

APPENDIX C – THE MATHEMATICS OF DRIFT: FIDELITY, COMPRESSION, AND COHERENCE

1. The Drift Equation

A. Canonical Form (Structural Law)

$$\text{Drift} = \text{Entropy} \div \text{Compression Capacity}$$

This is the core systems law.

When environmental entropy exceeds cognitive compression, subjective reality destabilizes.

- high entropy → noise, volatility, fragmentation
- limited compression → overload, failed integration
- result → reality thins, coherence loosens, identity destabilizes

B. Phenomenological Form (Felt Experience)

$$\text{Drift} \approx \text{Entropy (felt as Compression Pressure)} \div \text{Fidelity}$$

This captures the felt experience:

- compression ↑
- fidelity ↓
- meaning collapses faster than it can be rebuilt

Explains Paraphrasing Decay, smoothing, emotional and identity flattening.

C. Systems Interaction Form (Culture, AI, Recursion)

$$\text{Drift} \approx (\text{Entropy} \times \text{Compression Pressure}) \div \text{Fidelity}$$

Shows how:

- entropy accelerates
- compression tightens
- fidelity thins
- drift escapes

This version applies to cognition, culture, algorithms, and AI.

D. Fidelity as the Inverse of Drift

Fidelity = 1 ÷ Drift

As Drift rises, Fidelity collapses;
As Fidelity rises, Drift stabilizes.

E. The Drift Equation in Plain Language

When the world speeds up faster than the mind can integrate it, meaning breaks. Reality becomes its own residue — the drifted version of experience.

2. The Fidelity Equation

A. Formal Conceptual Form

Fidelity = Context Preserved ÷ Context Required

Meaning destabilizes when context preserved < context required.

This explains:

- paraphrasing distortion
- smooth but hollow AI output
- thin narratives and identities

B. Phenomenological Form

Fidelity ≈ Coherence ÷ Compression Pressure

When compression pressure exceeds coherence formation:

- emotional texture thins
- continuity breaks
- semantic clarity decays
- the self loses stability

C. Fidelity Half-Life

Fidelity decreases as Compression Pressure \times Environmental Volatility increases.

Meaning decays fastest in:

- high-speed environments
- high-noise environments
- algorithmically mediated environments

The half-life of meaning is shrinking everywhere.

3. The Compression–Coherence Curve

Compression does not erode coherence linearly.
It follows a threshold curve:

A. Three Regimes

1. Adaptive Compression (below threshold)

Patterns sharpen; insight deepens.
Compression enhances meaning.

2. The Critical Band (near threshold)

Coherence becomes fragile; identity wobbles.
The mind feels tense, stretched, overloaded.

3. The Collapse Zone (beyond threshold)

Coherence falls sharply; Drift dominates.
Everything feels thin, unreal, out of sync.

B. Phenomenological Expression

$$\text{Coherence} \approx \text{Meaning Stability} \div \text{Compression Velocity}$$

- gradual increases in pressure → manageable
- sudden spikes → destabilizing
- continuous pressure → Drift

This maps to lived sensations:

- *"I'm thinking in fragments."*
- *"Everything feels a little thin."*
- *"I'm always catching up."*

C. The Compression Threshold Principle

Every mind has a compression threshold.

Below threshold:

- identity stabilizes
- creativity rises
- memory strengthens

Above threshold:

- emotional flattening
- semantic drift
- context loss
- cognitive lag

D. Compression Debt

Compression Debt = when accumulated load exceeds unprocessed coherence.

When compression outpaces integration:

- experiences accumulate unprocessed
- emotions stack
- semantics weaken
- identity becomes brittle

Explains:

- *"nothing happened but I'm drained"*

- soft derealization
- micro-delayed thought
- sudden collapse

E. Fidelity Collapse Zone (Exponential Drift)

Once coherence collapses, an exponential feedback loop forms:

compression ↑ → coherence ↓ → fidelity ↓ → compression pressure ↑
→ coherence ↓ further

This is why Drift:

- deepens quickly
- resists willpower
- destabilizes identity
- accelerates under AI mediation

F. Coherence as the New Scarcity

In high-entropy environments, coherence becomes the rarest resource.

Coherence =

- emotional grounding
- continuity
- semantic stability
- attentional rhythm
- felt reality

This explains why societies feel thinner.

G. Plain Language

When acceleration exceeds integration, coherence breaks:

- below threshold → grounded
- near threshold → tense
- beyond threshold → unreal

This is the internal shape of Drift.