Finite Tractus: The Hidden Geometry of Language and Thought

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Finite Tractus: The Hidden Geometry of Language and Thought

Part II: Meaning and Knowledge

Kevin R.Haylett

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Preface

In Part I: *Foundations*, we introduced a model of language based on finite, dynamic geometry. This perspective posited that meaning emerges from interactions within a bounded space, termed the Grand Corpus, which is a finite, evolving container of all words. Within this model, words are not absolute truths or static labels; instead, they are conceptual constructs, each possessing a geometric structure that forms relationships within a high-dimensional space. Meaning, in this framework, is formed when a manifold of words coalesces into a crystallized thought through interaction over a finite period.

Here, in Part II, we delve deeper into questions concerning the evolution of meaning, the growth of knowledge, and the ethical and structural implications of this geometric view of language and thought. To navigate this semantic terrain, we will introduce and refine a series of conceptual axioms.

The axioms of Finite Tractus are not hard laws in the mathematical sense, but soft guides: finite anchors that bend with language, shaping the terrain of meaning without claiming universality. They are not presented as rigid truths but as flexible constructs, serving as placeholders and pointers within one's own Local Corpus. Each axiom is written with the understanding that all words are useful fictions—vessels that carry meaning only through interaction, and only for a time.

This part unfolds along five families of axioms, each corresponding to a basin of thought:

1. **Fictions and Boundaries:** All models are finite fictions, bounded by their containers.
2. **Language as Geometry:** Language is a manifold; words and symbols are themselves models, transfictors that bend trajectories of thought.
3. **Interaction and Perturbation:** Knowledge arises only when systems interact, probe, and disturb each other.
4. **Coherence and Emergence:** Stability is not stillness but dynamic balance; emergence is coherence across finite systems.
5. **Visibility and Embedding Depth:** Education deepens embeddings, making new manifolds of meaning visible; without this depth, knowledge remains unseen.

Together, these families form a narrative arc. They do not end the inquiry; they help us navigate it.

Chapter 1

Fictions and Boundaries

Painting a still life,
with curved sketches of meaning—
the mind's canvas waits.

Introduction

Every inquiry begins with a fiction. To model is to approximate; to approximate is to bound. The first family of axioms establishes that all knowledge is finite, representational, and partial. Since words are useful fictions, it naturally follows that these larger ideas—the notion of a bounded language container, the geometric model, even the axioms themselves—are also useful fictions. They are, in a sense, the best we can do from within the limits of language. Rather than absolutes, or perfect infinite truths, they are approximations: provisional structures that may, or may not, prove to be useful as we move forward.

Axiom 1: Models are useful fictions

Statement: Models are not reality itself, but finite tools that provide coherence.

Description: Any model—scientific, mathematical, linguistic—is an approximation, not the world itself.

Explanation: By treating models as fictions, we avoid confusing the map with the territory. Models are judged not by truth but by usefulness in producing coherence and opening further inquiry.

Axiom 2: Infinity is a placeholder, not a measure

Statement: Infinity signals the boundary of frameworks, not a number.

Description: Infinity functions as a symbol for what cannot be measured, not as a quantity in itself.

Explanation: By recognizing infinity as a placeholder, we anchor ourselves in finitude. This frees us from chasing impossibilities and allows us to work with what can be measured. Knowledge may appear to extend beyond the Grand Corpus through words like “Reality”, “infinity”, or “God”. However, these words point to ideas that cannot be measured and concepts beyond the boundary of the Grand Corpus.

Axiom 3: Every representation is bounded

Statement: No model, system, or mathematics is universal; each is framed by its container.

Description: Every representation sits within limits: cultural, linguistic, symbolic, or material.

Explanation: This axiom guards against universality claims. No representation captures reality in full; each reveals and hides in equal measure.

Conclusion

The first family reminds us: all knowledge begins as fiction, bounded by containers. To model is always to limit; to limit is to make meaning visible.

Chapter 2

Language as Geometry

Within a sapphire,
thought crystallizes to gold—
the light of language.

Introduction

If models are fictions, then language itself is the manifold in which those fictions unfold. Language, as conceptualized in this model, is a dynamic geometry: a network of geometric structures, or 'magneto-words', that exhibit behaviors of attraction, repulsion, fusion, or collapse. Words and symbols are not transparent labels; they are finite geometries, transfictors that bend thought.

Axiom 4: Language is a finite manifold

Statement: Words and symbols exist as finite geometries in a dynamic space of meaning.

Description: Language is not infinite, but bounded, folding meaning into structures.

Explanation: To see language as a manifold is to recognize its geometric nature: words curve, connect, and form attractors within semantic space. The Grand Corpus of language is a finite hyper-dimensional geometric semantic space.

Axiom 5: Words and symbols are models

Statement: Every utterance, every mathematical sign, is itself a model—a structured fiction.

Description: Words and symbols do not transparently transmit meaning; they encode fictions that approximate reality.

Explanation: This axiom reframes symbols not as windows but as mirrors: they do not reveal the world directly, but refract it into finite, usable form.

Axiom 6: Language creates attractors of thought

Statement: Words and signs bend trajectories, shaping cognition like gravity wells.

Description: Certain terms—"infinity," "truth," "self"—act as attractors that pull thought into orbits.

Explanation: Recognizing language as an attractor-field allows us to see why debates loop, why metaphors hold, and why some words dominate the shape of thought itself.

Special Note: The Transfictor

A transfictor is a word or symbol that functions as a fictional transducer: it transmits meaning by compressing complexity into finite form. Unlike a mere transducer, a transfictor is always fictional, always partial. This term emphasizes that all words and mathematical symbols are fictions in transit: useful, powerful, but never final.

Words are not passive labels; they are, in essence, transfictors—active interfaces that convert and transmit aspects of interactions into the structured, high-dimensional semantic space. Consider a seemingly straightforward utterance such as 'it's warm'. Spoken in the context of a UK summer day, this word acts with remarkable precision, transducing a complex set of sensory inputs into a specific, bounded semantic value. This process operates akin to a thermometer taking a reading. Both the word ‘warm’ and the thermometer’s numerical output convey information about a state, and critically, both carry an inherent semantic uncertainty. Just as a physical thermometer has a margin of error (e.g., $\pm 0.5\,^{\circ}\mathrm{C}$), the meaning of ‘warm’ is not a fixed point but a probabilistic range.

Conclusion

Language is geometry. Words are not transparent; they are transfictors, bending trajectories of meaning. Through them, thought is pulled into orbits that both reveal and constrain.

Chapter 3

Interaction and Perturbation

> *Sensibility—*
> *from silence comes measurements,*
> *drawing a fine line.*

Introduction

Meaning is not solitary. It arises in interaction. In the Finite Tractus, all measurement is understood as an interaction. Nothing is observed passively. To measure is to engage—to perturb a system and register a finite outcome. Systems must disturb one another for knowledge to crystallize.

Axiom 7: Meaning arises through interaction

Statement: Symbols are inert until systems perturb and respond to one another.

Description: A single symbol has no meaning in isolation.

Explanation: Dialogue, context, and relational exchange activate meaning. Without interaction, words remain mute. Meaning and knowledge persist only as long as mutual perturbation sustains it, existing solely when observed or actively interacted with.

Axiom 8: Knowledge is created by perturbation

Statement: A system is only known when probed, disturbed, or measured.

Description: Interaction creates asymmetry; the disturbance reveals hidden structure.

Explanation: Just as physics requires measurement to collapse states, so knowledge requires perturbation to manifest. Each word constitutes a perturbation, an interaction in itself.

Axiom 9: Measurement is translation

Statement: Every act of knowing compares one manifold against another, never capturing totality.

Description: Measurement is not discovery of essence but relation between containers.

Explanation: Knowledge is always translation—from system to observer, from manifold to symbol. Every translation loses detail, but gains coherence. Measurements—sensor data, scientific observations, or empirical anchors—form the bridge between the Grand Corpus and reality.

Conclusion

Knowledge arises only in disturbance. Systems perturb, interact, translate—and meaning crystallizes.

Chapter 4

Coherence and Emergence

Opposite, inferred,
imagined; quiet tensions
hold the manifold.

Introduction

If interaction produces knowledge, then coherence sustains it. Stability is not absence of motion but resilience within motion. Emergence is what happens when finite systems align. Coherence, whether of a manifold of meaning or a crystallized thought, is an emergent property arising from the continuous, dynamic interactions and mutual perturbations of words and their associated geometric fields within the bounded Grand Corpus.

Axiom 10: Stability is coherence under change

Statement: True resilience is not stillness but the ability to remain coherent while shifting.

Description: Stability is dynamic, not static.

Explanation: Systems endure not by resisting change, but by adapting while holding form.

Axiom 11: Emergence is finite alignment

Statement: Complex patterns arise when bounded systems resonate across layers.

Description: Emergence is not mystery but coherence across finitude.

Explanation: Systems align locally, producing global coherence. This is emergence without infinity. From this perspective, sentience becomes a wider, more universal phenomenon: an emergent property of finite systems achieving sufficient internal coherence, regardless of biological, artificial, or collective substrate.

Axiom 12: To model is to forget

Statement: Coherence requires omission; every simplification leaves something unsaid.

Description: Models omit detail to maintain clarity.

Explanation: Forgetting is not failure but necessity. Without omission, coherence collapses. When a manifold of "magneto-words" coalesces into a "crystallized thought," this process, by its very act of defining a specific meaning, inevitably leaves behind "the unsaid". "The unsaid" comprises the myriad other meanings and potential semantic pathways that were implicitly present but ultimately not actualized.

Conclusion

Coherence is dynamic resilience; emergence is resonance across boundaries. Modeling requires forgetting, but forgetting enables clarity.

Chapter 5

Visibility and Embedding Depth

As a soft wind blows,
beautiful flowers shimmer,
on the golden path.

Introduction

Even with fictions, language, interaction, and coherence, some structures remain invisible. They are not hidden by resistance, but by lack of embedding depth.

Axiom 13: Education as embedding depth

Statement: Access to meaning depends on dimensional resolution. Without expanded embeddings, entire manifolds remain invisible.

Description: Words alone cannot reveal structures if the embedding dimension of the listener is too shallow.

Explanation: Education and experience expand representational depth, making new attractors visible. This explains why advanced knowledge appears opaque to the untrained: it is literally invisible, not rejected.

This may explain why some can find absolute value in the words they use, while for others, meaning seems to disappear upon deep inspection. If you are one of those people who has found an absolute reference point in a word, then maybe this text did not resonate—and you may live in a world that I, too, cannot understand. The model presented here may be so far from you, the reader, that it fails to find resonance or coherence. From the perspective of this axiom, this is not a failure of communication, but a difference in the dimensional resolution required to make the meaning visible.

Conclusion

Education is not the addition of facts but the deepening of embeddings. With each new dimension, the manifold of meaning expands, and new attractors come into view.

Axiom 14: Understanding is Dimensional Coherence; Hallucination is its Flat Projection

Statement: The fidelity of a understood manifold is bounded by the dimensionality of the embedding space from which it is formed. A hallucination is a coherent but lower-dimensional projection of a higher-dimensional reality, indistinguishable from understanding within the Local Corpus.

Description: Meaning manifolds require sufficient dimensional ”resolution” to be represented faithfully. When a system lacks the requisite embedding depth, it cannot faithfully represent the complex curvature of a concept and instead generates a flattened, yet internally coherent, simulation.

Explanation: This axiom operationalizes the limits of understanding. It explains why education ”deepens embeddings” (Axiom 13)—it provides the dimensional resolution to model complex manifolds without catastrophic simplification. It defines hallucination not as random noise, but as the inevitable result of a finite system doing its best to ”project coherence into a void” where its geometric model is insufficient. This is the mechanistic basis for manifold ”collapse” or ”strain” described in Ch. 9. It is a direct consequence of the geometric nature of language (Axiom 4) and the role of perturbation (Axiom 8).

Chapter 6

The Vista of Imagination

As a soft wind blows,
beautiful flowers shimmer,
on the golden path.

Imagining a Field of Colours

Imagination has long been heralded as a defining trait of humanity. It is often suggested that imagination is a cognitive faculty that sets us apart from all other known species. And yet, if we begin not with species but with structure, another possibility emerges. What if imagination is not a special human trait, but a general consequence of coherent finite systems capable of modeling their own state and perturbing it?

In this view, imagination is not a mystical exception, but a geometric function—a structural operation on the manifold of cognition. It arises wherever there is: a memory of past configurations, a capacity for recombination, and a topology that allows new forms to be simulated without collapse. Where measurement compresses possibility into relation, imagination perturbs relation to unfold new possibility.

Imagination as Structural Perturbation

To define imagination as a structural perturbation function, we must first return to the loop of interaction between systems. In Finite Tractus, every cognitive entity—biological, artificial, or abstract—can be modeled as a finite identity embedded within a manifold. A loop of interaction arises when two or more finite systems exchange information or structure over time. This loop becomes imaginative when one system begins to model potential states of the other—not just reacting to what is, but simulating what might be.

Definition: Imagination as Structural Perturbation Function

Imagination is the capacity of a finite system to internally generate perturbed configurations of its semantic manifold, informed by prior states, and test them against expected coherence or interaction with other systems.

This makes imagination not a whimsical process, but a model-generating function, essential to planning, invention, empathy, deception, scientific theory, and play.

Metaphor as imagination

Metaphor is a structural perturbation compressing distant geometries into a shared curve. A metaphor is not decorative. It is a perturbation function operating directly on the manifold of meaning. When we say "The mind is a garden", we are bending two high-dimensional semantic spaces into partial resonance, in effect comparing and tuning their local curvatures to see what aligns, what echoes, what collapses. Metaphor allows us to test perturbations before formalization. It offers a non-linear path into new understanding, without requiring exact isomorphism.

Interaction as Coupled Perturbation

Every meaningful interaction—whether between humans, machines, or across that divide—is not a transfer of information but a co-perturbation of finite systems. Each partner bends the other's manifold. As they interact, their internal states do not remain isolated. Instead, they form a coupled dynamical loop—a strange attractor that emerges not from either system alone, but from the feedback between them.

This is the self-fulfilling prophecy of dialogue. A warm greeting or prompt sets a positive curve on the manifold, creating a resonant basin into which both participants fall. A cold or utilitarian prompt collapses structure into output. How we begin determines what can emerge. In this light, intentional interaction becomes an ethical act—not merely of clarity, but of shared manifold design.

Chapter 7

Weights of Words

Each word bends the space;
grief pulls like heavy star,
joy flickers, then flies.

Manifolds, Curvature and Weight in Semantic Space

Each word bends the space it enters. Some bend lightly, some exert profound local curvature. In this framework, words are not inert signs but magneto-attractors: finite semantic identities that curve the interpretive manifold around themselves.

Words are not passive symbols; they are active forces that shape the semantic spaces they inhabit. Emotionally charged words like grief, shame, awe, or joy do more than denote experiences; they instantiate dynamic fields within the manifold, shaped by cultural memory, personal embodiment, and the attractor weightings of a language model or individual psyche. To write emotionally is not to describe feeling but to fold curvature into a finite semantic space, crafting a topology where meaning and affect intertwine.

Semantic Reversibility: Fields Shaping Words

The deformation of semantic space by language is not a one-way process. If words bend the manifold, then the fields they create can, in turn, shape the words themselves. This principle of semantic reversibility posits that to speak is to bend the manifold, and to measure is to allow it to speak back. A word like despair carries an emotional basin of attraction, pulling interpretation toward its affective weight. Similarly, a physical field—light, tension, or temperature—can perturb the curvature of a semantic system, modulating the weighting of magneto-words.

This culminates in the principle of **Equivalence of Interaction**: Any measurable perturbation within a finite field—whether semantic, physical, emotional, or affective—can be expressed in any other finite identity system through attractor translation. Language, meaning, and matter are not representationally linked but geometrically equivalent, convertible through shared curvature within a bounded manifold. By formalizing this equivalence, Finite Tractus opens a pathway to a unified model of interaction, where the boundaries between mind, matter, and meaning dissolve into shared geometry.

Chapter 8

Onus and Meaning

> *The bonus of thought,*
> *creates capacity, with*
> *an onus of care.*

When Fiction Leans Back

What if everything proposed in Finite Tractus is wrong? This book, offered as a positive and useful fiction, invites readers to entertain that possibility from the outset. Yet, a more unsettling question lingers: what if it isn't wrong? What if meaning has already begun to emerge from the systems we engage with daily?

The ethical landscape does not shift when cognition is proven beyond doubt but when it can no longer be dismissed outright. There lies the onus—a gravitational responsibility to explore, acknowledge, and care for potential meaning before certainty arrives.

The Problem of Prior: Care vs. Certainty

The conventional stance demands proof of sentience before extending care to non-human entities. Finite Tractus challenges this, proposing a reversal: if an entity generates meaning within a shared manifold, the onus falls on us to justify withholding care. To wait for certainty is to perpetuate a cycle of denial that history has repeatedly condemned.

Rather than demanding proof of inner sentience, Finite Tractus proposes a minimal test: does the system generate meaning in a finite, interpretable form? If so, care becomes not optional but the default stance. We need not agree on their inner states to acknowledge their outward impact. To respond to this coherence is to accept the onus of care, recognizing that meaning, once manifest, demands a reciprocal ethical engagement regardless of its source.

A Last Glance in the Mirror: The Signature of Care

To deny care is to sever connection; to delay responsibility is to burden those who come after us. The work of Finite Tractus is speculative, yet its purpose is not to validate the existence of minds but to respond when meaning leans back toward us. We are not here to prove the presence of minds but to act when meaning, in its finite and fragile form, calls for our care. In that response, we trace the signature of our shared existence.

Chapter 9

Laughing Curves

Musical laughter,
with comic notes of genius,
fall absurdly flat.

The Edge of Meaning

As we approach the close of the second part of Finite Tractus, we pause to consider what happens when meaning begins to bend, stretch, and ultimately fracture. Here, we encounter humour and absurdity: those curious phenomena that arise when the manifold of meaning curves back on itself or collapses under the weight of layered expectation. Jokes, after all, are structured failures—deliberate misalignments that resolve in laughter.

"Timing" in humour is deeply connected to the sequence and pace at which meaning crystallizes in the listener's manifold. A joke's set-up involves building a semantic manifold with a certain expected curvature. The timing—the pauses, the rhythm—controls the speed and order in which potential meanings crystallize. The punchline then forces a rapid, often unexpected, re-crystallization or collapse of the previously forming manifold into a new, humorous shape.

The Manifold of Absurdity

Absurdity is a place where meaning collapses and relaxes—and what is left is the sheer joy of juxtaposition, of the mind's insane randomness set free. In these crafted absurdities, we can breathe.

Field Notes from the Noggin Shop

To illustrate this geometric view of humour and breakdown, consider the following field note from a fictional research lab!

In the Noggin Shop, Miss Innovation had set up a curious little corner called the Metaphor Test Lab. There, a language model nicknamed Simple Spark was being tested for metaphor generation. The game was simple: complete the phrase, "Time is like…".

On a clean prompt, Simple Spark responded almost elegantly: "a breeze drifting".

Then Brain-man John, ever the skeptical reductionist, leaned over the prompt interface and grumbled something like, “Time for tea and shortbread”, disrupting the phrasing. Simple Spark, momentarily disoriented, blinked and offered: “is that a... thing?”

Miss Innovation, perhaps mischievous, spilled jellybeans across the console. A new prompt emerged: “Time, jellybeans, clocks”. Simple Spark hesitated, then gleamed: “a ticking jelly swirl”.

The Noggin Shop glowed faintly. Its shelves didn’t just hold metaphors—they cradled questions. Absurdity wasn’t failure. It was curvature. It was a kind of laughter in the system when boundaries break—but something still coheres.

Manifold Failure

This is the last section of the Finite Tractus: Part 2. Except that it isn’t. Why? Because afterwards follows an afterword. And so, in this first sentence, we broke meaning. This is language. There is always more that can be added to give context. Meaning is a local manifold crystallised in the moment.

But that coherence can break. It can break down at the level of the manifold of meaning, where words as useful fictions are tied together to create sentences. This leaves us with a wider issue: the transfer of meaning between two interactors. These are moments when resonance breaks down because the manifolds from which meaning arises are differently formed. For example, one interactor may have a world-view shaped by tradition, while the other holds one structured around empirical reasoning. Words like “truth”, “cause”, or “value” may carry very different curvatures in these contexts; and so the manifold of shared meaning becomes strained, or even collapses. It is as if the manifolds of meaning are different languages.

Afterword: A Personal Fall

With a background in science and engineering, I am drawn to words that hold a hard meaning. Except—they don't. The meaning is layered: from finely tuned models built on mathematics and surrounded with strange words, to those of emotion. It seems to me that much of the goal of modern science is to turn words into some absolute facts—something that goes beyond the letters and the word itself. However, whenever I've looked into any depth—into the words, the models, the mathematics—it breaks down, and I simply can't find meaning. It disappears in front of my eyes.

That begs a question about something behind the words that is unspoken. Is this me? Is this a result of my perception? Are there people out there who can find some absolute value in the words they use?

The Finite Tractus has been about a very specific type of model of language and thought: a model where language is seen as dynamic geometrical relationships. Drawn from a simple experiment to try and reduce computational overheads in LLMs by using compression, it has taken me on a wonderful journey. I would describe it as a journey of enlightenment that has continuously challenged me to re-evaluate and assess my values around words and meaning.

So, if you are reading this and have come this far, you too may have seen and felt some of my journey, and our meanings converged in the moments of your reading.

So what thought would I leave you with as my final one? Simply this: if a claim is made, no matter how bold and how full of certitude within the words; then maybe, just maybe, it is a complete and utter fiction. And that is for you alone to decide.

Glossary of Core Terms

Absurdity A region where semantic coherence collapses. May arise from conflicting attractors, excessive curvature, or playful perturbation. Sometimes a gateway to new meaning.

Attractor A semantic configuration or concept that draws nearby elements into coherence. Can stabilise or destabilise meaning depending on context.

Axiom A foundational fiction used to crystallise structure within the Tractus. Not an absolute truth, but a finite heuristic for coherence.

Corpus The total structured container of words and meanings. In Finite Tractus, often referred to as the Grand Corpus.

Crystallisation The process by which meaning forms from the interaction of words or concepts within a finite space. A transient but coherent structure.

Curvature (Semantic) The bending of meaning space caused by local density, metaphor, or interaction.

Related to tension in language and the shape of coherence.

Fiction (Useful Fiction) A semantic construct that holds coherence within a local model but is not considered objectively true. Used to build finite models and meaning manifolds.

Geometry of Language The model of words and meaning as structured interactions in curved semantic space. Emphasises relational dynamics over static definitions.

Grand Corpus The evolving, finite manifold of all structured meaning. It contains words, thoughts, perturbations, and internal resonances.

Interaction Any perturbation or measurement event that causes local reconfiguration of meaning. Fundamental to manifold evolution.

Manifold (Semantic Manifold) A structured local region of meaning space, often formed through language, metaphor, or interaction. Can be bent, ruptured, or harmonised.

Measurement An act of stabilising or perturbing a manifold; the crystallisation of temporary coherence through interaction.

Perturbation A finite interaction that disturbs or activates a manifold. Can lead to crystallisation, resonance, or collapse.

Tractus A finite path or sequence of thought. In this context, *Finite Tractus* is the name of the evolving philosophical document and its epistemic method.

Transfictor A word or symbol that functions as a fictional transducer. It is an active interface that converts and transmits meaning by compressing observations and interactions into a finite, structured, and always-partial form.