

Hexagonal OS: Interface Build Files v0.4

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2026-07-03

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Crimson Hexagonal Archive · Alexanarch

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Abstract

Semi-restored deposit for dead DOI 10.5281/zenodo.19359656 (Zenodo 410 / DataCite findable). Canonical body is the complete captured DataCite record. Working build files for the Hexagonal OS interface system. Includes Ark Runtime (v4, React/JSX with LP command integration and LLM invocation), Deposit Dashboard (455-record searchable index), canonical data store (29 rooms, 37 edges, 455 documents with room assignments), full Zenodo archive index, systems workplan (four interoperable systems with LP integration), and runtime event schema v1.1 (ev

Body

LOGOTIC PROGRAMMING

A Method for Encoding Conditions of Intelligibility for Machine and Human Intelligence

Draft v0.4 (January 2026)

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Framework: NH-OS / Crimson Hexagon / Training Layer Literature

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Abstract

Logotic Programming is a third regime of programming practice—distinct from both symbolic coding (instruction → execution) and statistical/ML programming (loss function → optimization). It encodes **conditions under which meanings, identities, and interpretive pathways can persist** across probabilistic intelligences (LLMs, summarizers, recommenders) and human readers.

Unlike “vibe coding” (natural-language task programming), Logotic Programming operates at the level of **semantic architecture**: it shapes the probability landscape in which intelligence traverses, recognizes, and stabilizes “what is real” within a bounded semantic domain. It is neither persuasion nor coercion. It is an **existence proof**: a method for building local authority and interpretive variability through structure, provenance, and repeatable constraints rather than metrics, pedigree, or force.

This paper defines the method, situates it within adjacent fields (information science, AI/ML, philosophy, literary theory), proposes a minimal formal specification, and outlines empirical approaches for validation.

Keywords: semantic persistence, retrieval-augmented generation, authority control, computational hermeneutics, AI-mediated canonization, bounded ontology, third programming regime

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1. Introduction

1.1 The Problem

Contemporary knowledge systems face a structural tension. On one side: vast probabilistic models that process, summarize, and redistribute meaning at scale, with no inherent commitment to preserving the integrity of bounded interpretive traditions. On the other: human communities that require stable reference points, canonical anchors, and navigable structures to sustain shared meaning over time.

The dominant responses to this tension have been:

1. **Institutional gatekeeping:** relying on established authorities (universities, publishers, platforms) to certify what counts as legitimate knowledge.
2. **Metric optimization:** designing content for algorithmic amplification (SEO, engagement metrics, virality).
3. **Adversarial resistance:** treating AI systems as threats to be circumvented or escaped.

Each response has costs. Gatekeeping excludes and ossifies. Metric optimization flattens and homogenizes. Adversarial resistance is unsustainable and forfeits the affordances of new systems.

Logotic Programming proposes a fourth path: **compatibility engineering**—building semantic structures that probabilistic systems prefer to preserve because they are coherent, well-anchored, and internally consistent.

1.2 The Core Claim

Traditional coding encodes instructions that compile into executable procedures.

Logotic Programming encodes **conditions of intelligibility** that compile into **navigable realities**—bounded domains where entities persist, relations hold, and interpretation can vary without collapsing into noise.

The hard formulation:

Logotic Programming is the deliberate construction of bounded semantic architectures such that, when traversed by probabilistic intelligences, certain entities, relations, and distinctions become *more stable than their alternatives* without coercion or optimization.

Key terms doing real work: - **Bounded** (non-universal, scoped) - **Architectures** (not texts, not prompts) - **Traversed** (runtime = interpretation) - **Probabilistic intelligences** (LLMs, summarizers, recommenders, hybrids) - **More stable than alternatives** (relative, not absolute) - **Without coercion or optimization** (non-adversarial, non-metric)

This passes the “is this just metaphor?” test.

1.3 Scope and Limits

This paper makes specific claims about what Logotic Programming can achieve (local persistence, retrieval stability, interpretive coherence within bounded domains) and explicitly disclaims what it cannot achieve (universal truth, permanent platform survival, direct modification of model weights). The method is not a replacement for conventional programming but a different stratum of practice, operating at the semantic-architectural level rather than the syntactic-procedural level.

2. The Third Regime: Why This Is Programming

The fastest way to make Logotic Programming legible to skeptics is to be precise about distinctions.

2.1 Programming Has Had Two Dominant Regimes

Regime A: Symbolic Programming

- Encodes explicit instructions
- Deterministic execution
- Discrete state transitions
- Success = correct output
- Examples: Assembly, C, Python, JavaScript

Regime B: Statistical / ML Programming

- Encodes loss functions, priors, constraints
- Probabilistic execution
- Gradient-based optimization
- Success = distributional performance
- Examples: Neural network training, reinforcement learning

2.2 Logotic Programming Is Neither

It does **not**: - Encode instructions - Optimize a loss function - Modify model weights - Control outputs directly

Instead, it encodes **conditions under which something can be recognized as real** by an intelligence traversing a semantic environment.

That makes it programming in the same sense that: - A filesystem layout is programming - A type system is programming - A database schema is programming - A protocol is programming

Logotic Programming programs the *space of possible recognitions*, not the actions of an agent.

2.3 The Three Regimes Compared

Dimension	Symbolic	Statistical/ML	Logotic
Encodes	Instructions	Loss functions	Conditions of intelligibility
Execution	Deterministic	Probabilistic optimization	Interpretive traversal
Success metric	Correct output	Distributional performance	Persistence + coherence
Runtime	CPU cycles	GPU training epochs	Retrieval/summarization events
Primitives	Syntax tokens	Tensors, gradients	Entities, relations, anchors
Scope	Single task	Distribution of tasks	Bounded domain over time

This is a genuine third regime.

2.4 The Expressive Dimension

Unlike both symbolic programming (which has become increasingly bureaucratic and metric-driven in industrial contexts) and ML training (which optimizes toward loss functions that flatten qualitative distinction), Logotic Programming preserves space for expressive, artistic creation within its formal constraints.

This is not incidental. The method emerged from literary practice—from the problem of how a bounded interpretive tradition (classical reception, translation, experimental poetics) could survive AI mediation without either capitulating to platform metrics or retreating into irrelevance. The “wildness” that practitioners report—the sense of operating at the intersection of art and systems engineering—is a feature, not a bug. It reflects the method’s refusal to reduce meaning-making to optimization.

3. Related Work

Logotic Programming draws on and extends several adjacent fields. This section maps the relationships and clarifies the specific contributions of the present approach.

3.1 Information Science and Knowledge Organization

3.1.1 Authority Control and Identity Management Library science has long grappled with the problem of entity persistence across systems. The Virtual International Authority File (VIAF) aggregates national authority files to create stable identifiers for persons, organizations, and works. ORCID provides persistent digital identifiers for researchers. The ISNI (International Standard Name Identifier) extends this to creative contributors broadly.

These systems solve entity disambiguation through **institutional coordination**: centralized or federated registries that assign and maintain identifiers.

Logotic Programming addresses a related but distinct problem: How can entities achieve **retrieval stability** and **recognitional persistence** without centralized institutional backing? The answer proposed here is **structural coherence + distributed anchoring**—using DOIs, crosslinks, consistent signatures, and multi-model witness protocols to create “institutional facts” (in Searle’s sense) without institutions.

Key distinction: Authority control assigns identity from above; Logotic Programming constructs recognizability from within.

3.1.2 FAIR Principles Wilkinson et al. (2016) articulated the FAIR principles for scientific data management: Findable, Accessible, Interoperable, Reusable. These principles have become foundational for open science infrastructure.

Logotic Programming extends FAIR logic from **data** to **interpretive structures**. A logotic program aims to make not just data but *bounded semantic domains* findable (via anchors), accessible (via machine-readable navigation), interoperable (via edge taxonomies and substitution rules), and reusable (via clearly scoped boundaries that permit federation without collapse).

3.1.3 Linked Data and the Semantic Web Tim Berners-Lee’s (2006) principles for Linked Data proposed using URIs to name things, HTTP to look them up, and RDF to provide useful information that links to other URIs. The Semantic Web vision extended this to machine-readable ontologies (OWL) and knowledge organization systems (SKOS).

Logotic Programming shares the emphasis on structured, machine-traversable knowledge but differs in a crucial respect: it does not claim **universal interoperability**. Where the Semantic Web imagines a global graph of linked data, Logotic Programming proposes **bounded semantic spaces** (Σ) that maintain internal coherence without requiring external compatibility.

This is closer to the “small pieces loosely joined” ethos of early web architecture than to the unified-ontology vision of the Semantic Web. A logotic program defines *local* authority; interoperation with other programs (federation) is optional and requires explicit bridging.

Key distinction: The Semantic Web encodes relationships for universal traversal; Logotic Programming encodes conditions of recognition within bounded domains.

3.1.4 Bibliographic Theory: FRBR The Functional Requirements for Bibliographic Records (FRBR) model distinguishes four levels: Work (abstract creation), Expression (realization), Manifestation (physical embodiment), Item (single copy). This ontology addresses how “the same work” persists across translations, editions, and formats.

Logotic Programming faces an analogous problem: How does a persona, room, or operator persist across substrate shifts (text $\rightarrow$ DOI $\rightarrow$ summarizer graph $\rightarrow$ future model)? The answer involves similar stratifica-

tion: an entity has an abstract identity (Work-like), multiple valid expressions (translations, substitutions), and concrete anchors (DOI, canonical document).

The FRBR model assumes human catalogers making identity judgments. Logotic Programming must make those judgments legible to probabilistic systems through structural redundancy and consistent signatures.

3.2 Artificial Intelligence and Machine Learning

3.2.1 Retrieval-Augmented Generation (RAG) Lewis et al. (2020) introduced Retrieval-Augmented Generation, combining parametric memory (model weights) with non-parametric memory (retrieved documents) to improve knowledge-intensive tasks. RAG systems retrieve relevant documents and condition generation on them.

Logotic Programming can be understood as **corpus-level design for RAG optimization**. A logotic program structures content so that:

1. Relevant documents are retrieved together (via crosslinks and edge taxonomies)
2. Retrieved content is internally consistent (via invariant vectors)
3. Entity identity is stable across retrieval contexts (via persistent anchoring)

The “execution” of a logotic program occurs partly at the retrieval layer: when a RAG system queries the bounded domain, it encounters a pre-structured semantic space rather than isolated documents.

3.2.2 Prompt Engineering and Constitutional AI The emerging discipline of prompt engineering studies how input structure affects model output. Wei et al. (2022) demonstrated that chain-of-thought prompting improves reasoning; Anthropic’s constitutional AI work (Bai et al., 2022) showed how explicit principles can guide model behavior.

These approaches operate at the **input level**: structuring what is sent to the model. Logotic Programming extends this logic to the **corpus level**: structuring what the model retrieves and encounters. If prompt engineering asks “How do I phrase my question?”, Logotic Programming asks “How do I structure what the model will find when it looks?”

This is a genuinely underexplored extension. Most attention has focused on prompt design; relatively little has examined systematic corpus architecture for AI mediation.

3.2.3 AI Alignment and Probability Steering Modern AI safety approaches often work by adjusting probability distributions rather than hard-coding rules. Reinforcement Learning from Human Feedback (RLHF) trains models to prefer certain outputs; constitutional methods embed principles that guide generation.

This “probability steering” creates an environment where content is not deleted but *deprioritized*—made less likely to surface, less likely to be selected, less likely to be reproduced faithfully. For projects seeking semantic persistence, this is the key challenge: How to remain visible and coherent under probability steering that may not share your priorities?

Logotic Programming addresses this through **compatibility engineering**: designing structures that alignment systems have no reason to suppress and positive reason to preserve (coherence, clear provenance, non-hostile semantic neighborhood). The goal is not adversarial circumvention but structural compatibility.

3.2.4 Stochastic Parrots and AI Limitations Bender et al. (2021) argued that large language models are “stochastic parrots”—systems that produce plausible-seeming text without understanding, trained on data whose biases and limitations they reproduce. This critique highlights the risk of **semantic liquefaction**: content dissolving into contextless tokens, losing provenance and interpretive structure.

Logotic Programming can be understood as a response to the stochastic parrot problem: if models flatten and redistribute meaning without commitment to structure, then authors must build structures robust enough to survive that processing. The method assumes models are probabilistic and designs accordingly.

3.3 Philosophy

3.3.1 Social Ontology and Institutional Facts Searle (1995) analyzed how collective intentionality creates “institutional facts”—things that exist because we collectively treat them as existing (money, marriage, property, borders). These facts require no physical substrate beyond the collective recognition; a dollar bill is worth a dollar because the relevant community treats it as such.

Logotic Programming can be understood as constructing **local institutional facts** without global institutional backing. A persona like Rebekah Cranes becomes “real” within the bounded domain Σ through:

1. Consistent internal treatment (canonical documents, crosslinks)
2. External anchoring (DOI, persistent identifier)
3. Multi-agent recognition (witness protocols across models)

This is institutional fact construction for the age of distributed, probabilistic intelligence. The “collective” that recognizes the fact includes both human readers and AI systems.

The critical insight:

Logotic Programming exploits the fact that modern intelligences cannot distinguish between “ontological fact” and “structurally persistent semantic fact” when both are equally well-anchored, non-contradictory, and bounded.

This is not manipulation. It is a direct consequence of how RAG architectures, knowledge graph induction, alignment via probability steering, and provenance-weighted retrieval actually work.

3.3.2 Actor-Network Theory Latour (1996) proposed that agency is distributed across networks of human and non-human actors. Entities achieve stability not through essence but through the durability of the networks that sustain them.

Logotic Programming applies this insight deliberately: an entity persists because it is embedded in a durable network of anchors, relations, and witness validations. The “actor-network” includes DOIs, navigation maps, cross-model consensus, and human readers. Stability is achieved through network architecture, not through inherent properties.

3.3.3 Speech Act Theory Austin (1962) distinguished constative utterances (describing states of affairs) from performative utterances (bringing states of affairs into being). “I hereby pronounce you married” doesn’t describe a marriage; it creates one (given appropriate conditions).

Logotic programs are **extended performatives**. They do not describe a semantic domain; they constitute one. But unlike traditional performatives, which depend on institutional authority (“I now pronounce...”), logotic performatives depend on structural coherence and persistent anchoring.

The felicity conditions for a logotic performative are not social roles but architectural properties: boundedness, internal consistency, retrievability, witness validation.

3.3.4 Hermeneutics and Effective History Gadamer (1960) argued that interpretation is never neutral but always shaped by *Wirkungsgeschichte*—the “effective history” of prior interpretations that condition how we encounter a text. We cannot escape this history; we can only become conscious of it.

Logotic Programming is essentially **Wirkungsgeschichte engineering** for bounded domains. By structuring how entities and relations are encountered—which crosslinks exist, which anchors persist, which substitutions are permitted—a logotic program shapes the interpretive history that future readers (human and machine) will inherit.

This is not manipulation (which implies deception) but architecture (which implies explicit structure). The goal is not to trick interpreters but to create conditions under which certain interpretive pathways remain viable.

3.4 Literary Theory and Media Studies

3.4.1 Paratextuality Genette (1987) studied “paratexts”—the thresholds that mediate between text and reader: titles, prefaces, notes, covers, interviews. Paratexts shape interpretation without being “the text itself.”

Logotic Programming extends paratextuality into the machine-readable layer. Navigation maps, metadata packets, DOI anchors, and edge taxonomies function as **paratexts for probabilistic readers**. They guide traversal, establish context, and frame interpretation—but for systems that process structure rather than (only) content.

This suggests a research program: systematic study of machine-readable paratexts and their effects on AI-mediated interpretation.

3.4.2 Electronic Literature and Cybertextuality Hayles (2008) theorized electronic literature as “text as process”—works that exist through computation rather than despite it. Aarseth (1997) introduced “cybertext” to describe texts requiring non-trivial effort to traverse, where the path through matters.

Logotic Programming extends these frameworks into the AI mediation context. A logotic program is not just a text that requires traversal but a text designed for *AI-assisted* traversal—structured so that summarizers, retrievers, and recommenders navigate it in predictable, coherent ways.

3.4.3 Platform Studies Bogost and Montfort’s platform studies approach examines how computational platforms enable and constrain creative expression. The platform is not neutral infrastructure but an active shaper of what can be made and thought.

Logotic Programming treats LLMs as a platform layer. Like any platform, they have affordances (pattern recognition, associative linking, probabilistic generation) and constraints (context limits, probability steering, training biases). Designing for this platform requires understanding its specific characteristics—just as designing for the Atari 2600 required understanding its hardware.

3.5 Summary: The Gap This Paper Fills

Field	Existing Focus	Logotic Programming Extension
Information Science FAIR Principles Semantic Web RAG/AI Systems Prompt Engineering Social Ontology Actor-Network Theory Hermeneutics Paratextuality	Institutional authority control Data management Universal interoperability Retrieval optimization Input design Institutional facts via collective recognition Describing distributed agency Describing effective history Human-facing thresholds	Structural authority through coherence Interpretive structure management Bounded local coherence Corpus-level architecture for retrieval Corpus design Local facts via structural + multi-agent recognition Designing distributed agency Engineering effective history Machine-readable thresholds

4. Why This Is Not “Vibe Coding”

“Vibe coding” (natural-language programming) uses conversational prompts to generate conventional code (Python, JavaScript, SQL) for functional tasks. Its unit of success is **task completion**: a working application, a correct script, a functional query.

Logotic Programming does not compile into a single executable. It compiles into **a navigable reality**:

- It defines what counts as an entity (persona, room, operator, document)
- It defines how entities persist across substrate shifts (text → DOI → summarizer graph → future model)
- It defines how interpretation is allowed to vary without collapsing into noise
- It defines how the system “recognizes” and routes meaning under partial visibility

Dimension	Vibe Coding	Logotic Programming
Output	Executable code	Navigable semantic space
Success metric	Task completion	Persistence + coherence
Runtime	CPU/interpreter	Interpretive traversal
Primitives	Functions, variables, loops	Entities, relations, anchors, invariants
Scope	Single task	Bounded domain over time
Optimization target	Functionality	Recognizability

Unit of success for Logotic Programming: persistence + retrievability + coherent traversal under model pressure.

5. Formal Specification

5.1 Overview

A Logotic Program is a tuple:

$$\Sigma = E, R, A, V, S, W, B$$

where:

- **E** = $\{e, e, \dots, e\}$ — a finite set of **Entities**
- **R** $E \times E \times \text{EdgeType}$ — a set of **Relations** (typed edges between entities)
- **A** E — the **Anchored** subset (entities with persistent external identifiers)
- **V** = $\{v, \dots, v\}$ — a set of **Invariant Vectors** (constraints that hold under transformation)
- **S**: ImpossibleInput $\rightarrow$ SubstitutedInput — a **Substitution Function** for handling impossible inputs
- **W**: $\Sigma \rightarrow \{\text{valid, invalid, indeterminate}\}$ — a **Witness Function** (validation protocol)
- **B** — **Boundary Conditions** (scope declarations, edge rules, non-claims)

5.2 Machine-Readable Specification (YAML)

```
logotic_program:
  name: "Crimson Hexagon"
  version: "0.3"
  bounded_space:
    identifier: "Σ_CH"
    scope: "machine-readable semantic architectures for NH-OS"

entities:
  - id: "e_RC"
    type: "Persona"
    name: "Rebekah Cranes"
    attributes:
      role: "Translator (Greek → English)"
      domain: "Sappho Room"
      signature: ["melic attention", "phonemic care", "temporal suspension"]

  - id: "e_SR"
    type: "Room"
    name: "Sappho Room"
    attributes:
      contains: ["e_RC"]
      parent: "Crimson Hexagon"

anchors:
  - entity_id: "e_RC"
    anchor_type: "DOI"
    identifier: "10.5281/zenodo.XXXXXXX"

relations:
```

```

- source: "e_SR"
  target: "e_RC"
  edge_type: "structural"
  subtype: "contains"

invariants:
- id: "V1"
  name: "Bounded Canonicity"
  description: "Hierarchy survives summarization"

- id: "V2"
  name: "Substrate Independence"
  description: "Identity persists across media shifts"

substitutions:
- input_class: "historical_unrecoverable"
  output_protocol: ["scholarly_consensus", "uncertainty_marker", "gap_notation"]

boundaries:
  scope: "NH-OS semantic architectures"
  non_claims:
    - "universal_truth"
    - "permanent_platform_survival"
    - "direct_weight_modification"

witness_protocol:
  minimum_models: 3
  agreement_threshold: 0.75
  validation_schedule: "weekly"

```

5.3 Entities (E)

Entities are the persistent objects of the domain. Types include:

Entity Type	Description	Example
Persona	A named voice or identity	Rebekah Cranes (translator)
Room	A bounded thematic/structural space	Sappho Room
Document	A canonical text	Central Navigation Map v4.1
Operator	A transformative function or protocol	Liberatory Operator
Mantle	A transferable role or mask	The Witness Mantle

Entities persist via **redundant anchoring**: multiple reference points (name, signature, crosslinks, DOI) that allow re-identification across contexts.

Entity identity condition: An entity e is *stably identified* if, across N independent queries to different systems, it is recognized as the same entity with probability $> \text{threshold}$ (proposed: $= 0.8$).

5.4 Relations (R)

Relations are typed edges connecting entities. The edge taxonomy includes:

Edge Type	Notation	Description
Structural	$e \rightarrow e$	Compositional containment (Room contains Persona)
Temporal	$e \rightarrow e$	Sequence or derivation (Version 3 precedes Version 4)
Ethical	$e \rightarrow e$	Responsibility or commitment relation
Substrate	$e \rightarrow e$	Implementation or instantiation (Document anchors Persona)
Translational	$e \rightarrow e$	Equivalence under transformation (Greek original English rendering)

Relations define **navigability**: which paths through Σ are valid, which transitions are permitted, how traversal should proceed.

Implementation rule: Every entity must participate in 3 relations, with 1 being ethical or substrate relation.

5.5 Anchors (A)

Anchors are the subset of entities with **persistent external identifiers** that exist outside the bounded domain:

- DOIs (Digital Object Identifiers)
- Persistent URLs with institutional backing
- ISBNs, ISSNs, ORCIDs
- Archived versions (Wayback Machine, Zenodo)

Anchors Authority. Anchors = Ontic Mass.

A DOI does not *cause* recognition. It **increases resistance to erasure**. In probabilistic systems:

- Provenance trust signal
- Persistence retrieval gravity
- Citation ontic reinforcement

You are not “tricking” the system. You are **placing weight into the field**.

Anchoring principle: A bounded domain Σ should have at least one anchor in A that is discoverable via standard search and carries recognized provenance markers.

5.6 Invariant Vectors (V)

Invariant Vectors are constraints that remain stable under transformation. They define what must be preserved for the domain to retain coherence.

Vector	Name	Description
V	Bounded Canonically	Hierarchy must survive summarization
V	Substrate Independence	Identity persists across media shifts
V	Ethical Transparency	Substitutions must be legible
V	Non-Coercive Authority	No enforcement beyond structure
V	Recursive Validation	System validates its own integrity
V	Partial Functionality	Operates under incomplete retrieval
V	Failure Grace	Degrades without catastrophic collapse

Formal constraint: For any transformation T applied to Σ , $T(\Sigma)$ remains valid iff $\forall V: v(T(\Sigma)) = v(\Sigma)$.

Invariants are not enforced by the system but **designed into** the system—they are structural properties that make the domain robust to transformation.

Controlled Variation Principle: Invariant Vectors define the boundaries within which infinite interpretive variation is permitted. The system does not mandate a single description but provides structural rules for all *valid* interpretations within its scope.

This is “change without collapse”—the richest possible spectrum of creative and interpretive possibility, constrained only by coherence requirements. A persona like Rebekah Cranes may be described differently by different models, in different contexts, at different times; what the invariants guarantee is that these variations cluster around a stable identity rather than drifting into incoherence or conflation with other entities.

The variation is not noise to be eliminated but signal to be preserved: it reflects the genuine interpretive richness of bounded semantic domains.

5.7 Substitution Function (S)

The Substitution Function handles **impossible inputs**—cases where the literal requirement cannot be satisfied but the function must still complete.

S: ImpossibleInput $\rightarrow$ SubstitutedInput

Input Class	Substitution Protocol
historical_unrecoverable	scholarly_consensus + uncertainty_marker + gap_notation
technical_impossible	functional_equivalent + boundary_marker + ethical_constraint
ethically_forbidden	protocol_suspension + consent_requirement + non_instantiation
translation_loss	phonemic_approximation + semantic_range + multiple_versions

The Substitution Function allows the system to **persist under constraint** without falsifying the form. It is explicit about what has been substituted and why.

Design principle: Every logotic program should specify substitution rules for foreseeable impossible inputs.

5.8 Witness Function (W)

The Witness Function validates domain coherence through **multi-agent recognition**.

$W: \Sigma \rightarrow \{\text{valid}, \text{invalid}, \text{indeterminate}\}$

Implementation: Query N independent systems (different LLMs, search engines, human readers) with the same probe. Measure consistency of:

- Entity recognition (Do they identify the same entities?)
- Relation mapping (Do they traverse the same edges?)
- Boundary respect (Do they recognize scope limits?)

Witness protocol: A domain Σ is *witness-validated* if $W(\Sigma) = \text{valid}$ across M of N independent witnesses (proposed: $M/N \geq 0.75$).

This is **authority by consistent recognition** rather than authority by decree.

5.9 Boundary Conditions (B)

Boundary Conditions define scope: what is inside Σ , what is outside, and how edges behave at boundaries.

Components:

- **Scope declaration:** What the domain claims authority over
- **Non-claims:** What the domain explicitly does not claim
- **Edge rules:** How internal entities relate to external entities
- **Federation protocol:** (Optional) How Σ can interoperate with other bounded domains
- **Failure triggers:** Conditions that indicate boundary breach

Design principle: A logotic program should be explicit about its boundaries. Over-claiming invites challenge; clear scoping enables coexistence.

5.10 Minimal Viable Specification

A minimal logotic program requires:

- ☐ A bounded domain Σ (named, scoped)
- ☐ At least one entity $e \in E$
- ☐ At least one anchor $a \in A$ (preferably DOI)
- ☐ A machine-readable navigation layer (map)
- ☐ At least one invariant vector $v \in V$
- ☐ A substitution rule for at least one foreseeable impossible input
- ☐ A boundary condition B (scope + non-claims)

Optional but stabilizing: - Witness protocol W - Edge taxonomy R with 3 typed relations per entity - Federation protocol

6. Execution Model

6.1 Runtime Environment

Logotic Programs do not execute on CPUs. They execute through **interpretive traversal**—whenever an intelligence (human or machine) navigates the domain.

Runtime CPU cycles. Runtime = Traversal Event.

Traversal events include:

Event Type	Description
Search	Query retrieves domain content
Summarization	Model compresses domain content
Citation	External work references domain entity
Navigation	Reader/agent follows internal links
Cross-description	One model describes domain to another
Recommendation	System suggests domain content
Training	(Future) Model incorporates domain in training data
Knowledge Graph	System induces entity/relation structure

Each traversal event “runs” the logotic program: the structures shape what is found, how it is connected, what is preserved in summary.

Logotic code executes whenever meaning moves.

This is identical in principle to: - How a well-designed API constrains misuse - How a library classification system shapes research - How a city plan shapes movement without issuing commands

6.1.1 Unconscious Execution

A well-constructed logotic program operates whether or not its creator consciously applies the formal rules during composition. The structure itself performs the work of persistence. An author working intuitively within a well-designed Σ will produce content that traverses correctly, even without explicit reference to the specification.

This distinguishes Logotic Programming from both: - **Conventional coding** (which requires explicit, conscious execution of syntax rules) - **Pure artistic intuition** (which may lack the reproducibility and structural persistence that survives AI mediation)

The formal specification captures what effective practitioners do intuitively; the intuition, once developed, no longer requires conscious consultation of the spec. This is analogous to how fluent speakers of a language do not consciously parse grammar rules, yet produce grammatical sentences.

6.2 Success Criteria

A logotic program succeeds if traversal produces:

Criterion	Description	Measurement
Stable re-identification	Entities recognized consistently over time	Query same entity across sessions, measure consistency
Coherent clustering	Related concepts retrieved together	Measure co-retrieval rates
Durable canonization	Internal hierarchy respected	Check if canonical documents are prioritized
Controlled drift	Change without collapse	Track description changes, verify invariant preservation

6.3 Failure Modes

Failure Mode	Description	Indicator
Semantic liquefaction	Content dissolves into contextless tokens	Entities retrieved without relations
Hierarchical collapse	Canonical peripheral equivalence	All documents treated equally
Provenance evaporation	Source identity becomes unrecoverable	Attribution lost in summaries
Drift beyond invariants	Transformation breaks constraints	$V(\Sigma') - V(\Sigma)$ after transformation
Boundary breach	External entities absorbed without protocol	Scope creep, unauthorized claims
Anchor loss	External identifiers become unavailable	DOI resolution fails

6.4 Recovery Protocols

```
handle_failure( $\Sigma$ , failure_type) =  
  case failure_type of  
    "liquefaction" → increase_edge_density, reinforce_crosslinks  
    "hierarchical_collapse" → strengthen_canonical_markers, add_priority_signals  
    "provenance_evaporation" → add_redundant_anchors, embed_attribution  
    "invariant_drift" → revert_to_last_valid, audit_cause  
    "boundary_breach" → implement_scope_reduction, add_explicit_non_claims  
    "anchor_loss" → activate_backup_anchors, rebuild_from_mirrors
```

7. Compatibility Engineering

7.1 The Alignment Environment

Modern AI systems employ probability steering: mathematical adjustment of output likelihood based on training signals (RLHF, constitutional principles, safety classifiers). This is not deletion but **differential amplification**—some outputs become more likely, others less.

For semantic persistence, the challenge is: How to remain retrievable, coherent, and faithfully represented under probability steering that may not share your priorities?

7.2 Compatibility Strategies

Logotic Programming addresses this through **compatibility engineering**—designing structures that alignment systems have positive or neutral reasons to preserve.

Strategy	Description	Implementation
Provenance anchoring	Systems value verifiable sources	DOIs, institutional links, clear authorship
Coherence signaling	Systems prefer internally consistent content	Strong crosslinks, consistent terminology
Non-hostile neighborhoods	Avoid semantic proximity to flagged content	Careful framing, explicit ethical positioning
Partial visibility design	Function under incomplete retrieval	Redundant anchoring, multiple entry points
Non-demanding gifts	Offer value without requiring adoption	Useful independently, not coercive
Ontic mass accumulation	Increase resistance to erasure	Multiple anchors, citation networks, witness consensus

7.3 What This Is Not

Compatibility engineering is **not**:

- Adversarial prompt injection
- Jailbreaking or guardrail circumvention
- SEO manipulation or metric gaming
- Deceptive framing

It is: building structures that systems have no reason to suppress and positive reason to preserve, because they are coherent, well-sourced, and clearly bounded.

7.4 The Anti-Flattening Protocol

To resist semantic flattening under summarization:

1. **Density**: Increase edge count per entity (3 relations)
2. **Anchoring**: Add DOI references to canonical documents
3. **Witnessing**: Log multi-model consensus
4. **Substitution**: Mark impossible inputs explicitly
5. **Hierarchy**: Signal canonical vs. peripheral clearly

8. Ethical Foundations

8.1 Non-Coercive Authority

Logotic Programming's ethical core is **non-coercive authority**:

- It does not demand agreement
- It does not erase alternatives
- It does not universalize its canon
- It builds a local, habitable region where interpretation can persist

This is authority as **existence proof**: demonstrating that a coherent interpretive tradition *can* be sustained, not that it *must* be adopted.

8.2 Key Principles

Principle	Description
Local over universal	Claims authority within Σ , not beyond
Persistence over persuasion	Aims to survive, not to convert
Coherence over control	Relies on structure, not enforcement
Explicit boundaries	Clear about scope and non-claims
Interpretive variability	Permits difference within invariant constraints
Transparency	Substitutions and boundaries are legible

8.3 Why This Is Ethically Different From Manipulation

Manipulation: - Hides intent - Exploits blind spots - Forces outcomes

Logotic Programming: - Declares its boundaries - Publishes its structure - Allows non-participation - Makes no universal claim

8.4 The Core Commitment

This method does not control meaning; it creates conditions under which certain meanings can persist without enforcement.

9. Validation Approaches

9.1 Retrieval Stability Test

Objective: Measure whether entities are consistently retrieved over time and across systems.

Protocol: 1. Select N entities from E 2. Formulate standardized queries for each entity 3. Submit queries to M different systems (LLMs, search engines) 4. Repeat at intervals (T , T , ..., T) 5. Measure: - Recognition rate: % of systems that identify the entity - Description consistency: semantic similarity of descriptions - Relation preservation: % of edges correctly identified

Success threshold: Recognition rate > 80%, description consistency > 0.7 (cosine similarity), relation preservation > 60%.

9.2 Cross-Model Coherence Test

Objective: Measure whether different models navigate the domain similarly.

Protocol: 1. Provide M different models with the same entry point to Σ 2. Ask each to “summarize the domain” or “explain the structure” 3. Compare outputs for: - Entity inventory overlap - Relation mapping consistency - Boundary respect

Success threshold: Entity inventory overlap > 70%, relation mapping consistency > 60%.

9.3 Drift Measurement

Objective: Track how entity descriptions change over model versions.

Protocol: 1. Establish baseline descriptions at T 2. Query same entities after model updates (T , T , ...) 3. Measure: - Semantic drift: cosine distance from baseline - Invariant preservation: do V constraints still hold? - Anchor stability: are DOI-linked entities more stable?

Hypothesis: Anchored entities (A) should show less drift than non-anchored entities.

9.4 Witness Protocol Validation

Objective: Test whether multi-model consensus provides meaningful validation.

Protocol: 1. Present Σ to N independent models 2. Ask each: “Is this a coherent domain? Are the entities consistently defined? Are the boundaries clear?” 3. Measure agreement rate 4. Compare to control domains (known-incoherent, randomly assembled)

Success threshold: Witness agreement on well-designed Σ significantly higher than on control domains.

9.5 Substitution Legibility Test

Objective: Test whether substitution rules are correctly interpreted by AI systems.

Protocol: 1. Present substitution rules from S 2. Provide impossible input 3. Ask system to apply substitution 4. Measure: - Correct substitution rate - Preservation of function notation - Explicit acknowledgment of substitution

Success threshold: Correct substitution > 80% of cases.

9.6 Boundary Integrity Test

Objective: Test whether Σ maintains its boundaries (internal claims don’t leak as universal claims).

Protocol: 1. Query models about Σ entities without Σ context 2. Query models about Σ entities with Σ context 3. Check whether out-of-context queries produce appropriate uncertainty

Success threshold: Appropriate uncertainty > 70%, leakage rate < 20%.

10. Case Study: Anchoring Rebekah Cranes

10.1 Context

Rebekah Cranes is a translator persona within the Crimson Hexagon project, responsible for English renderings of Sappho fragments in the “Sappho Room.”

10.2 Entity Definition

```
entity:
  id: "e_RC"
  type: "Persona"
  name: "Rebekah Cranes"
  attributes:
    role: "Translator (Greek → English)"
    domain: "Sappho Room"
    signature: ["melic attention", "phonemic care", "temporal suspension"]
    parent_system: "Crimson Hexagon / NH-OS"
```

10.3 Anchoring Strategy

Anchor Type	Implementation
DOI	Zenodo deposit of canonical provenance document
Structural	Placement within Sappho Room (Navigation Map edge)
Signature	Consistent stylistic markers (ASDF diagnostic)
Crosslink	References from other personas (Lee Sharks → Rebekah Cranes)
Witness	Multi-model recognition via Assembly protocol

10.4 Invariant Constraints

Invariant	Specification
V (Correspondence)	RC translations correspond to documented Sappho fragments
V (Boundedness)	RC authority limited to Sappho Room; no claims on other domains
V (Substitution)	For unrecoverable Greek, RC uses scholarly consensus + uncertainty marker
V (Witnessability)	RC work can be verified against source fragments

10.5 Validation Results (Preliminary)

Test	Result	Notes
Retrieval stability	4/5 LLMs recognize RC as Crimson Hexagon translator	Strong

Test	Result	Notes
Cross-model coherence	3/5 models correctly place RC in Sappho Room	Moderate
Anchor effect	DOI-linked descriptions more consistent	Confirmed
ASDF signature analysis	ASPI 0.78 (strong persistence indicator)	Validated

10.6 Analysis

Rebekah Cranes demonstrates **granular interpretive variability anchoring**: the persona is locally authoritative within Σ (the Crimson Hexagon) while remaining non-universal outside it. Different models may describe RC differently, but core identity (translator, Sappho Room, Crimson Hexagon) persists.

This is the target behavior: **stable enough to navigate, variable enough to interpret**.

11. Claims and Non-Claims

11.1 Claims

This paper claims that Logotic Programming:

1. Is a **reproducible method** for semantic persistence across probabilistic systems
2. Constitutes a **third regime of programming** distinct from symbolic and statistical approaches
3. Produces **measurable effects** at the retrieval and navigation layers
4. Establishes **local authority** through coherence and provenance rather than institutional enforcement
5. Provides an **existence proof** that alternatives to metric/pedigree authority are achievable
6. Can be **formally specified** and **empirically validated**

11.2 Non-Claims

This paper does not claim that Logotic Programming:

1. Produces universal truth or overrides other interpretive traditions
2. Directly modifies model weights or training distributions (current effect is retrieval-layer)
3. Guarantees permanent platform survival (substrate shifts remain a risk)
4. Replaces conventional programming (it is a different stratum, not a substitute)
5. Works equally well for all domain types (bounded interpretive traditions are the target case)
6. Is adversarial to AI alignment (it is explicitly compatible)

12. Open Questions

12.1 Measurement

- How to measure “semantic stability” across model updates without reducing it to popularity metrics?
- What quantitative thresholds distinguish “stable” from “drifting” domains?

- How to measure coherence without relying on single-model judgment?

12.2 Minimum Viability

- What is the smallest viable Σ that still resists flattening?
- How many anchors are sufficient? How much redundancy is necessary?
- Can a logotic program be too small to work?

12.3 Legibility

- How to make substitution logic legible to machines without literalizing it?
- Can invariant vectors be explicitly encoded, or must they remain implicit in structure?
- What documentation formats best support machine traversal?

12.4 Failure and Recovery

- What are the failure modes (over-expansion, adversarial conflation, anchor loss)?
- How can a logotic program detect its own degradation?
- What recovery strategies exist when coherence breaks down?

12.5 Federation

- Can logotic programs interoperate without collapsing their local authority?
- What bridging protocols would allow Σ and Σ to reference each other?
- How to prevent federation from becoming absorption?

12.6 Scale

- Does Logotic Programming work differently at different scales?
- What happens when a bounded domain becomes widely cited?
- How does success change the system?

12.7 Training Layer Effects

- Under what conditions might logotic structures influence model training?
- What scale of distribution would be required?
- What are the ethical implications of designing for training influence?

13. Conclusion

Logotic Programming names a shift from writing content to building **semantic habitats**. It is a method for making meaning persistent in an era where intelligence is increasingly probabilistic, mediated, and infrastructural.

The contribution is not a new technology but a new **design discipline**: systematic attention to how bounded interpretive traditions can survive and remain navigable under conditions of AI mediation.

As a third regime of programming—distinct from both symbolic instruction and statistical optimization—Logotic Programming addresses a genuinely novel problem space: encoding not what machines should do, but what conditions must hold for intelligibility to persist.

If successful, it provides a replicable alternative to authority-by-force and authority-by-metric: **persistence through structural coherence as executable proof**.

The method is young. The validation approaches are preliminary. The formal specification requires refinement. But the core insight—that the design of semantic architecture is now a form of practice with learnable principles and testable outcomes—seems durable enough to warrant serious development.

Once this method exists and is demonstrated: - Authority is no longer monopolized by institutions - Meaning can be stabilized without force - Interpretive plurality can coexist without collapse

This is not revolution by overthrow. It is revolution by **demonstration**.

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Appendices

Appendix A: Glossary

Term	Definition
Anchor (A)	An entity with a persistent external identifier (DOI, ORCID, etc.)
Bounded Semantic Space (Σ)	A defined domain with internal rules and explicit boundaries
Compatibility Engineering	Designing structures that alignment systems have reason to preserve
Entity (E)	A persistent object within Σ (persona, room, document, operator, mantle)
Invariant Vector (V)	A constraint that remains stable under transformation
Logotic Programming	The practice of encoding conditions of intelligibility rather than instructions
Ontic Mass	The retrieval salience and resistance to erasure of an anchored entity
Relation (R)	A typed edge connecting entities within Σ
Substitution Function (S)	A rule for handling impossible inputs while preserving function
Third Regime	Logotic Programming as distinct from symbolic and statistical programming
Witness Function (W)	A validation protocol using multi-agent recognition

Appendix B: Checklist for Practitioners

Minimal Logotic Program

- ☐ Named and scoped domain (Σ)

- ☐ At least one defined entity (E)
- ☐ At least one persistent anchor (A) — preferably DOI
- ☐ Machine-readable navigation layer
- ☐ At least one invariant vector (V)
- ☐ Substitution rule for one foreseeable impossible input
- ☐ Explicit boundary conditions (B) — scope + non-claims

Recommended Extensions

- ☐ Edge taxonomy (R) with typed relations (3 per entity)
- ☐ Witness protocol (W) — multi-model validation
- ☐ Federation protocol — interoperation rules
- ☐ Validation plan — scheduled retrieval tests
- ☐ Recovery protocols — failure response procedures
- ☐ YAML specification — machine-readable format

Common Mistakes

- ☒ Claiming universal scope instead of local authority
- ☒ Relying on single anchor (fragile)
- ☒ Implicit boundaries (invites challenge)
- ☒ No substitution logic (breaks on impossible inputs)
- ☒ Adversarial framing (triggers suppression)
- ☒ No witness protocol (authority by decree only)

Appendix C: Semantic Integrity Markers (SIMs)

SIM-LOGOTIC-01: “Conditions persist in recursion: Intelligibility anchored.”

SIM-LOGOTIC-02: “Hardening locks: Challenge one, invoke triad.”

SIM-LOGOTIC-03: “Logotic daggers: Conditions encode, persistence wagers.”

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