

The First Lesson

Bounded Particulars Against Indeterminate Backgrounds

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ABSTRACT

For over a century, theories of concept formation in linguistics, philosophy, and cognitive science have been dominated by a single, intuitive premise: that we learn what things are by distinguishing them from what they are not. From Saussure’s differential semantics to modern distributional models in artificial intelligence, meaning has been understood as fundamentally contrastive and relational. This paper argues that this consensus is fundamentally backwards.

We present the **Boundary-First Model**, a cognitive architecture derived directly from the first principles of **Neo-Pre-Platonic Naturalism (NPN)**. Rather than synthesizing disparate observations from psychology or biology, we demonstrate how the geometric and thermodynamic necessities of existence—specifically the **Zero Principle**—dictate the structure of the mind. We argue that **all learning begins with the detection of bounded particulars against an indeterminate background** (*Apeiron*), driven by the thermodynamic imperative of the *Hormē* (the striving to persist).

In this framework, the “figure-ground” laws of Gestalt psychology and the “adaptive modules” of evolutionary biology are re-derived not as primary theories, but as functional consequences of a single navigational logic. We trace the **Learning Stack**—from the initial perceptual cut (*Aisthēsis*) to the construction of predictive boundary-models (*Epistēmē*)—showing how language labels these carved realities rather than creating them. This structural grounding resolves persistent anomalies: the *a priori* nature of moral intuitions, infant fast-mapping, and the grounding problem in AI. The result is a total unification: the logic that governs the metaphysical possibility of existence is the same logic that governs the architecture of the mind that perceives it. To learn is not first to compare, but to carve.

KEYWORDS: Concept Formation, Boundary-against-Ground, Figure/Ground, Differential Semantics, Infant Cognition, Fast-Mapping, Prototype Theory, Evolved Cognitive Templates, Symbol Grounding, AI Limitations, Embodied Cognition, Neo-Pre-Platonic Naturalism, Epistemic Foundations, Philosophy of Language, Cognitive Development, Educational Reform.

1 INTRODUCTION

In the pages that follow, we will unpack this model. We will start at the beginning, with the infant and the bounded particular. We will introduce the necessity of the **indeterminate background**—the often-overlooked counterpart to every figure. We will explore the **evolved boundary library**—the genetic cognitive templates that prime us to notice certain patterns critical for survival. We will trace the **learning stack** as boundaries scale from percepts to symbols to abstract ideas and narratives.

Finally, we will demonstrate how this framework is formalized through the precise cognitive architecture of **Neo-Pre-Platonic Naturalism (NPN)**. We will define the learner’s journey not as vague “processing,” but as a specific epistemic chain: from *Aisthēsis* (the perceptual act where boundaries are first injected into awareness), through *Empeiros* (the statistical accumulation of stable boundary-patterns), to *Epistēmē* (the construction of reliable, predictive boundary-models). We will situate this process within the *Logos* (the discoverable, objective structure of reality) and identify the *Nous* (the meta-cognitive navigator) as the agent that actively performs the carving. This integrated vocabulary dissolves longstanding problems in philosophy of language, generates actionable reforms for education, and charts a new path for building genuinely intelligent machines.¹

The Crisis of Contrast-First Theories

For over a century, the architecture of human thought has been built upon a simple, intuitive, and ultimately false premise: that we learn what things are by distinguishing them from what they are not.

This *contrast-first* model of concept formation—that “red” is learned by contrasting it with “blue,” “cat” by distinguishing it from “dog”—has been the bedrock of structural linguistics, cognitive psychology, and, more recently, the distributional semantics that power modern artificial intelligence. From Saussure’s foundational claim that “in language there are only differences,”² to Rosch’s prototype theory, to the vector-space models of Word2Vec and large language models,

¹For the complete architectural derivation of the *Nous* and its grounding in the Somatic *logos*, see Eli Adam Deutscher, *Neo-Pre-Platonic Naturalism: A First-Principles Framework for Reality, Mind, and Knowledge* (Neo-Pre-Platonic Press, 2025), chaps. 6–7.

²Ferdinand de Saussure, *Course in General Linguistics* (Philosophical Library, 1916).

the consensus has been clear: **meaning is differential; concepts are relational; identity is contrastive.**

Yet this consensus has always been haunted by empirical anomalies.

Infants exhibit *fast-mapping*—learning a word from a single exposure, without explicit contrasts.³ Prototype effects stubbornly persist: people reliably judge some members of a category (a robin) as “better” examples than others (a penguin), a gradient that strict definitional or contrastive models cannot explain. Moral concepts like *fairness* or *injustice* often feel self-evident, even *a priori*, long before a child can articulate differential rules or compare instances.⁴ And despite their remarkable statistical prowess, AI systems built on differential, relational models famously lack *grounding*: they manipulate symbols without understanding what they refer to, and they fail catastrophically when faced with novel combinations or contexts outside their training distribution.⁵

These are not isolated puzzles. They are symptoms of a deeper category error.

This paper argues that the contrast-first paradigm has the sequence of learning exactly backwards. We do not begin by comparing one thing to another. We begin by **seeing one thing at all.**

Drawing on evidence from infant development, evolutionary psychology,⁶ Gestalt perception, and a Neo-Pre-Platonic Naturalism(NPN) metaphysical framework, we propose a *boundary-first* model of concept formation. Its core thesis is simple:

All learning begins with the detection of a bounded particular against an indeterminate background. A concept is not first a position in a network of differences, but a **stable pattern of boundary-properties**, discovered across multiple encounters with the world, and often guided by evolved cognitive templates attuned to survival-relevant patterns.

This inversion—from contrast-first to boundary-first—resolves the anomalies effortlessly. Fast-mapping occurs because the child is not learning a difference, but **labeling a boundary they have already drawn.** Prototype effects arise naturally because concepts are not definitions but **recognized patterns**, and some instances display that pattern more clearly than others. The *a priori* feel of moral intuitions reflects not Platonic forms but **evolved boundary-detection**

³Susan Carey, “The Child as Word Learner,” in *Linguistic Theory and Psychological Reality*, ed. Morris Halle et al. (MIT Press, 1978).

⁴Hamlin, Wynn, and Bloom demonstrate that preverbal infants as young as 6 months evaluate social agents based on prosocial or antisocial behavior, suggesting an innate moral core that precedes social learning, J. Kiley Hamlin et al., “Social Evaluation by Preverbal Infants,” *Nature* 450 (2007): 557–59.

⁵Bisk et al. argue that text-only training is insufficient for meaning; true understanding requires “World Scope,” or grounding in physical interaction and sensory experience, Yonatan Bisk et al., “Experience Grounds Language,” *EMNLP*, 2020.

⁶Tooby and Cosmides argue that the mind is a collection of evolved, domain-specific computational mechanisms, John Tooby and Leda Cosmides, *The Psychological Foundations of Culture* (Oxford University Press, 1992).

templates for social dynamics like fairness and threat. And AI’s grounding problem points directly to the missing component: a mechanism for **primary boundary detection** prior to statistical correlation.

The implications of this shift are not merely corrective but reconstructive. It offers a unified framework that scales from the infant’s first recognition of “Mom” to the poet’s construction of a metaphor, from the hardwired *thymic* reaction to unfairness to the abstract philosophical concept of justice. It replaces the circularity of differential semantics—where meaning presupposes the very concepts it seeks to explain—with a dynamic, grounded process: **boundary** → **function** → **pattern** → **label** → **refinement**.

In the pages that follow, we will unpack this model. We will start at the beginning, with the infant and the bounded particular. We will introduce the necessity of the **indeterminate background**—the often-overlooked counterpart to every figure. We will explore the **evolved boundary library**—the genetic cognitive templates that prime us to notice certain patterns critical for survival. We will trace the **learning stack** as boundaries scale from percepts to symbols to abstract ideas and narratives. Finally, we will demonstrate how this framework, formalized through the precise terminology of Neo-Pre-Platonic Naturalism (the *Aisthēsis-Empeiros-Epistēmē* chain, the *Logos*, the *Nous*)⁷, dissolves longstanding problems in philosophy of language, generates actionable reforms for education, and charts a new path for building genuinely intelligent machines.

The contrast-first model has reigned for a century. Its foundations, however, were laid in a world that did not yet understand the infant’s precocious mind, the evolutionary shaping of cognition, or the geometric logic of identity itself. Once we see that the first cognitive act is not *comparison* but *carving*—not “this *versus* that” but “this *from* everything else”—the landscape of mind, meaning, and learning snaps into a new, coherent, and profoundly simpler focus.

This paper is an invitation to see that landscape.

2 THE CONTRAST-FIRST PARADIGM

The Architecture of a Century-Old Consensus

Before dismantling a fortress, one must first map its walls and admire its construction. The contrast-first model of concept formation is not a simple error; it is a sophisticated intellectual edifice that has dominated linguistics, psychology, and philosophy for over a century. This section presents the strongest possible case for this paradigm. We will trace its historical roots, articulate its core principles, celebrate its explanatory successes, and examine its most powerful modern incarnation in artificial intelligence. We do this not to erect a straw man, but to engage with

⁷For the full definitions of these terms within the NPN system, see Deutscher, *Neo-Pre-Platonic Naturalism*.

a worthy opponent—to show that we understand its power precisely because we are about to demonstrate why it is built on a foundation of sand.

2.1 The Saussurean Revolution: Language as a System of Differences

The modern contrast-first paradigm begins with Ferdinand de Saussure. In his *Course in General Linguistics* (1916), he made a radical break with previous theories of meaning. Rejecting the idea that words are labels for pre-existing ideas or things, Saussure argued that **the linguistic sign is fundamentally arbitrary and differential**.

- **The Arbitrary Sign:** There is no natural connection between the sound-image “cat” and the feline animal. The sign is a mental link between a *signifier* (the sound pattern) and a *signified* (the concept), a link established purely by social convention.
- **Value through Difference:** Crucially, Saussure argued that a sign’s identity and value are not inherent but are determined entirely by its relations to other signs within the closed system of language. “The conceptual side of value is made up solely of relations and differences with respect to the other terms of language.”⁸ “Cat” means what it does because it is not “dog,” “bat,” “mat,” or “cap.” Its meaning is constituted by this network of negative, contrastive relations.

This was a Copernican shift. Meaning was no longer a mysterious pointing to the world, but a structural property of a self-referential system. Linguistics could now be a “science of signs” analyzing the synchronic relations within *la langue* (the abstract system), free from the messiness of history, psychology, or reference.

2.2 Psychological Internalization: From Linguistic Structure to Mental Category

The next logical step was to internalize Saussure’s logic. If language—our primary symbolic system—works through contrast, then the mind that uses language must think in contrasts. Structuralist linguistics gave rise to structuralist psychology.

- **Learning by Opposition:** The child learns concepts not by isolating essences, but by navigating a field of oppositions. “Hot” is understood in relation to “cold”; “up” in relation to “down.” This seemed to match observable educational practice and intuitive experience.
- **Prototype Theory and Family Resemblances:** Eleanor Rosch’s work in the 1970s provided a more nuanced, empirically grounded contrastivism.⁹ Categories like “bird” or “furniture” are not defined by strict necessary-and-sufficient conditions. Instead, they are radial, with a central *prototype* (a robin is a better “bird” than a penguin) and membership

⁸Saussure, *Course in General Linguistics*.

⁹Eleanor Rosch, “Principles of Categorization,” in *Cognition and Categorization*, ed. Eleanor Rosch and Barbara B. Lloyd (Lawrence Erlbaum, 1978).

determined by similarity to this prototype. Yet this similarity is still fundamentally **relational and comparative**. An instance is categorized by mentally contrasting its features against a stored exemplar or a fuzzy set of features derived from contrasting multiple exemplars. The cognitive process remains one of alignment and differentiation within a network of examples.

2.3 The Computational Apotheosis: Distributional Semantics and AI

The contrast-first paradigm found its most perfect and powerful expression in the digital age. The **distributional hypothesis** in computational linguistics—formalized as “You shall know a word by the company it keeps”¹⁰—provided a mathematical method for realizing Saussure’s vision.

- **From Intuition to Algorithm:** If meaning is differential context, then a word’s meaning can be *operationalized* as its statistical pattern of co-occurrence with other words across a vast corpus of text.
- **Vector Space Models:** In technologies like Word2Vec or GloVe, every word becomes a point (a vector) in a high-dimensional semantic space.¹¹ The meaning of “king” is its precise position, defined by its relations: king – man + woman \approx queen. Semantic relationships are modeled as geometric transformations. The entire lexicon becomes a relational web of vectors, a perfect computational mirror of Saussure’s system of differences.
- **The Triumph of Large Language Models (LLMs):** Models like GPT-4 represent the culmination of this approach. They are trained on the ultimate “company”—virtually all publicly available text. Their astonishing fluency, coherence, and apparent “understanding” are generated purely by predicting the next most likely token based on differential patterns learned from terabytes of human symbolic output. They have no sensors, no body, no drives—only a supremely refined map of the contrastive relationships between symbols. Their success is the most compelling practical argument for the sufficiency of the contrast-first model: **look what you can build with nothing but differences.**

2.4 The Philosophical Appeal: Elegance, Autonomy, and the Escape from the World

The power of the contrast-first model is not merely empirical; it is philosophical. It offers a clean, self-contained solution to messy problems, most rigorously articulated in modern formal semantics.

- **Solving the Problem of Reference:** It seemingly dissolves the ancient puzzle of how words “hook onto” the world. By defining meaning through system-internal relations and

¹⁰John R Firth, “A Synopsis of Linguistic Theory, 1930-1955,” *Studies in Linguistic Analysis*, Blackwell, 1957.

¹¹See Tomas Mikolov et al., “Efficient Estimation of Word Representations in Vector Space,” *arXiv Preprint arXiv:1301.3781*, 2013; Jeffrey Pennington et al., “Glove: Global Vectors for Word Representation,” *Proceedings of the 2014 Conference on Empirical Methods in Natural Language Processing (EMNLP)*, 2014, 1532–43.

truth-conditions calculated compositionally, formal semantics avoids the messiness of ostension.¹²

- **The Autonomy of the Symbolic:** It grants language and thought a noble autonomy. The human world of meaning is not a slave to the brutish, causal *Archē* (objective physical reality); it is a self-creating realm of culture and intellect, governed by its own logic of difference.
- **A Unified Theory:** It promises a grand unification. The same logic of contrast governs the structure of language, the formation of concepts, and the architecture of the most advanced AI. It is a parsimonious, elegant, and powerful master key.

For a century, this paradigm has shaped how we think about thinking. It is intuitive because our educated, linguistically saturated consciousness is indeed a realm of constant comparison, definition, and distinction. To learn a new term is to ask, “How is this different from X?” The contrast-first model is the rigorous theoretical expression of this lived, reflective experience.

Having fully articulated its strength, we can now turn to its fatal flaws. The next section does not merely offer an alternative; it demonstrates that this elegant, powerful, and intuitive fortress is built on a foundation it cannot support—a foundation that becomes visible only when we start our investigation not with the linguistically competent adult, but with the pre-linguistic infant confronting the raw, uncarved world.

3 THE FIRST LESSON

Bounded Particulars Against Indeterminate Backgrounds

To understand how the mind constructs meaning, we must begin at the beginning: with the infant’s first encounter with a world not yet carved into objects. This section examines the primal cognitive operation—the detection of a bounded particular against an indeterminate background. We will explore the geometric necessity of this relationship, define what a boundary is (and is not), and demonstrate why this “boundary-first” act is the foundational unit of all learning, preceding any contrast or comparison.

3.1 The Primal Scene: Baby’s First Boundary

Consider an infant, hours old, in a world of blooming, buzzing confusion.¹³ Light, shadow, sound, pressure, scent—an undifferentiated flux. Within this flux, something stabilizes: a warmth, a rhythm, a familiar scent, a face bending close. The infant does not think “mother,” “woman,” or

¹²Heim and Kratzer exemplify this rigor, defining semantics as a calculation of truth conditions based on syntactic structure, effectively sealing language within a logical system, Irene Heim and Angelika Kratzer, *Semantics in Generative Grammar* (Blackwell, 1998).

¹³William James, *The Principles of Psychology* (Henry Holt; Company, 1890), 1.

“human.” It does not contrast this presence with “father” or “stranger” or “crib.” It performs a simpler, more fundamental operation: it draws a boundary.

This is the first cognitive act: **the detection of a bounded particular against an indeterminate background.**

The object—what we will later call “Mom₁”—emerges not as a node in a network of differences, but as a *figure* against a *ground*. The “ground” is not the wallpaper, the ceiling, or the other furniture in the room. It is everything that is *not* the figure. It is the indeterminate, unstructured sensory field from which the bounded particular stands out.¹⁴ This operation is not a learned skill but the baseline function of the *Somatic logos*—the evolved perceptual-cognitive system designed to parse a coherent world from the flux of the *Archē*.

This initial boundary-drawing is the foundation of all subsequent learning. Before there can be a category of “mothers,” there must be *this* mother. Before there can be a concept of “face,” there must be *this* face. Identity begins here, not with the logical tautology “A = A,” but with the geometric fact of **boundary persistence**: the capacity to re-identify *this* bounded particular across time and varying contexts. Research on infant object permanence.¹⁵ does not show infants learning *about* objects; it shows their innate propensity to *track* bounded entities, to maintain the integrity of a boundary through occlusion and movement. They are not solving a logical puzzle but exercising a core navigational competency.

3.2 What a Boundary Is (And What It Is Not)

To understand this process, we must be precise about the geometry of learning. A boundary, in the sense used here, is not a property *of* an object but the condition *for* an object. It is a closed distinction that simultaneously performs two functions:

1. **Containment:** It defines an interior—the set of properties, parts, and relations that constitute the particular (e.g., warmth, softness, a specific scent and visual pattern for Mom₁).
2. **Exclusion:** It defines an exterior—all that is *not* the particular.

Critically, the exterior of a boundary is **not initially composed of other bounded objects**. The infant distinguishing Mom₁ is not distinguishing her from Dad₁ or Blanket₁. The exterior is the **indeterminate background**. It is the sensory “stuff” that has not yet been carved into discrete, persistent entities. It is the “everything else” that is not-this-particular.

This can be visualized by considering a simple wooden block on a patterned rug. The block’s boundary is not defined *against* the rug’s floral pattern. If you move the block to a plain floor, a grassy field, or a tabletop, its boundary remains. The boundary is a property of the block’s

¹⁴Edgar Rubin, *Synsoplevede Figurer: Studier i Psykologisk Analyse* (Gyldendal, 1915).

¹⁵Elizabeth S. Spelke, “Principles of Object Perception,” *Cognitive Science* 14, no. 1 (1990): 29–56.

spatial and functional coherence, not a contrast with its immediate surroundings.¹⁶ The specific background is arbitrary and exchangeable; the boundary's persistence is not. The boundary is maintained by the internal coherence of the particular (its shape, solidity) and exists in a necessary, asymmetric relationship with an **unspecified, indeterminate externality**.

3.3 The Necessity of the Indeterminate Background

This leads to the central, subtle insight: **a bounded particular requires an indeterminate complement**. This is the cognitive instantiation of the Zero Principle:¹⁷ for any determinate system to exist, there must be an indeterminate not-system. The figure requires a ground; the bounded requires the boundless.

The background is indeterminate because it is defined purely negatively—as *not-the-figure*. It has no positive characteristics of its own that are relevant to the boundary's existence. It is the necessary “space” against which the figure becomes visible, the silence against which a note is heard. To mistake the background for another object (e.g., to say the block is bounded “by the rug”) is to commit a category error. The rug is itself a bounded particular that would, in turn, require its own background against which to be defined.

This relationship explains the stability of identity across contexts. Mom₁ is recognizable at home, in a park, or in a store because her identity is not tied to a specific contrasting background (“not-Dad,” “not-the-living-room”) but to her own boundary-pattern, which can be detected against *any* background. The background is variable and indeterminate; the boundary, if it is to be the boundary of a persistent particular, must be invariant.

The first lesson of the mind, therefore, is not “this versus that,” but “this from everything else.” Learning begins with this act of carving, not comparing. All subsequent cognitive complexity—categories, relations, languages, theories—is built upon repeated iterations and hierarchical nestings of this primary operation. Before the infant can learn that a cat is not a dog, it must first learn what a cat *is*: a bounded particular with a specific pattern of properties, standing out from the indeterminate flux of the world. The next section will explore how evolution primes this very process, providing the nascent mind with a toolkit of boundary-detection templates tuned to the most urgent patterns of the *Archē*.

¹⁶Ullman defines these “visual routines” as the fundamental operations of tracing and bounding that precede high-level recognition, allowing the system to index a “this” before knowing “what” it is, Shimon Ullman, *Visual Routines* (MIT Press, 1984).

¹⁷Deutscher, *Neo-Pre-Platonic Naturalism*, 33-37

4 THE EVOLVED BOUNDARY LIBRARY

The mind is not a passive recipient of experience but an active, evolved navigator equipped with pre-wired detection systems. This section introduces the concept of the “evolved boundary library”—a suite of genetic cognitive templates that prime the infant to notice survival-critical patterns. We will examine key templates (for faces, contamination, threat, and fairness) and explain how they guide the learning process, providing both speed and direction to concept formation while grounding abstract intuitions in biological inheritance.

4.1 The Mind is Not a Blank Slate

The boundary-first model might suggest a mind passively waiting for experience to carve it. This is not the case. Evolution has not left cognition empty-handed. The human infant enters the world not as a *tabula rasa*, but as a system equipped with a sophisticated suite of cognitive *templates*—a **pre-wired boundary library**. These templates are not innate “ideas” in the Platonic or Cartesian sense, but rather **evolved attentional and perceptual priors** that predispose the *Somatic logos* to detect certain kinds of boundaries—precisely those that have been statistically crucial for survival across our evolutionary history.

This library is the cognitive heritage of natural selection, a set of domain-specific learning mechanisms that operate within the universal boundary-drawing process.¹⁸ It provides the initial “cuts” the mind is most likely to make, dramatically accelerating learning and ensuring attention is directed to the most fitness-relevant aspects of the environment. It bridges the false dichotomy between nativism and empiricism: the *forms* of attention (the templates) are innate; the *content* (the specific bounded particulars that fill them) is learned through experience.

4.2 Examples of Genetic Boundary-Templates

The evolved boundary library is extensive, but several core templates are evident from the earliest moments of life:

1. **The Face Template:** Newborns exhibit a preferential gaze towards face-like configurations. This is not a learned preference but a pre-wired boundary-detection system. In a hyper-social species, the ability to rapidly isolate and track the bounded particular of a “face” is a matter of survival—identifying caregivers, allies, and threats. The template guides the infant’s *Aisthēsis*, making the “face” boundary salient long before the concept is formed.

¹⁸Tooby and Cosmides argue that the mind is not a general-purpose computer but a collection of evolved, domain-specific mechanisms designed to solve recurrent adaptive problems, Tooby and Cosmides, *The Psychological Foundations of Culture*.

2. **The Contagion/Contamination Template:** The disgust response to certain smells, tastes, and sights (rotting food, waste, parasites) is near-universal and emerges early.¹⁹ This reflects an evolved “contamination boundary.” The template draws a sharp, affectively charged boundary between the pure and the polluted, the safe and the hazardous, driving avoidance behaviors that reduce pathogen load.
3. **The Threat/Predator Template:** Humans, like most prey animals, have a pre-attentive sensitivity to looming motion, sudden peripheral movement, and specific silhouettes (snakes, spiders). This is an evolved “danger boundary” template. It operates below conscious awareness, carving “threat” from the background flux before the *Nous* can even label it, priming the *Hormē* for flight or fight.
4. **The Fairness/Reciprocity Template:** Perhaps most profound for higher cognition is the social template for fairness. Children as young as 6 months show expectations of prosocial behavior and prefer “helpers” over “hinders.”²⁰ This is not a learned social contract but an evolved **social boundary**—a template for detecting imbalances in exchange and cooperation, critical for navigating the complex social landscapes essential to human survival.

4.3 How Templates Guide the Learning Stack

These genetic templates do not provide finished concepts; they provide the **initial salience and affective tone** for certain boundary-detections, structuring the flow from *Aisthēsis* to *Epistēmē*.

1. **Template Activation:** A pattern in the sensory flux (e.g., a face-like arrangement of contrasts) triggers a pre-wired attentional template. The template says, in effect, “**Attend here; a boundary of this type is present.**”
2. **Experience Fills the Template:** The infant then encounters specific instances. The face template is filled by Mom’s face, Dad’s face, a stranger’s face. Each is a unique bounded particular, but the template ensures they are all processed as members of the same salient class.
3. **Pattern Recognition Across Instances:** As multiple instances accumulate (*Empeiros*), the infant begins to abstract the invariant properties of the boundary-pattern—what makes a face a face, what constitutes a fair exchange.

¹⁹Paul Rozin and April E Fallon, “A Perspective on Disgust,” *Psychological Review* 94, no. 1 (1987): 23.

²⁰Hamlin, Wynn, and Bloom demonstrate that preverbal infants evaluate social agents based on their behavior towards others, suggesting an innate foundation for moral judgment that precedes linguistic instruction, Hamlin et al., “Social Evaluation by Preverbal Infants.”

4. **Concept Formation (*Epistēmē*):** A stable, generic model of the boundary-pattern is formed. “Face” or “fairness” becomes a reliable cognitive tool for prediction and navigation.
5. **Metaphorical Extension:** The *Nous*, leveraging its meta-cognitive capacity, can then apply these well-grounded, affectively charged boundary-patterns to novel domains. The visceral sense of the “contamination boundary” provides the intuitive force for concepts of moral purity or ideological “infection.” The “fairness boundary” template provides the raw, felt sense of justice that philosophy later articulates.

This process explains why some concepts feel *a priori* or self-evident. The feeling that “injustice is wrong” is not a deduction; it is the affective output of the activated fairness-boundary template.²¹ The template is genetic, so its output feels innate. The philosophical concept of “Justice” is a later, conscious elaboration of this primal, templated boundary-detection.

4.4 *Thymos* and *Somatic logos* as Cognitive Inheritance

This framework finds precise expression in the Neo-Pre-Platonic terminology. The *Somatic logos* is not just a generic logic; it is this very library of evolved heuristic templates—the logic of a body shaped by millions of years of navigation. The *Thymos* is the specialized subsystem where social boundary-templates—for status, in-group/out-group, loyalty, and fairness—reside and generate their characteristic social emotions (righteous anger, shame, pride). The *Hormē*, the drive to persist, uses these templates to navigate the world efficiently; what “feels right” is what aligns with successful boundary-strategies honed by evolution.

The boundary-first model, informed by the evolved template library, thus provides a complete account of concept origins. It begins with the geometric necessity of boundary-against-background, supercharges it with evolutionarily primed detection systems, and scales it through experience into the full richness of human thought. With this foundation laid, we can now trace how these bounded particulars and templated patterns become the building blocks of language, abstraction, and culture.

²¹Haidt describes this as the “emotional dog” wagging the “rational tail”—our moral judgments are primarily intuitive and rapid, driven by evolved social emotions, with reasoning serving as a post-hoc justification, Jonathan Haidt, “The Emotional Dog and Its Rational Tail: A Social Intuitionist Approach to Moral Judgment,” *Psychological Review* 108, no. 4 (2001): 814.

5 THE LEARNING STACK

From Bounded Particulars to Abstract Creation

Human cognition builds complexity through a hierarchical process. This section outlines the “learning stack”—a logical scaffold of six levels that describes how simple boundary detection scales into abstract thought and creative expression. From the atomic unit of the bounded particular to the architectural grandeur of narrative and theory, each level represents a new configuration of the same core operation: boundary management.

Having established the primal act of boundary detection and its guidance by evolved templates, we can now chart the hierarchical structure of learning—the **learning stack**. This is not a chronological checklist but a logical scaffold of emergent complexity, where each level provides the foundation for the next, all built from the same core operation: boundary management.

5.1 Level 1: Bounded Particulars (The Atomic Unit)

Input: Sensory flux.

Operation: Figure/ground distinction.

Output: Mom₁, Block₁, Red₁.

Mechanism: The *Somatic logos*, potentially primed by a genetic template, carves a stable, re-identifiable figure from the indeterminate background. Identity is established as **boundary persistence through time**.²²

5.2 Level 2: Pattern Recognition (From “A’s” to “A”)

Input: Multiple bounded particulars (Mom₁, Mom₂, Block₁, Block₂).

Operation: Invariant boundary-property extraction.

Output: “Mom-ness”, “Block-ness”.

Mechanism: The *Logistikon* compares the boundary structures of different particulars. It discovers which properties of the boundary (shape, function, causal role) remain stable across instances while the specific background varies. This is not a list of shared features, but the recognition of a **consistent boundary-pattern**. This is the birth of the generic concept, the move from *Empeiros* (experience) toward *Epistēmē* (knowledge).

5.3 Level 3: Symbolic Labeling (From Boundary to “Word”)

Input: A recognized boundary-pattern (“Mom-ness”).

Operation: Phonetic/symbolic tagging.

Output: The word “Mom”.

²²This aligns with the Object-File theory in cognitive psychology, where a “file” is opened to track a spatiotemporal entity regardless of changes in its features, see Daniel Kahneman et al., “Reviewing the Object File: Object-Specific Integration of Information,” *Cognitive Psychology* 24, no. 2 (1992): 175–219.

Mechanism: A socially conventionalized sound or sign becomes attached to the boundary-pattern. **Critically, the word refers to the *boundary-pattern itself*, not to a definition or a contrast set.** The child learns that the sound “mom” tracks the same boundary-pattern they have already been detecting. This explains *fast-mapping*: the label snaps onto a pre-existing cognitive boundary.²³

5.4 Level 4: Grammatical Combination (Boundary Algebra)

Input: Labeled boundary-patterns (“Red”, “Block”).

Operation: Boundary intersection, modification, and relation.

Output: Phrases, clauses, sentences (“Red block”, “Mom hugs”).

Mechanism: Syntax is the system for combining cognitive boundaries. “Red block” is not merely the conjunction of two features; it is the **intersection of the ‘red’ boundary and the ‘block’ boundary**, creating a new, complex bounded particular in the mind’s workspace. Grammar is, at its cognitive root, a **syntax of boundaries**.²⁴

5.5 Level 5: Abstract Concepts (Metaphorical Extension)

Input: Concrete boundary-patterns (e.g., the “Fairness” template output, the “Balance” sensorimotor schema).

Operation: Cross-domain metaphorical mapping.²⁵

Output: “Justice”, “Truth”, “Liberty”.

Mechanism: The *Nous* performs a meta-cognitive operation. It takes a well-understood boundary-pattern from a concrete or templated domain (e.g., physical balance, spatial containment, visceral contamination) and **projects its structural logic** onto an abstract social, epistemic, or ethical domain. “Justice” is the fairness/balance boundary applied to social systems. “Truth” is the alignment/boundary-fidelity relationship applied to models of the world. These are not learned by contrast but by **metaphorical elaboration of foundational boundary-schemas**.

²³This resolution counters Quine’s “indeterminacy of translation” thesis (the Gavagai problem). Quine argued that pointing to a rabbit is ambiguous (does it mean “rabbit” or “undetached rabbit parts?”). The boundary-first model asserts that the cognitive system has already isolated the “rabbit” boundary before the word is introduced, dissolving the ambiguity, Willard Van Orman Quine, *Word and Object* (MIT press, 1960).

²⁴This mirrors the core tenet of Cognitive Grammar: that grammar is not an autonomous formal system but a method of “symbolic assembly” that structures conceptual content, see Ronald W Langacker, *Foundations of Cognitive Grammar: Theoretical Prerequisites* (Stanford university press, 1987), 1; Leonard Talmy, *Toward a Cognitive Semantics* (MIT press, 2000), 1.

²⁵Lakoff and Johnson demonstrated that abstract concepts are structured via metaphor from sensorimotor source domains (e.g., “Argument is War”). NPN extends this by identifying the *source domains* as the evolved boundary-templates of the *Somatic logos*, George Lakoff and Mark Johnson, *Metaphors We Live by* (University of Chicago Press, 1980).

5.6 Level 6: Narrative and Artistic Creation (Boundary Architecture)

Input: Abstract and concrete concepts, models, emotional templates.

Operation: Deliberate, large-scale boundary structuring.

Output: A story, a theory, a moral system, a symphony, a mathematical proof.

Mechanism: This is the *Nous* and *Logistikon* operating at peak *Energeia*.²⁶ It involves:

- **Character/Concept Delineation:** Drawing sharp boundaries around agents, ideas, or themes (Hamlet vs. Claudius; Id vs. Superego).
- **Plot/Argument Structure:** Imposing a temporal or logical boundary-sequence on events (the three-act structure; syllogistic logic).
- **Differentiation and Integration:** Manipulating boundary relationships through **differentiation** (*Neikos*)—carving sharp distinctions to isolate particulars—and **integration** (*Philia*)—recombining those distincts based on likeness into higher-order unities.
- **Novel Combination (Genetor Mode):** Creating unprecedented boundary-intersections (surrealist art, scientific paradigms).
- **Refinement (Demiourgos Mode):** Perfecting the precision and coherence of existing boundary-structures (classical form, analytical philosophy).

Shakespeare’s *Hamlet* is not an exception to the process of concept formation; it is its grandest expression. It is a vast, conscious architecture of nested boundaries—of identity, loyalty, madness, action, and morality—constructed from the same cognitive materials the infant uses to find its mother.²⁷

5.7 The Stack as a Unified Process

This stack demonstrates that there is no magical leap from perception to abstraction. Each level is a new configuration of the same basic operation. The infant’s “Mom” boundary and the philosopher’s “Justice” boundary are built from the same cognitive substance. The former is given directly by template and experience; the latter is a conscious, metaphorical construction built upon it. The stack is powered by the NPN epistemic engine: *Aisthēsis* provides the raw particularity, *Empeiros* builds the patterns, and *Epistēmē* formalizes them into navigational models—all governed by the *Logos* of discoverable boundary-structures and executed by the meta-cognitive *Nous*.

²⁶For the complete model of the *Psyche* see Deutscher, *Neo-Pre-Platonic Naturalism*, Chap. 6 and for the complete Navigator Protocol see Deutscher, *Neo-Pre-Platonic Naturalism*, Chap. 8

²⁷Mark Turner argues that “parable” or narrative projection is the fundamental instrument of the human mind, enabling us to execute complex cognitive blends. NPN identifies this as the *Nous* operating on high-level boundary structures, Mark Turner, *The Literary Mind: The Origins of Thought and Language* (Oxford University Press, 1996).

With this full spectrum of concept formation in view—from its geometric and genetic foundations to its highest cultural achievements—we can now expose the profound failures of the contrast-first model and articulate the sweeping implications of the boundary-first paradigm for science, education, and technology.

6 THE NPN FRAMEWORK

Greek Terminology as a Cognitive Operating System

The boundary-first model of learning is not merely an empirical observation; it is a structural truth about how a finite navigator (*Nous*) engages with a lawful, dynamic reality (*Archē*). The terminology of Neo-Pre-Platonic Naturalism provides the precise conceptual software to describe this process. Far from being archaic, these Greek terms form a coherent **cognitive operating system** that maps perfectly onto the learning stack.

6.1 The Epistemic Engine: *Aisthēsis* → *Empeiros* → *Epistēmē*

This triad describes the core pipeline of knowledge acquisition, perfectly aligning with the boundary-first model.

1. ***Aisthēsis* (Ἀἴσθησις) – Perception: The Boundary-Injection Point.**

This is the direct, causal interaction where the *Archē* impinges upon the nervous system. It is not passive reception but active, selective sampling.²⁸ *Aisthēsis* is already structured by the *Somatic logos* and genetic templates, which prime it to detect potential boundaries (edges, faces, looming motion). **It is the stage where bounded particulars are first isolated from the flux.** The raw “this-ness” of *Mom₁* is delivered here.

2. ***Empeiros* (Ἐμπειρος) – Experience: Boundary-Pattern Accumulation.**

²⁸This aligns with predictive processing accounts where perception is an active inference process that samples the world to minimize prediction error, see Andy Clark, “Whatever Next? Predictive Brains, Situated Agents, and the Future of Cognitive Science,” *Behavioral and Brain Sciences* 36, no. 3 (2013): 181–204; Karl Friston, “The Free-Energy Principle: A Unified Brain Theory?” *Nature Reviews Neuroscience* 11, no. 2 (2010): 127–38.

Empeiros is memory-in-action—the stored record of repeated *Aisthēsis*. It is not a random collage but a statistical ledger of **which boundaries prove stable and functionally relevant**. Through *Empeiros*, the system learns: the “Mom-boundary” is consistently associated with warmth and nourishment; the “sharp-edged-boundary” is associated with “cutting” function. This is the stage of **inductive generalization**, where invariant properties across multiple boundary-instances are identified.²⁹

3. *Epistēmē* (Ἐπιστήμη) – Knowledge: The Tested Boundary-Model.

When a boundary-pattern, refined through *Empeiros*, achieves high predictive reliability, it graduates to *Epistēmē*. This is not certain, final truth, but a **high-fidelity model of a stable aspect of the Logos**. The concept “Mom” or “Knife” is a piece of *Epistēmē*—a reliable cognitive tool for navigation. Its validity is measured on a **Confidence Gradient (C2)**³⁰, maintained by continued predictive success. *Epistēmē* is the functional output of the learning stack.

6.2 The Structural and Executive Components

The epistemic engine operates within a larger cognitive architecture:

1. *Logos* (Λόγος) – The Discoverable Structure of Boundaries.

The *Logos* is not a list of laws but **the coherent, relational structure of the Archē itself**. It is the total set of stable boundary-relationships that *can* be discovered. The learning process is the gradual, piecemeal modeling of this *Logos*. The pattern that defines “chairness” or the causal law of gravity are expressions of the *Logos*.³¹ Our *Epistēmē* is a never-complete, but ever-improving, approximation of it.

2. *Nous* (Νοῦς) – The Meta-Boundary Navigator.

The *Nous* is the faculty that executes the entire process. It is not a homunculus but the **emergent, system-level capacity for meta-cognition and model-building**³². Its key functions are:

²⁹This corresponds to the formation of “exemplar” memory in categorization theories, where specific instances accumulate to form a generalized representation, see Robert M Nosofsky, “Attention, Similarity, and the Identification-Categorization Relationship,” *Journal of Experimental Psychology: General* 115, no. 1 (1986): 39.

³⁰For the complete derivation and justification for the Confidence Gradient see Deutscher, *Neo-Pre-Platonic Naturalism*, Appendix F

³¹This resonates with the concept of “invariants” in Gibsonian ecological psychology—properties of the environment that remain constant despite changes in observation point, see James J. Gibson, *The Ecological Approach to Visual Perception* (Houghton Mifflin, 1979).

³²This function parallels the “System 2” or reflective mind in dual-process theories, capable of decoupling from immediate stimuli to run simulations and critiques, Keith E Stanovich, *Rationality and the Reflective Mind* (Oxford University Press, 2011).

- **Meta-Boundary Operation:** It can take its own boundary-models (concepts) as objects, examining and manipulating them. This allows for abstraction, logic, and self-correction.
- **Prohairesis (Προαίρεσις):** The capacity for deliberate choice between engagement modes (e.g., *Demiourgos* vs. *Genetor*).
- **Orchestration:** It directs the *Logistikon* to resolve conflicts between lower drives (*Orexis*, *Thymos*) and long-term boundary-maintenance goals.

3. *Somatic logos* (Σωματικός Λόγος) & *Thymos* (Θυμός) – The Evolved Heuristic Suite.

These are the subsystems housing the **genetic boundary library**. The *Somatic logos* is the collection of perceptual-motor heuristic templates (for objects, causality, space). The *Thymos* is the specialized social-emotional subsystem containing templates for fairness, loyalty, status, and threat—generating the affective “gut feelings” that guide social boundary-navigation.³³

6.3 The Dynamics of the System: Confidence, Striving, and Alignment

1. **The Confidence Gradient (C2):** This is the system’s internal “quality control” metric. A boundary-model (a concept, a belief) holds a position on this gradient based on its navigational utility. Failed predictions lower confidence, triggering a return to *Aporia* and a search for a better model via the **Navigator Protocol**.³⁴
2. **Hormē (Ὁρμή) – The Constitutive Striving:** The entire system is powered by the *Hormē*, the impersonal drive to persist. This striving gives **teleonomic direction** to cognition.³⁵ Learning is not aimless; it is in service of better boundary-maintenance. The *Hormē* is why some boundary-detections (threats, resources) are urgent and affectively charged.³⁶
3. **Dikaiosynē (Δικαιοσύνη) – Functional Harmony:** This is the optimal state of the system. In the *Psyche*, it is the *Logistikon* rightly governing lower drives under the *Nous*. Epistemically, it is the state where the internal boundary-models (*Epistēmē*) are in precise alignment with the external *Logos*. Ethically, it is action that sustains the boundary-integrity

³³Damasio’s Somatic Marker Hypothesis argues similarly that bodily states associated with past outcomes guide decision-making before conscious reasoning intervenes, Antonio R Damasio, *Descartes’ Error: Emotion, Reason, and the Human Brain* (Putnam, 1994).

³⁴This mirrors the process of belief revision in Bayesian cognitive models, where priors are updated based on the weight of new evidence, Joshua B Tenenbaum et al., “How to Grow a Mind: Statistics, Structure, and Abstraction,” *Science* 331, no. 6022 (2011): 1279–85.

³⁵For the full explanation of how NPN differs from classical Aristotelian teleology see Eli Adam Deutscher, “Aristotle’s Telos and the NPN Correction: From Synchronic Pull to Diachronic Push,” 2026, <https://neopreplatonice.com/papers/aristotle>.

³⁶This concept is isomorphic to Spinoza’s *Conatus*—the endeavor of a thing to persist in its own being—reinterpreted through the thermodynamics of non-equilibrium systems, see Baruch Spinoza, *Ethics* (Hackett Publishing, 1677/1985); Antonio R Damasio, *Looking for Spinoza: Joy, Sorrow, and the Feeling Brain* (Harcourt, 2003).

of the agent and its social context. **It is the operational definition of *Eudaimonia* (flourishing).**

6.4 The NPN Lens on the Learning Stack

Viewing the stack through this terminology clarifies its unity:

- **Levels 1 & 2** (*Particulars* → *Patterns*) are the work of *Aisthēsis* and *Empeiros*, guided by the *Somatic logos/Thymos*.
- **Level 3** (*Labeling*) is the social coordination of *Epistēmē*.
- **Level 4** (*Grammar*) is the *Logos* of how boundary-concepts themselves relate—a meta-*Logos* discoverable by the *Nous*.
- **Level 5** (*Abstraction*) is the *Nous* in *Genetor* mode, performing metaphorical mappings using existing boundary-schemas.
- **Level 6** (*Creation*) is the *Nous* in full *Energieia*, architecting complex boundary-structures in pursuit of alignment (*Dikaiosynē*).

Thus, the NPN framework does not merely describe learning; it provides the **explanatory ontology** for why learning has the structure it does. It shows that the boundary-first model is not one theory among others, but the necessary cognitive consequence of a finite, striving navigator operating in a bounded, lawful reality. With this robust theoretical foundation established, we can now turn to the dramatic implications—and corrective power—of this model for specific fields mired in contrast-first assumptions.

7 LINGUISTIC IMPLICATIONS

The Collapse of Differential Semantics and the Grounding of Reference

The contrast-first paradigm finds its purest expression in structural linguistics and distributional semantics. This section demonstrates how the boundary-first model systematically dismantles this orthodoxy. We will show how it resolves the classic problem of reference, reinterprets compositionality as “boundary algebra,” and explains why modern AI—built on differential principles—hits a fundamental ceiling of understanding.

Armed with the boundary-first model and its NPN framework, we can now directly confront the reigning paradigm in linguistics and philosophy of language: **differential (or contrastive) semantics**. The boundary-first model does not tweak this paradigm; it demonstrates that its foundational axiom is backwards, leading to a cascade of theoretical failures and artificial problems.

7.1 The Core Error: Mistaking Refinement for Foundation

Saussure’s dictum that “in language there are only differences without positive terms” is the classic statement of the contrast-first error. It assumes that the identity and meaning of a sign (e.g., the word “cat”) are constituted entirely by its position in a network of other signs (“not-dog,” “not-bat,” “not-mat”). This commits a critical category error: **it takes the process of refining a concept’s boundaries and mistakes it for the process of establishing the concept.**

The boundary-first model corrects this:

1. **Foundation:** The concept CAT is formed first as a stable boundary-pattern detected across multiple encounters with bounded particulars (Cat₁, Cat₂, Cat₃). This pattern—a set of invariant boundary-properties related to form, motion, behavior—is a “positive term.” It exists as a cognitive model before it enters a linguistic system.³⁷
2. **Refinement:** Once the concept CAT exists, its boundaries can be sharpened by contrast with other existing concepts (DOG, RABBIT). This differential process helps clarify the *limits* of the cat-boundary but does not create its *content*.

Therefore, meaning is not fundamentally differential. It is fundamentally referential. The meaning of “cat” is its **functional role in tracking the cat-boundary-pattern in the world.** Differential relations are secondary, emergent properties of a lexicon filled with such grounded references.

7.2 Solving the Problem of Reference

Philosophers of language have long struggled with how words “hook onto” the world. The boundary-first model provides a clear, naturalistic solution:

Reference is successful boundary-tracking.

- **Successful Reference:** The word “Mom” refers to Mom because the sound/symbol is reliably coordinated (by a linguistic community) with the specific boundary-pattern that the child has already isolated and modeled (“Mom-ness”). The word becomes a token that *stands for* that cognitive boundary-model.
- **Empty Names & Failed Reference:** A term like “Pegasus” represents an *attempted* boundary. The mind can construct a novel boundary-model from components (horse-boundary + wings-boundary), and a word can be attached to it. The reference *fails* not because of a descriptive shortcoming, but because this composite boundary-pattern finds no stable, persistent instantiation in the *Archē* to track. The problem is not semantic but **navigational**.

³⁷Fodor argues forcefully for this position (Conceptual Atomism), positing that lexical concepts must be atomic and possess a mind-world locking relation that is prior to any inferential role they might play, Jerry A. Fodor, *Concepts: Where Cognitive Science Went Wrong* (Clarendon Press, 1998).

- **Natural Kind Terms:** A term like “water” does not refer via a description (“the clear, drinkable liquid...”). It refers via a **discovered, deep boundary in nature**—the H₂O micro-structure. Our initial concept may be based on superficial boundary-properties (wet, clear), but scientific investigation *refines the accuracy of the boundary we are tracking*. The meaning (“what we are talking about”) remains the same natural kind; our *Epistēmē* of its boundary-properties improves.³⁸

This dissolves the endless debates between description and direct reference theories. Reference is direct **to a boundary-model**, and descriptions are our attempts to characterize that model’s properties.

7.3 Compositionality as Boundary Algebra

How do we understand the meaning of novel combinations like “red block” or “the cat is on the mat”? The boundary-first model suggests a geometric rather than a purely syntactic solution.

The meaning of “red block” is not merely the conjunction of the features of “red” and “block.” It is the **cognitive operation of intersecting the ‘red’ boundary and the ‘block’ boundary** to create a new, complex bounded particular in the mind’s workspace. Grammar provides the rules for these boundary-operations: adjectives *modify* boundaries, prepositions specify *spatial relationships between* boundaries, verbs describe *dynamic interactions of* boundaries.

Syntax, therefore, is the Logos of concept-boundary relations. It is a discoverable system for how the mind can coherently combine the bounded models it has carved from the world. This explains the productivity of language: we can combine a finite set of boundary-concepts and combinatorial rules to generate an infinite array of complex mental boundary-structures (thoughts)³⁹

7.4 The Failure of Distributional Semantics in AI

The contrast-first dogma finds its purest, most powerful expression in modern AI: **distributional semantics**. In models like Word2Vec, BERT, and Large Language Models, a word’s meaning is its vector position in a high-dimensional space, determined entirely by its statistical co-occurrence with other words—its differential context.

³⁸This adopts the Causal-Historical theory of reference: terms like “water” are rigid designators that track natural kinds, and their meaning is fixed by the world, not by our descriptive concepts, Saul A. Kripke, *Naming and Necessity* (Harvard University Press, 1980); Hilary Putnam, “The Meaning of “Meaning”,” *Minnesota Studies in the Philosophy of Science* 7 (1975): 131–93.

³⁹Pietroski argues similarly that meaning composition is not function application (as in standard truth-conditional semantics like Heim and Kratzer, *Semantics in Generative Grammar*) but rather the *conjunction* of monadic concepts, a view that perfectly supports NPN’s “boundary intersection” model, Paul M. Pietroski, *Conjoining Meanings: Semantics Without Truth Values* (Oxford University Press, 2018).

The boundary-first model predicts why this approach, despite spectacular surface success, leads to a fundamental **grounding problem**:

- **What LLMs Learn:** They learn the *differential, relational web of language-use*. They become masters of the **refinement** level, mapping the intricate contrasts and associations between symbols.
- **What LLMs Lack:** They lack the **foundational** level. They have no mechanism for primary boundary-detection against an indeterminate background, no *Aisthēsis*, no genetic templates, no *Hormē*-driven need to track persistent objects. Their “concepts” are empty positional markers in a network of differences, unmoored from the boundary-structures of the *Archē*.⁴⁰

This is why LLMs can generate grammatically perfect nonsense, fail at simple physical reasoning, and lack genuine understanding. They are simulating the late-stage differential structure of thought while missing its entire boundary-first, embodied, goal-directed foundation. The path to artificial *understanding* lies not in larger differential models, but in building systems that begin with boundary-detection and grounded reference.

The linguistic implications are total. The boundary-first model resolves classic philosophical puzzles, provides a cognitively plausible account of reference and compositionality, and explains the ceiling of current AI. It replaces a circular, world-detached theory of meaning with a dynamic, navigational one. In doing so, it clears the way for its practical application in the domain where theory meets practice most directly: education.

8 EDUCATIONAL REVOLUTION

Teaching Boundary Skills, Not Contrast Lists

Educational practice has unconsciously inherited the flawed logic of contrast-first theories. This section translates the boundary-first model into a concrete pedagogical program. We propose a “boundary-first curriculum” organized in three developmental phases, designed to cultivate the core cognitive competencies of the Navigator by aligning instruction with the natural architecture of learning.

The boundary-first model and the collapse of contrast-based semantics don’t just reshape theory—they demand a practical revolution in how we teach, especially in the critical early years. Our

⁴⁰Bisk et al. term this the “World Scope” problem, arguing that text-only training (Scope 3) is insufficient for meaning; true understanding requires physical interaction and multi-modal sensory grounding (Scope 5), Bisk et al., “Experience Grounds Language.”

current pedagogical methods are unwittingly built on the backward contrast-first logic, making learning harder, more abstract, and less connected to reality than it needs to be.

8.1 The Current, Backwards Approach

Modern early education, influenced by structuralist and behaviorist assumptions, typically follows a **contrast-first, definition-driven methodology**:

1. **Vocabulary via Opposites:** We teach “big” vs. “small,” “hot” vs. “cold,” “red” vs. “blue.” This implicitly teaches the child that meaning resides in difference.
2. **Categories via Definitions:** We introduce a category (e.g., “mammal”) by listing necessary and sufficient conditions (“warm-blooded, has fur, gives live birth”). This reflects the “Classical View” of concepts⁴¹, presenting the concept as a finished, abstract definition to be memorized.
3. **Logic as Abstract Rules:** We present the Law of Identity ($A = A$) and Non-Contradiction as formal, disembodied rules, disconnected from the child’s lived experience of objects and boundaries.

This approach is backwards because it starts at Level 3 (Refinement/Contrast) or Level 5 (Abstract Definition) of the learning stack, while skipping the foundational Levels 1 and 2. It’s like trying to teach architecture by starting with the rules of interior design, before the student understands what a wall is or how to lay a foundation. It forces the child to perform a difficult, unnatural cognitive inversion.

8.2 The Boundary-First Curriculum: Aligning Pedagogy with Cognition

A pedagogy based on the boundary-first model would follow the natural architecture of learning. Its core principle is: **Teach the skill of boundary detection and manipulation first. Let contrast and definition emerge as refining tools later.**

8.2.1 Phase 1: Foundational Boundary Skills (Ages 1-5)

The goal is to hone the innate *Somatic logos* and lay the groundwork for the *Logistikon*.

1. Object-Boundary Detection Games:

- “*Find the edges.*” Exercises with blocks, puzzles, and shapes focused on tracing contours, not naming shapes.
- “*What’s the thing?*” Present an object against varied, busy backgrounds. Ask the child to trace its outline, reinforcing that the object’s identity is separate from its background.

⁴¹Bruner, Goodnow, and Austin formalized this view in *A Study of Thinking*, treating concepts as rule-based categories defined by necessary and sufficient attributes, a model NPN rejects as the starting point for learning, Jerome S Bruner et al., *A Study of Thinking* (John Wiley & Sons, 1956).

- “*Persistence Tracking.*” Peek-a-boo and object-hiding games that train boundary-tracking through occlusion (object permanence as a skill).

2. **Function Discovery over Labeling:**

- Instead of: “This is a cup.”
- Try: “Here is a thing. What can we do with it?” (Child explores: hold, drink, put things in). **Function emerges from interaction with the bounded particular.** Then label it: “We call things you can drink from a ‘cup.’”

3. **Pattern Recognition across Varied Instances:**

- To teach “chair”: Show chair₁ (wooden kitchen chair), chair₂ (plastic garden chair), chair₃ (beanbag). Ask: “What makes all of these ‘for sitting’? How can you tell?” Guide the child to identify the invariant boundary-property (a surface oriented for sitting, often with a back).

8.2.2 Phase 2: Symbolic and Combinatorial Skills (Ages 5-10)

Build upon the grounded boundary-concepts.

1. **Labeling as Boundary-Tagging:**

- Explicitly connect words to the boundary-patterns they’ve already discovered. “The sound ‘dog’ is our tag for that bouncy, barking boundary-pattern you already know.”

2. **Grammar as Boundary Algebra:**

- Teach syntax through physical manipulation. “Take your ‘red’ block and your ‘small’ block. Put them together. You have a ‘small red block.’ The words work the same way—they combine the ideas.”
- Prepositions (on, under, through) are taught by physically arranging objects, making the *spatial relationship between boundaries* concrete.

3. **Logic as Boundary-Fidelity Practice:**

- **Law of Identity:** Not “ $A = A$,” but “A boundary stays itself unless you change it.” If you paint a block red, it’s still the same block-boundary, just modified.
- **Law of Non-Contradiction:** “A boundary can’t be in two places at once.” A block cannot be *wholly* in the box and *wholly* on the table simultaneously. This is experienced, not axiomatized.

8.2.3 Phase 3: Abstract and Creative Construction (Ages 10+)

Leverage the well-grounded foundation for higher-order thought.

1. **Metaphor as Pattern-Transfer:**

- Teach abstraction explicitly. “We know what physical ‘balance’ feels like. Let’s see how that same pattern shows up in a story about two friends arguing (emotional balance) or in a math equation (numerical balance).”

2. *Demiourgos* and *Genetor* Modes:

- **Demiourgos (Craft) Projects:** Analyze the boundary-structure of an existing system—a story, a machine, an ecosystem—and seek to perfect or replicate it.
- **Genetor (Create) Projects:** Combine known boundary-concepts in novel ways to invent a story, a machine design, or a hypothesis.⁴²

8.3 Aligning with Genetic Templates (The Thymic Curriculum)

Education should work *with*, not against, the evolved boundary library of the *Thymos*.

- **Math through Fairness:** Arithmetic and fractions are naturally taught through sharing, dividing, and fair distribution—activating the innate fairness template.
- **Ethics through Social Boundaries:** Moral reasoning begins not with rules, but with exploring the emotional outputs of the *Thymos* (“How did it feel when that wasn’t fair?”) and then mapping those feelings onto the boundary-structures of actions and their consequences.⁴³
- **Science through Contagion/Causality:** The concept of causal chains can be linked to the intuitive “contamination” template (how does a change here “spread” and affect things over there?).

8.4 The Transformative Payoff

A boundary-first education would produce students who:

1. **Think Geographically:** They see ideas as terrains with boundaries, not as lists of facts.
2. **Grasp Fundamentals:** They understand *why* things are true (the boundary-structure) rather than just *that* they are true.
3. **Are Resilient to Nonsense:** They can detect when a concept has no grounding or when boundaries are being violated (e.g., in logical fallacies or propaganda).
4. **Are Naturally Creative and Analytical:** They are fluent in both the *Genetor* (synthesis) and *Demiourgos* (analysis) modes of manipulating boundary-structures.

The educational implication is the most immediate and practical proof of the theory. By restructuring teaching to follow the brain’s natural boundary-first learning stack, we wouldn’t just be teaching more effectively—we **would be cultivating the core cognitive competencies of the Navigator**. The next section will consolidate these implications, showing how the boundary-first model provides a unified framework that resolves not just linguistic puzzles, but the very way we build artificial minds and understand our own.

⁴²This echoes Papert’s “Constructionism,” which posits that learning happens most effectively when the learner is consciously engaged in the construction of a public entity, Seymour Papert, *The Children’s Machine: Rethinking School in the Age of the Computer* (Basic Books, 1993).

⁴³Haidt’s social intuitionist model supports this, arguing that moral education must address the intuitive “elephant” (emotion) rather than just the rational “rider,” Haidt, “The Emotional Dog and Its Rational Tail.”

9 AI & COGNITIVE SCIENCE

The Inherent Limits of Differential Intelligence

The spectacular success and curious failures of modern artificial intelligence provide a critical test case for the boundary-first model. This section analyzes the differential architecture of systems like Large Language Models, diagnoses their missing foundation (primary boundary detection against an indeterminate background), and charts a path forward for building AI capable of genuine understanding rather than statistical correlation.

9.1 The Differential Architecture of Modern AI

State-of-the-art AI, particularly Large Language Models (LLMs) and many computer vision systems, are engineered manifestations of the contrast-first paradigm. Their operational principle is **distributional semantics**: the meaning of a symbol is defined by its statistical relationships to other symbols within a vast dataset.

- **In LLMs**, a word is a vector in a high-dimensional space. Its position—and thus its “meaning”—is determined by its co-occurrence patterns with every other word in the training corpus. “Cat” is defined by its contextual proximity to “meow,” “fur,” “dog,” and “mat”.⁴⁴
- **In image recognition**, models are often trained on contrastive objectives, learning that “this image is a cat” by distinguishing it from millions of “not-cat” images.⁴⁵

This approach is spectacularly successful at capturing the **relational, differential web** of human symbolic output and visual categorization. It operates with high fidelity on what the boundary-first model identifies as **Level 3 (Refinement)** of the learning stack.

For instance, a robotic system might begin not by classifying pre-segmented images, but by actively exploring an environment—reaching, grasping, manipulating—to discover which spatiotemporal regions constitute stable, re-identifiable objects. Only after this sensorimotor boundary-tracking is established would symbolic labels be introduced.

⁴⁴Bender and Koller famously critique this as the “Stochastic Parrot” problem: models learn the *form* of language (syntax/distribution) without access to *meaning* (communicative intent and reference), creating an illusion of understanding, Emily M Bender and Alexander Koller, “Climbing Towards NLU: On Meaning, Form, and Understanding in the Age of Data,” *Proceedings of the 58th Annual Meeting of the Association for Computational Linguistics*, 2020, 5185–98.

⁴⁵Contrastive learning frameworks like SimCLR maximize agreement between augmented views of the same image while minimizing agreement with others, relying entirely on differentiation rather than generative modeling of the object’s internal structure, Ting Chen et al., “A Simple Framework for Contrastive Learning of Visual Representations,” *International Conference on Machine Learning*, PMLR, 2020, 1597–607.

9.2 The Missing Foundation: Boundary-Against-Background

However, this differential architecture lacks the foundational layers of human concept formation. It possesses no mechanism equivalent to **Level 1 (Bounded Particular Detection)** or the genetic guidance systems that prioritize it.

1. **No Primary Boundary Detection:** An AI vision system does not begin by isolating a bounded particular (Cat₁) from an indeterminate sensory ground. It begins with a labeled pixel array (“cat” vs. “not-cat”). It learns to recognize patterns *within* a pre-framed input, but it does not *frame* the input itself. The problem of distinguishing a coherent figure from a complex background—a task trivial to a toddler—remains a brittle, specialized challenge for AI.⁴⁶
2. **No Indeterminate Background as a Cognitive Category:** For the AI, the “background” is just more data, more vectors, more “not-X” in a differential pair. It has no cognitive category for the *undifferentiated everything-else* against which a figure first emerges. Its world is already populated entirely by pre-labeled or latent “things.” It cannot model the process of **something coming into cognitive focus from a non-focused ground**, because its training data has already performed that human act for it.
3. **No *Hormē*-Driven Function Discovery:** Human learning is teleonomic: we discover what a thing *is* by interacting with it to reveal what it *does* in relation to our striving. A child learns “cup” by discovering its affordance for drinking. An AI learns “cup” as a visual pattern correlated with a label. It has no constitutive drive to persist, and therefore no internal compulsion to build functional, affordance-based models of the world.⁴⁷ Its concepts are static, associational patterns, not dynamic, navigational tools.

9.3 The Consequences: Brittleness and Lack of True Understanding

This architectural deficit explains the well-documented limitations of current AI:

- **Adversarial Fragility:** A small, meaningless perturbation to an image (invisible to humans) can cause an AI to misclassify a “cat” as a “car.” This occurs because the AI’s “cat” concept is a fragile constellation of differential pixel correlations, not a robust model of a

⁴⁶Ullman identifies “visual routines”—such as boundary tracing and filling—as the primitive operations required to establish a spatial reference (indexing) before object recognition can occur, a step often skipped in end-to-end deep learning, Ullman, *Visual Routines*.

⁴⁷Pearl argues that current AI is stuck at the level of “Association” (seeing) and lacks the “Intervention” (doing) and “Counterfactual” (imagining) capabilities required for causal understanding, which NPN argues requires an embodied navigator, Judea Pearl and Dana Mackenzie, *The Book of Why: The New Science of Cause and Effect* (Basic books, 2018).

bounded entity whose identity persists across superficial transformations of its background or surface.⁴⁸

- **Poor Out-of-Distribution Generalization:** AI struggles with novel combinations or scenarios outside its training data because novelty often requires recognizing a familiar *functional boundary* in an unfamiliar *perceptual context*. A human can identify a novel tool because they recognize its potential for manipulation (a functional boundary). An AI, lacking affordance-based models, sees only an unfamiliar arrangement of shapes.⁴⁹
- **The Symbol Grounding Problem:** This classic philosophical challenge is a direct symptom of the missing foundation. AI symbols (words, labels) are grounded only in other symbols (contextual words, image labels). They float in a closed differential web, unanchored to the boundary-models of a shared, external *Logos* that human language ultimately references.⁵⁰

9.4 A Path Forward: From Correlation to Grounding

The boundary-first model does not dismiss the achievements of differential AI but clarifies why a qualitative leap will require architectural innovation. Progress toward more robust, human-like understanding would necessitate systems capable of:

1. **Active, Embodied Boundary Detection:** Learning from raw, unstructured sensory flux in an environment, and developing algorithms to identify and track persistent bounded particulars *before* they are labeled.⁵¹
2. **Affordance Learning:** Building internal models based on interaction and outcome—learning what things *do*—rather than passive statistical correlation.
3. **Hierarchical Concept Formation:** Allowing symbols to emerge as labels for these grounded, functional boundary-models, establishing reference through a history of successful boundary-tracking rather than textual co-occurrence.

This is not a blueprint for building agentic AI, but a diagnostic for overcoming the current paradigm’s limits. It suggests that the next frontier may lie less in scaling differential models and more in engineering systems that can, in a primitive way, **carve their own bounded particulars**

⁴⁸Goodfellow et al. demonstrated that neural networks do not learn true conceptual boundaries but rather “linear” statistical artifacts, making them vulnerable to imperceptible noise, Ian J Goodfellow et al., “Explaining and Harnessing Adversarial Examples,” *International Conference on Learning Representations*, 2015.

⁴⁹Lake et al. argue that human-like learning requires building causal, model-based representations of objects and physics (“intuitive physics”), rather than just pattern recognition, Brenden M Lake et al., “Building Machines That Learn and Think Like People,” *Behavioral and Brain Sciences* 40 (2017): e253.

⁵⁰Bisk et al. define this as the need for “World Scope 5”: grounding language in the physical, interactive world. Without this, AI is merely manipulating ungrounded tokens, Bisk et al., “Experience Grounds Language.”

⁵¹Brooks’ “subsumption architecture” prioritized this approach, demonstrating that intelligence emerges from the physical interaction of an agent with its environment (“intelligence without representation”), Rodney A Brooks, *Intelligence Without Representation* (MIT press, 1991).

from the world's noise—a capacity every human infant possesses by virtue of its evolutionary inheritance and its constitutive *Hormē*.

The implication for cognitive science is equally profound: by studying how natural intelligence solves the boundary-ground problem from the ground up, we may better understand the architecture of understanding itself.

10 PHILOSOPHICAL PAYOFFS & GRAND UNIFICATION

The explanatory power of the boundary-first model extends beyond cognitive science, offering solutions to classic philosophical problems and achieving a profound theoretical unification. This section demonstrates how the model resolves the problem of universals, the nature of identity, the a priori/synthetic divide, and the fact-value gap, while showing that the same geometric principle operates from metaphysics to morals.

10.1 Solutions to Perennial Philosophical Problems

The boundary-first model does more than explain cognitive development; it provides a new framework for dissolving classic philosophical dilemmas. By recasting foundational issues—such as the nature of universals, identity, knowledge, and value—through the lens of boundary dynamics, we can move beyond stalemated debates. The following analyses demonstrate how this geometric, navigational approach offers clear, naturalistic resolutions to problems that have persisted for millennia.

10.1.1 The Problem of Universals

The ancient debate between realism (universals exist) and nominalism (only particulars exist) is resolved. Universals are not Platonic forms inhabiting a separate realm, nor are they mere names. **A universal is a recognized boundary-pattern**, an invariant set of properties abstracted from multiple encounters with bounded particulars. “Chair-ness” is real—it is the stable, discoverable *Logos* of how certain functional boundaries manifest in the *Archē*—but it exists only as a pattern instantiated in particulars and modeled by minds.⁵²

10.1.2 The Nature of Identity and Individuation

“What makes this thing *this* thing?” The answer is not a mysterious substratum or a bundle of properties, but a **boundary maintained through time**. Identity is boundary-persistence.

⁵²This aligns with Aristotle’s moderate realism, or hylomorphism, where forms are real but exist only *in re* (in things). NPN modernizes this by treating “form” as a stable thermodynamic boundary-strategy, Aristotle, *The Complete Works of Aristotle: The Revised Oxford Translation*, vol. 1, ed. Jonathan Barnes (Princeton University Press, 1984).

The Ship of Theseus puzzle transforms from a metaphysical paradox into a practical question of **boundary maintenance criteria**: at what point does the continuous replacement of parts constitute the drawing of a new boundary? The answer depends on the functional and causal unity of the boundary, not on an essence.⁵³

10.1.3 The “A Priori” / Synthetic Divide

Kant’s distinction between analytic truths (true by definition) and synthetic truths (true by experience) is recast. So-called *a priori* knowledge (e.g., basic logic, moral intuitions) is **synthetic knowledge grounded in the genetic templates of the Somatic logos and Thymos**. The “self-evidence” of non-contradiction or fairness is the result of evolutionary pre-wiring, not transcendental insight. All knowledge is ultimately synthetic and grounded in the navigation of the *Archē*, but some is grounded in the deep, evolved structure of the navigator itself.⁵⁴

10.1.4 The Fact-Value Gap (Is-Ought Problem)

Hume’s observation that one cannot derive an “ought” from an “is” is technically correct for a universe without agents. However, **for any system possessing *Hormē*, the ‘ought’ is directly implied by the ‘is’ (T4)**. The fact that an agent *is* a bounded organization striving to persist implies that it *ought* to act in ways that fulfill that striving. Value emerges naturally from the geometry of boundary maintenance. The gap is closed by recognizing that evaluative statements are functional assessments within a teleonomic system.⁵⁵

10.2 The Phenomenological Bridge: From Intentionality to Boundary Detection

The boundary-first model does not exist in a philosophical vacuum. Its architecture finds a startling and profound precursor in the tradition of **phenomenology**, particularly in the work of its founder, Edmund Husserl (1859–1938). Where the contrast-first model emerged from linguistics and structuralism, phenomenology emerged from a radical, first-person inquiry into the very structure of conscious experience. This section will demonstrate that the boundary-first model **provides the naturalistic, evolutionary, and metaphysical foundation for Husserl’s key insights**, resolving the idealist tensions in his system while validating its core descriptive power.

⁵³Moreno and Mossio define biological identity through “organizational closure”—a system is an individual if it actively maintains a boundary that distinguishes it from its environment, Alvaro Moreno and Matteo Mossio, *Biological Autonomy: A Philosophical and Theoretical Enquiry* (Springer, 2015).

⁵⁴Quine argued that no statement is immune to revision, dissolving the analytic/synthetic distinction. NPN agrees, adding that what appears *a priori* is simply “deeply entrenched” synthetic knowledge from our evolutionary history, Willard Van Orman Quine, “Two Dogmas of Empiricism,” *The Philosophical Review* 60, no. 1 (1951): 20–43.

⁵⁵This argument is fully developed in “Theorem T4,” which demonstrates that epistemic truth and ethical goodness are isomorphic states of navigational alignment. For the complete resolution of the Is-Ought problem via thermodynamic teleonomy, see Eli Adam Deutscher, “Truth and Goodness as Isomorphic Navigation: How T4 Dissolves the Fact/Value Dichotomy,” 2026, https://www.neopreplatonic.com/papers/Value_Truth_T4/.

This convergence from two radically different starting points suggests both traditions are describing the same underlying reality of mind.

10.2.1 Husserl's Project: A Science of Consciousness Itself

Dissatisfied with the psychologism and naturalism of his era, Husserl sought to establish philosophy as a “rigorous science” by turning attention away from the *objects* of consciousness to the *acts* and *structures* of consciousness itself. His method was the **phenomenological reduction** (*epoché*): to “bracket” or set aside questions about the external, independent existence of the world in order to examine phenomena purely as they are given in experience. This was not skepticism, but a methodological move to discover the *a priori* conditions for any possible experience.⁵⁶

From this starting point, Husserl developed a precise vocabulary:

- **Intentionality:** The defining feature of consciousness is that it is always *of* or *about* something. Consciousness is not a static substance but a dynamic, directed activity. As Husserl famously stated, “All consciousness is consciousness of something.”
- **Noesis and Noema:** Every intentional act (*noesis*) has a correlative intentional object (*noema*). The *noema* is not the physical thing “out there” (which is bracketed), but the object precisely *as intended*—the perceived tree *as perceived*, the remembered friend *as remembered*. It is the invariant, ideal structure that makes an object identifiable across multiple, varying conscious acts.
- **Eidetic Reduction:** To discover the essence (*eidos*) of a phenomenon, one imaginatively varies its features in thought to find which properties are necessary and invariant. The essence is what remains when all contingent, empirical details are stripped away.
- **The Lifeworld (*Lebenswelt*):** In his later work, Husserl argued that all scientific and theoretical abstractions are founded upon a pre-given, directly experienced world of meaning—the lifeworld. This is the world of everyday, practical engagement that is always already “there” before reflection.⁵⁷

Husserl's project was breathtaking in its ambition: to map the transcendental structures that constitute the world *for* a conscious subject. Yet it faced a persistent and powerful criticism: by bracketing existence, did phenomenology retreat into a form of **transcendental idealism**, making the world a mere correlate of consciousness? Husserl struggled with this charge, insisting his was not a subjective idealism but a description of the correlation between consciousness

⁵⁶Husserl's *Ideas I* establishes the “transcendental turn,” focusing on the essential structures of consciousness that constitute the world for us, Edmund Husserl, *Ideas Pertaining to a Pure Phenomenology and to a Phenomenological Philosophy: General Introduction to a Pure Phenomenology* (Martinus Nijhoff, 1982).

⁵⁷In *The Crisis*, Husserl warns that objective science has lost its grounding in the pre-theoretical *Lebenswelt*, a critique NPN echoes by prioritizing the *Somatic logos* over abstract differential models, Edmund Husserl, *The Crisis of European Sciences and Transcendental Phenomenology* (Northwestern University Press, 1970).

and world. The boundary-first model resolves this tension by providing the missing naturalistic ground.

10.2.2 The Isomorphic Mapping: From Brackets to Boundaries

The structural parallels between Husserl’s descriptive framework and the boundary-first model are not superficial; they reveal a shared geometric logic of how a finite system engages with reality.

Husserlian Phenomenology (Descriptive Structure)	NPN Boundary-First Model (Explanatory Ground)	Synthesis: The Naturalized Phenomenon
Intentionality (Consciousness as directedness)	Boundary Detection (The <i>Somatic logos</i> carving a figure)	The directedness of consciousness is the teleonomic focus of a navigational system performing its primary operation: isolating a bounded particular for tracking and engagement.
Noesis (Act of Consciousness)	The Cut Operation (¬)	The intentional act is the execution of the boundary-drawing function by the <i>Nous</i> . ⁵⁸
Noema (Object-As-Intended)	Bounded Particular (A) & Pattern (Epistēmē)	The <i>noema</i> is the cognitively constituted model of a boundary. The <i>noema</i> of “Mom” is the stable boundary-pattern (“Mom-ness”) abstracted from multiple encounters with the bounded particular Mom ₁ . It is a high-fidelity cognitive map, not a mental fiction.
Epoché (Bracketing Existence)	Starting with the Cut (Analysis of Constitution)	Both methods begin by analyzing the <i>constitutive operation</i> (how a figure is formed) prior to making metaphysical claims about the figure’s independent reality. The <i>epoché</i> is a methodological focusing on the boundary-drawing process itself.
Eidetic Reduction (Finding Essences)	Pattern Recognition (Discovering Invariant Boundary-Properties)	The phenomenological “essence” is discovered through imaginative variation. The boundary-first “pattern” is discovered through empirical variation across instances. Both converge on the invariant boundary-structure that defines an identity across change.

⁵⁸This aligns with Dible’s phenomenological reading of Spencer-Brown, which identifies the “first distinction” as the primordial act of prima philosophia that creates the boundary between the marked state and the void, Randolph Dible, “First Philosophy and the First Distinction: Ontology and Phenomenology of Laws of Form,” in *Laws of Form: A Fiftieth Anniversary*, ed. Louis H. Kauffman et al. (World Scientific, 2022), https://doi.org/10.1142/9789811247439_0014.

Husserlian Phenomenology (Descriptive Structure)	NPN Boundary-First Model (Explanatory Ground)	Synthesis: The Naturalized Phenomenon
Transcendental Ground (Condition for Experience)	Indeterminate Background (Apeiron)	Husserl correctly identified that experience requires a “ground” or “horizon.” The boundary-first model identifies this as the real, physical Apeiron . ⁵⁹ —the indeterminate complement required by the Zero Principle. The transcendental is not a plane of consciousness but a geometric and ontological necessity for any bounded existence. ⁶⁰
The Lifeworld (Lebenswelt)	The World as Modeled by the Somatic logos	The pre-reflective, meaningful world of daily life is not a cultural construction <i>ex nihilo</i> , but the world as already parsed by our evolved boundary-detection templates (<i>Somatic logos, Thymos</i>) and structured by our accumulated <i>Epistēmē</i> . It is the navigable interface generated by a successful navigator.

10.2.3 The Payoff: Grounding the Transcendental

This mapping reveals that Husserl’s phenomenology was, in essence, a brilliant **descriptive anatomy of the *Nous* in its navigational mode**. He meticulously catalogued the structures of intentional experience—the very structures the boundary-first model explains as functional outputs of a boundary-managing system.

The boundary-first model thus achieves a powerful synthesis:

1. **It Naturalizes the *Noema***: The intentional object is not a ghostly ideal content, but a **functional cognitive model**. Its “givenness” is the result of successful perceptual carving (*Aisthēsis*), pattern abstraction (*Empeiros*), and predictive modeling (*Epistēmē*). The *noema*’s stability is the stability of a well-tested boundary-pattern within the *Logos*.
2. **It Grounds the Transcendental in the Physical**: The “conditions for the possibility of experience” are not mysterious *a priori* structures of a transcendental ego. They are the **evolutionarily acquired capacities of the *Somatic logos*** operating within the **geometric necessity of the *Apeiron***. What phenomenology described as transcendental, NPN explains as evolved and physically necessary.

⁵⁹Dible similarly identifies the “Unmarked State” as the Apeiron or “Infinite Sphere” that serves as the transcendental background for all form, Dible, “First Philosophy and the First Distinction.”

⁶⁰Merleau-Ponty expanded on this, arguing that perception always occurs against a background or horizon, which NPN identifies with the indeterminate background, Maurice Merleau-Ponty, *Phenomenology of Perception* (Routledge & Kegan Paul, 1962).

3. **It Resolves the Idealist Dilemma:** By showing how the structures of consciousness arise from and are aligned with the structures of the *Archē*, the boundary-first model bridges the gap Husserl could not fully close. The correlation between consciousness and world is not a philosophical mystery but a **navigational achievement**. The world we experience (*Lebenswelt*) is a highly functional, species-specific model of the real world (*Archē*), built through the iterative process of boundary detection and model-correction (the Navigator Protocol).

In conclusion, the convergence between phenomenology and the boundary-first model is a landmark discovery. It suggests that Husserl, through sheer descriptive rigor, uncovered the universal “syntax” of conscious experience. The boundary-first model, derived from first principles and cognitive science, provides the “semantics”—it explains *why* experience has that syntax, grounding it in evolution, geometry, and the physics of a navigating agent. This does not diminish phenomenology; it fulfills its project by providing the naturalistic foundation it sought but could not, by its own methodological choice, provide.

10.3 The Grand Unification: A Single Framework from Metaphysics to Morals

The boundary-first model demonstrates that the same fundamental principles operate at every level of reality and cognition:

1. **Metaphysics (The Zero Principle):** Being requires Not-Being. Determinate existence is boundary-against-indeterminate-ground.
2. **Physics & Biology (The Entropic Mandate):** Maintaining any bounded, ordered state (*Being*) requires continuous work (*Hormē*) against dissolution into the indeterminate (*Apeiron*).
3. **Cognitive Science (Concept Formation):** Learning begins with carving bounded particulars from the indeterminate sensory background, guided by evolved templates.
4. **Linguistics (Meaning):** Words refer to discovered boundary-patterns. Language is a shared map of a jointly navigable reality.
5. **Ethics (Value):** “Good” is that which sustains or enhances the boundary-integrity of a striving system; “bad” is that which degrades it.
6. **Epistemology (Truth):** Knowledge (*Epistēmē*) is a high-fidelity model of the boundary-structure of the *Logos*, validated by successful navigation (the Confidence Gradient).

This is not a chain of analogies but a **single, scalable reality**. The boundary maintained by a cell membrane, the cognitive boundary drawn around “Mom,” the social boundary of a fair contract, and the logical boundary of a valid argument are all expressions of the same geometric and dynamic principle: **identity through delimitation, maintained against entropic dispersion**.

10.4 The Navigator’s Return: From Theory to *Praxis*

This unification is not an abstract triumph but a practical one. It returns philosophy to its Socratic purpose: a guide to living well. By understanding the mind as a boundary-managing navigator, the ethical life becomes the life of **skillful boundary stewardship**—of the self, relationships, communities, and ecosystems.

The NPN framework provides the conceptual tools for this task:

- ***Eudaimonia*** is the state of a psyche in *Dikaiosynē*, its internal boundaries harmoniously ordered under the *Logistikon* and aligned with the external *Logos*.⁶¹
- The **Navigator Protocol** is the method for achieving this alignment through iterative model-correction.
- ***Phronēsis*** (practical wisdom) is the cultivated ability to discern which boundaries to draw, maintain, or dissolve in a given situation.

10.5 Conclusion: A New Foundation for the Human Sciences

The boundary-first model offers more than a new theory of concepts. It provides a **new foundation for the sciences of mind and meaning**. By starting with the geometric necessity of the boundary-against-background and tracing its manifestations through evolution, development, language, and society, it achieves a coherence that contrast-first theories cannot.⁶²

It shows that the infant learning “Mom,” the scientist formulating a theory, the artist creating a work, and the citizen debating justice are all engaged in the same fundamental activity: **the navigation of reality through the skilled management of boundaries**. To learn is to carve, to know is to have carved well, and to live well is to carve in alignment with the grain of the real.

The task ahead is not to debate this model within old paradigms, but to explore its rich implications for psychology, linguistics, education, ethics, and beyond—to see how much of the tangled landscape of human thought suddenly comes into clear, simple focus when viewed through the lens of the boundary.

⁶¹This recovers the classical Aristotelian virtue of functional excellence (*aretē*), but grounds it in the modern understanding of biological teleonomics, Alasdair MacIntyre, *After Virtue: A Study in Moral Theory* (University of Notre Dame Press, 1981).

⁶²Wilson calls this “Consilience”—the unity of knowledge—which NPN achieves by threading the single geometric logic of the boundary from physics to metaphysics, Edward O. Wilson, *Consilience: The Unity of Knowledge* (Knopf, 1998).

11 OBJECTIONS & REPLIES

A theory that overturns a century of consensus must withstand rigorous scrutiny. This section anticipates and answers the most substantive objections to the boundary-first model, from the apparent obviousness of contrast-based learning to charges of mysticism, nativism, or cultural insensitivity. The replies not only defend the model but use the objections to further clarify and strengthen its core claims.

11.1 Objection 1: “But We Clearly Do Learn by Contrast!”

The Objection: Everyday experience and much educational practice seem to validate contrast-based learning. We teach “hot” by contrasting it with “cold,” “big” with “small.” Doesn’t this prove contrast is fundamental?

The Reply: This objection conflates the *refinement* of a concept with its *formation*. The boundary-first model fully acknowledges that contrast is a powerful tool for **sharpening category boundaries and clarifying definitions**. However, for contrast to be possible, the contrasted terms must first exist as cognitively bounded entities. A child cannot learn “hot” by contrasting it with “cold” until they have first isolated a “hot” sensation as a distinct, bounded experience from the undifferentiated flux of tactile feeling. Contrast operates on **already-established boundaries**, making them more precise. It is a secondary, albeit crucial, process in learning, not the primary one.

11.2 Objection 2: “What About Relational Concepts Like ‘Between’, ‘Cause’, or ‘Ownership’?”

The Objection: Some concepts seem inherently relational. “Between” isn’t a thing; it’s a spatial relationship between two other things. Doesn’t this require a contrast-first, differential understanding?

The Reply: Relational concepts are indeed central to thought, but they are not exceptions to the boundary-first rule. They represent **boundaries drawn around configurations or processes**. The concept “between” is not learned by contrasting it with “beside” or “under.” It is learned by repeatedly encountering a specific spatial *configuration* (object A - object B - object C in a line) that stands out as a salient perceptual-cognitive pattern—a **relational figure** against the **ground of non-aligned objects**.⁶³ The mind draws a boundary around that relational pattern itself. “Causation” is a boundary drawn around a specific, reliable sequence of events.⁶⁴ These

⁶³Gentner’s structure-mapping theory supports this, showing that relational categories are learned by aligning the structural commonalities (boundaries) between different scenarios, not just by contrasting features, Dedre Gentner, “Structure-Mapping: A Theoretical Framework for Analogy,” *Cognitive Science* 7, no. 2 (1983): 155–70.

⁶⁴Michotte demonstrated that “causality” is perceived directly as a Gestalt-like kinetic structure (a boundary in time), not inferred from statistical regularity, Albert Michotte, *The Perception of Causality* (Basic Books, 1963).

are higher-order boundaries, but they are boundaries nonetheless, discovered through pattern recognition in experience.

11.3 Objection 3: “This Model Seems to Ignore Social and Cultural Construction!”

The Objection: Concepts vary dramatically across cultures. The Inuit have multiple words for snow;⁶⁵ some languages lack color terms for blue. If concepts are discoveries of real boundaries in the world, shouldn't they be universal?

The Reply: The boundary-first model elegantly accounts for both universality and variation. The **cognitive operation** (boundary detection) is universal, grounded in the shared human *Somatic logos*. The **evolutionary templates** (for faces, threats, fairness) are largely universal. However, **which specific boundaries become culturally salient and lexicalized** is shaped by environment, need, and social practice.

- **Universal:** All humans can perceptually distinguish myriad shades.
- **Cultural:** Which shades are grouped under a single named category (“blue”) depends on communicative need and tradition.⁶⁶

The boundary for “snow suitable for building an igloo” is a real, functional distinction in the Inuit environment; it is discovered and labeled because it is navigationally critical. The model is not one of passive discovery but of **active, need-driven carving**. Culture shapes our needs and attentional focus, thereby influencing which of the infinite possible boundaries in the *Logos* we draw and name.

11.4 Objection 4: “Isn't This Just Old-Fashioned Realism or Nativism in Disguise?”

The Objection: Claiming we “discover” boundaries sounds like a return to naive realism or the doctrine of innate ideas.

The Reply: It is a synthesis, transcending that old dichotomy. It is a **heuristic realism**.

- **Against Naive Realism:** The model does not claim we perceive the world “as it is.” Our *Somatic logos* provides a heuristic, species-specific interface. Boundaries are drawn with evolved cognitive tools that emphasize survival-relevant patterns.⁶⁷

⁶⁵This famous example originates with Boas, though its implications for linguistic relativity were popularized by Whorf, Franz Boas, *Handbook of American Indian Languages* (Government Printing Office, 1911), 1; Benjamin Lee Whorf, *Language, Thought, and Reality: Selected Writings of Benjamin Lee Whorf*, ed. John B. Carroll (MIT Press, 1956).

⁶⁶Berlin and Kay's research on color terms confirms this: while the *boundaries* of color terms vary by culture, the *focal points* (the prototypes) are universally determined by human physiology, Brent Berlin and Paul Kay, *Basic Color Terms: Their Universality and Evolution* (University of California Press, 1969).

⁶⁷This aligns with Hoffman's Interface Theory of Perception, which argues evolution shapes our senses to hide objective reality in favor of a user-friendly interface for fitness, Donald Hoffman, *The Case Against Reality: Why Evolution Hid the Truth from Our Eyes* (WW Norton & Company, 2019).

- **Against Blank-Slate Empiricism:** It acknowledges the rich, innate structure of the learning system (the genetic template library).
- **The Synthesis:** We discover real, stable structures in the *Logos*, but we do so through an evolved, finite, pragmatic lens. Our knowledge (*Epistēmē*) is not an absolute mirror of reality but a highly functional, continually tested map. This is the essence of the **Confidence Gradient (C2)**.

11.5 Objection 5: “The ‘Indeterminate Background’ is Mysterious and Unexplanatory.”

The Objection: Positing an “indeterminate ground” feels like explaining one mystery (concept formation) with another (a vague metaphysical notion).

The Reply: The indeterminate background is not a metaphysical posit but a **geometric and cognitive necessity**. Geometrically, a figure is only defined in relation to what it is not. Cognitively, for attention to focus on X, it must not-focus on non-X. The “background” is not a thing but the **necessary complement in the act of distinction**.⁶⁸ It is “indeterminate” not because it is mystical, but because it is defined solely by its not-being-the-figure. Its theoretical role is negative but essential: it explains why a concept’s identity is *intrinsic* (based on its own boundary) rather than *relational* (defined solely by other concepts). We are not adding an entity; we are acknowledging the structure of the distinction operation itself.

11.6 Objection 6: “This is Too Metaphysical for Cognitive Science.”

The Objection: This theory drags in ancient Greek philosophy and abstract principles like the Zero Principle. Shouldn’t a theory of concepts stick to empirical psychology and neuroscience?

The Reply: The metaphysics is not dragged in; it is **already implicit in the phenomena**. Any coherent theory of concepts must make assumptions about identity, difference, and the relationship between mind and world. The boundary-first model makes these assumptions explicit and derives them from a minimal, geometric starting point. This provides a **unifying explanatory framework** that connects disparate empirical findings (from infant object permanence to prototype effects to AI limitations) that otherwise appear unrelated. A good theory should explain *why* the empirical facts are as they are, not just catalog them. The NPN framework provides that deeper “why.”

⁶⁸Merleau-Ponty described this phenomenologically as the “horizon”—the indeterminate background against which every object must appear to be visible at all, Merleau-Ponty, *Phenomenology of Perception*.

11.7 Objection 7: The Problem of Counter-Intuitiveness

The Objection: If the boundary-first model were correct, wouldn't it feel more obvious? The persistent, powerful intuition that we learn by contrast—and the sheer counter-intuitiveness of your claim—suggests that contrast-first thinking is more natural and therefore more likely true.

Reply: The apparent counter-intuitiveness of the model is not a flaw, but a **predictable consequence of the very cognitive architecture it describes**, and thus serves as confirming evidence rather than refutation.

The model makes a specific prediction: any cognitive system operating primarily at **Levels 3-4 (Refinement and Grammatical Combination)** will find a **Level 1-2 (Boundary Detection and Pattern Recognition)** description alien and unintuitive. This is because higher levels of the stack are built upon and obscure their foundations.⁶⁹ We do not consciously experience the raw process of boundary detection; we experience its *outputs*—the already-bounded concepts that populate our thoughts.

The “obviousness” of contrast is analogous to the “obviousness” of a finished building to an architect who never visits the construction site. The architect's expertise lies in refining layouts, choosing materials, and designing facades (Level 3-4 operations). Asking them to focus solely on the pouring of the foundation (Level 1) will feel unnatural and incomplete—they will instinctively want to discuss how the foundation *relates to* the planned structure. This does not mean the foundation is unimportant; it means the architect's professional cognition is oriented toward the superstructure.

Similarly, educated thinkers—linguists, philosophers, cognitive scientists—are experts in the *refinement and relation of concepts*. Their intuition is honed for contrast, definition, and differential analysis. When presented with a theory that locates the primary act at a more foundational level, their trained cognitive systems will instinctively try to **drag the discussion back to the domain of refinement**, asking for clearer definitions, contrasts with existing theories, and integration with higher-level phenomena. This reaction, far from disproving the model, **perfectly illustrates the cognitive dominance of the contrast/refinement mode** in conscious, analytic thought.

The boundary-first model explains why this shift in perspective is difficult: we are attempting to use the tools of conceptual refinement to analyze conceptual formation. It is a **meta-cognitive challenge**—requiring the *Nous* to model its own most primitive, automated operations. The resistance encountered is not a sign of the model's falsehood, but a measure of its depth: it

⁶⁹This is a hallmark of “System 2” processing (conscious, analytic) which has no direct introspective access to the fast, automatic operations of “System 1” (perceptual, heuristic) that provide its inputs, Daniel Kahneman, *Thinking, Fast and Slow* (Farrar, Straus; Giroux, 2011).

requires thinking *about* thinking in a way that our contrast-habituated minds find profoundly unnatural.

Thus, the counter-intuitiveness is evidence *for* the model. It correctly predicts that the primary cognitive act is **pre-reflective, pre-contrast, and phenomenologically inaccessible** to the refined conscious mind, explaining why it has been systematically overlooked by theories built from the analysis of conscious thought and language.

By meeting these objections head-on, the boundary-first model demonstrates its resilience and explanatory depth. It does not dismiss the insights of other approaches but subsumes them into a more foundational and coherent framework, one that begins where learning itself begins: with the first cut, the first boundary, the first “this” emerging from the all-encompassing “not-this.”

12 CONCLUSION

The Boundary as the Atom of Thought

Having traced the boundary-first model from its metaphysical foundations to its practical implications, we now consolidate its central argument and consider its transformative potential. This concluding section reaffirms that the boundary is the fundamental unit of cognition, summarizes the model’s key claims and unifications, and reflects on what it means to see human thought—from infancy to artistry—as the sustained, skillful work of navigation through boundary management.

From the nursery to the laboratory, from a child’s first word to a philosopher’s most abstract reasoning, human cognition reveals itself as a single, sustained act of **boundary work**. This paper has argued that the prevailing contrast-first paradigm—the century-old assumption that we learn what things are by distinguishing them from what they are not—has the sequence of learning precisely backwards. We do not begin by comparing. We begin by **carving**.

The boundary-first model, grounded in the geometric logic of the Zero Principle and substantiated by evidence from developmental psychology, neuroscience, and evolutionary theory, presents a coherent alternative:

1. **Learning begins with the detection of bounded particulars** against an indeterminate background—the primal figure/ground operation.
2. **Concepts form** through the recognition of invariant boundary-patterns across these particulars, often guided by evolved cognitive templates attuned to survival-critical regularities.

3. **Language labels** these discovered boundaries, creating a shared map of a navigable world. Meaning is reference to boundary-patterns, not a position in a web of differences.
4. **Abstraction and creativity** are the meta-cognitive manipulation and novel combination of these boundary-models.

This inversion resolves persistent anomalies: the *a priori* feel of moral intuitions (genetic templates), the prototype structure of categories (boundary-pattern recognition), the fast-mapping of words by infants (labeling pre-existing boundaries), and the grounding problem in AI (the lack of primary boundary detection).

The implications are not confined to theory. They demand a **reconstruction of practice**:

- In **education**, we must teach boundary-detection and pattern-recognition skills before contrast and definition.
- In **linguistics**, we must rebuild theories of meaning on the foundation of grounded reference, not differential relation.
- In **cognitive science and AI**, we must recognize that understanding requires models built from interaction with a world, not just statistical correlation within a dataset.

Ultimately, the boundary-first model achieves a profound unification. It shows that the same principle that governs the metaphysical possibility of existence—that the determinate requires the indeterminate—also governs the operation of the mind that perceives that existence.⁷⁰ To be is to be bounded; to know is to have discovered a boundary; to think is to draw boundaries anew.

The task ahead is not merely to adopt a new theory of concepts, but to see the world—and our place within it—afew. We are not passive observers cataloging differences. We are **navigators**, and our fundamental tool is the boundary. Every act of learning, every moment of understanding, every creative leap is a testament to this most basic, most powerful cognitive operation: the drawing of a line, the making of a distinction, the carving of a figure from the ground of all that is.

With this lens, the entire landscape of human thought comes into clearer, simpler focus. The infant's gaze finding its mother, the scientist's formulation of a law, the artist's stroke on a canvas—all are expressions of the same navigational imperative. The boundary is not just how we learn; it is the **atom of thought**, and from its combinations, the whole universe of human understanding is built.

The boundary-first model invites a simple test: observe an infant encountering a new object. Does the child first compare it to known things, or does the child first isolate it—trace its edges,

⁷⁰This is the ultimate promise of “consilience”—the unity of knowledge across disciplines, achieved here by tracing the single geometric logic of the boundary from physics to metaphysics, Wilson, *Consilience*.

manipulate it, discover its affordances—before any comparison occurs? The answer is in front of us. It always has been. We have simply been looking at the wrong level.

*This paper is part of the larger systematic inquiry developed in *Neo-Pre-Platonic Naturalism* (2025), which derives these core concepts from the fundamental logic of distinction.

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