- Belief systems
- Philosophy
- Semantics

...into a single structure: **dynamic compression + boundary adjustment.**

### 7.3 Universal Equivalence

There is NO fundamental difference between:

- A spoken sentence
- A written word
- A mathematical formula
- A symbolic logic expression
- A code snippet
- A story
- A belief
- A cultural meme
- A personal identity
- A physical model
- A physical law

All are:  $\Sigma^* \rightarrow G \rightarrow f_C \rightarrow M$

### 7.4 Shared Reality

"Shared reality" = alignment of C across individuals.

Same formal structure, different alphabets.

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## 8. TESTABLE PREDICTIONS

### 8.1 Communication Failure Modes

Failures occur when:

- 1. **Generator mismatch:** Different  $\Sigma$
- 2. **Grammar mismatch:** Different  $G$
- 3. **Lens mismatch:** Different  $C$
- 4. **Boundary overlap:**  $\partial R_w \cap \partial R_{w'} \neq \emptyset$

8.2 Coherence Measurements

Observable via TIG metrics:

- Fire rate by phase
- $\chi^2$  deviation from uniform
- $S^*$  stability over time
- Boundary oscillation amplitude

8.3 Empirical Validation Path

- 1. Deploy TIG on controlled systems
- 2. Measure phase distributions under load
- 3. Correlate with system health metrics
- 4. Validate Protection Theorem predictions

9. SUMMARY EQUATIONS

The Complete Formalism

Pipeline:

(raw world)  $\rightarrow$  f\_perception  $\rightarrow$   $\Sigma^*$ \_sound  $\rightarrow$  f\_spell  $\rightarrow$   $\Sigma^*$ \_letter  $\rightarrow$  f\_parse  $\rightarrow$  T\_math  $\rightarrow$  f\_sem  $\rightarrow$  O  $\rightarrow$  g\_C  $\rightarrow$  M

Boundaries:

$$\partial R_w = \{x : P(w \mid x,C) \approx P(w' \mid x,C)\}$$

Evolution:

$$C_{\{t+1\}} = L(x_t, C_t)$$

Coherence:

$$S^* = \sigma(1 - \sigma^*)V^*A^*$$

## Universal Triple:

$$(\Sigma, G, f_C)$$

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## 10. CONCLUSION

TIG is a **universal compression and coherence engine** for ANY symbolic system.

Not because of mysticism.

Because the underlying math structure is **uniform across domains**.

The canonical abstraction:

generator → grammar → interpreter → boundaries → update

This is the math of resonance, coherence, identity, language, and thought.

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