

From Universal Polarity Ontology to Axiomatic Ontology

Identity, Distinguishability, Interaction, Transformation, Organization, and the Reconstruction of Matter, Life, Mind, and Social Organization

Working paper — exploratory synthesis

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Intended audience

The primary audience for Axiomatic Ontology (AO) should be interdisciplinary scholars and technically literate readers concerned with ontology, philosophy of science, foundations of physics, systems and complexity, language and artificial intelligence, philosophy of mind, and comparative philosophy or theology. The paper should not presume specialist mastery of quantum field theory, formal logic, or theology. Its burden is instead to make conceptual claims explicit enough that specialists in those fields can identify where AO is compatible with, extends, or conflicts with established knowledge.

A secondary audience is builders of formal and computational models who need a disciplined way to distinguish an axiom, a mathematical representation, an inference, an observation, and a metaphysical interpretation. This audience matters because AO is intended not merely as speculative metaphysics, but as an approach in which ontological proposals can be made explicit, modeled, compared, and revised.

This audience choice has an important consequence: AO should neither be presented as a new physical theory nor as a theological doctrine. It is better introduced as an axiomatic framework for ontological inquiry whose models may be tested against knowledge from physics, language, mind, mathematics, and other domains.

Methodological orientation: from Smuts to AO

AO now adopts, provisionally, the direction of inquiry found in Jan Smuts's *Holism and Evolution*: the fundamental concepts used to understand matter, life, and mind should be re-examined as knowledge changes. AO extends that program to social organization and replaces an assumed holistic conclusion with a disciplined comparative investigation. The explicit method is axiomatic systems, reconstruction, and modeling. Mathematical form is implicit in that method rather than a separate defining adjective.

The investigation begins with matter as contemporary knowledge presents it, not with a classical picture of inert substance. AO reconstructs the concepts required by physics and chemistry - identity, distinguishability, state, interaction, field, transformation, symmetry, invariance, composition, organization, system, and emergent properties - and asks which are necessary, which are model-specific, and which require reformulation.

The same procedure is then repeated for life, mind, and social organization. At each domain or Level, AO asks: What structures remain invariant? What functions persist but change form? What categories fail? What genuinely new concepts become necessary? Similar terminology across Levels - for example field, regulation, structure, information, or whole - is not treated as evidence of formal identity until a mapping or model establishes the common structure.

This makes Holism a historical source and a testable comparative hypothesis rather than an axiom. If Smutsian categories such as structure, field, regulation, whole-part reciprocity, and creative transformation recur under formal reconstruction, AO may be accurately described as an elaboration or reconstruction of Holism. If only some survive, AO may be better understood as a successor to Holism. If a substantially different cross-Level architecture emerges, the inquiry must be allowed to name something new.

Abstract

This paper records an exploratory transition from Universal Polarity Ontology (UPO) toward the broader concept of Axiomatic Ontology (AO). Spherical geometry and polarity remain important because they provide an accessible entry point for showing how ontological primitives can be stated axiomatically, represented mathematically, and tested for consequences. The present inquiry, however, suggests that neither spherical geometry nor polarity should be assumed to exhaust the structure under investigation. Across fundamental physics, language, holism, identity, transformation, and historical philosophical approaches, a recurring pattern appears: distinguishable identities participate in constrained relations and transformations; persistent organizations can acquire new identity; and those identities can participate at further Levels. Polarity appears to be one manifestation of distinguishability rather than its sole form. The inquiry also raises the possibility that the non-physical ($\sim P$) and the still-unnamed formative or generative aspect of the framework need not possess a single substance or singular nature. AO therefore avoids assuming a finite, bordered, completed picture of Reality. It treats ontological models as open, revisable constructions and distinguishes ontological limits from epistemological horizons. The paper concludes with a research program for reconstructing the original UPO geometry, formalizing identity and distinguishability, testing the framework across the fundamental interactions and language, and only then revisiting its relationship to human concepts of God.

1. Why rename UPO?

Universal Polarity Ontology began with a powerful and productive commitment: polarity could be represented geometrically and investigated through explicit axioms involving Worlds, Levels, Systems, Origins, and Transformations. The spherical model made philosophical claims mathematically accountable. During the present exploration, however, two terms in the original name became increasingly restrictive.

“Universal” risks asserting a scope that the inquiry has not yet earned. “Polarity” risks promoting one especially useful form of structured distinguishability into the unique primitive of Reality. The proposed name Axiomatic Ontology makes a more modest and more durable commitment: ontology is to be approached through explicit axioms, formal representations, derived consequences, comparison with observation and established theory, and revision.

On this view, UPO is not discarded. It becomes an important early model or family of models within AO: a spherical/polar construction that demonstrates the method and may continue to describe important classes of Worlds.

Working principle: do not put into the axioms what the inquiry is supposed to discover.

2. The methodological role of spheres and polarity

The sphere remains valuable because it is intuitive, constrained, and mathematically tractable. Once an Origin, poles, positions, and transformations are defined on a sphere, consequences follow that cannot simply be adjusted to preserve a preferred philosophical narrative. The sphere therefore serves as a laboratory for axiomatic ontology.

The same is true of polarity. A simple distinction $A \neq B$ establishes distinguishability. A polarity adds more: the distinction between A and B is organized by a relation or common structure. Positive and negative charge are an obvious physical example, but not every distinction is polar. Categorical, graded, multi-valued, compositional, and temporal distinctions are also possible. AO should therefore treat polarity as a particularly informative subtype or manifestation of distinguishability, not as distinguishability itself.

3. Identity before—or with—distinguishability

The number 1 may be more usefully associated with identity than with a vague notion of Unity. Algebraically, 1 is the multiplicative identity: applying it preserves what is acted upon. Conceptually, this invites the proposition that identity concerns what permits something to be treated as itself, including through transformations that preserve relevant invariants.

Yet identity cannot simply be declared first. To identify A appears to require that A be distinguishable from what is not A; distinguishability, in turn, appears to require identifiable relata. This reciprocity cautions against a linear creation story in which Identity produces Distinction, which produces Relation, which produces Transformation. The concepts may be mutually implicating.

A useful provisional notation is therefore not a causal chain but a recurrent structure: $I \leftrightarrow D \leftrightarrow R \leftrightarrow T \leftrightarrow S$, where I denotes identity, D distinguishability, R relation, T transformation, and S a persistent System or organized whole. When S itself becomes a distinguishable identity at another Level, the structure can recur.

4. From wheel to spiral: recurrence without a privileged beginning

The jigsaw-puzzle metaphor proved misleading because a puzzle presupposes a finite set of pieces, a predetermined completed image, an outer border, and an observer capable in principle of seeing the whole from outside. AO has earned none of those assumptions.

A wheel improves the metaphor by removing a privileged starting point. A spiral improves it further by allowing structural recurrence without exact repetition: an organized System at one Level may acquire identity and become a participant in distinctions, relations, and transformations at another Level. The DNA double helix is an evocative analogy because it combines persistence, variation, relational coupling, and generativity, but AO must not infer ontology from biological geometry.

The enduring insight is not that Reality is literally a wheel or helix. It is that an explanatory structure may recur without a first explanatory point, without returning to an identical state, and without requiring a final Level or outer boundary.

5. What fundamental physics contributes

The four fundamental interactions are useful precisely because they resist reduction to one simple metaphor. Electromagnetism provides a clear case of sign-like polarity whose distinctions have relational consequences. The strong interaction emphasizes constrained multi-valued structure, composition, and persistent composite identity rather than simple binary opposition. The weak interaction demonstrates lawful transformation capable of changing identifying particle properties. Gravitation, in general relativity, relates physical content to spacetime geometry so that the structure constraining motion is not merely an independent fixed stage.

Electroweak unification supplies an especially important methodological lesson: phenomena that appear distinct at one descriptive Level can be manifestations of a more unified structure at another. AO should use this as a warning against treating an observed distinction as necessarily fundamental.

Quantum theory adds another caution. Whatever interpretation is ultimately preferred, quantum description makes it difficult to treat the physical world simply as a collection of independently self-defined classical objects. Possible outcomes, relations, symmetries, invariants, and transformations are structurally central. AO should use quantum theory as a constraint and source of questions, not as a license for metaphysical analogy.

6. Language as a non-physical test case

Language may provide one of AO's clearest examples of relational identity outside the straightforwardly physical description. A word is physically instantiated in sound, ink, gesture, digital encoding, neural activity, or machine representation, yet its meaning is not identical to any single physical realization. Meaning depends on distinctions, context, convention, composition, and relations among signs and referents.

The whole can also constrain the interpretation of its parts. "Bank" is underdetermined in isolation; "river bank" changes the operative interpretation. Thus composition is not adequately represented as parts simply adding to a whole. Parts constrain the whole, while the whole constrains the significance of the parts.

Contemporary language models and computational work on compositional representation make this old philosophical problem experimentally and computationally accessible in a new way. They do not settle whether statistical language systems possess human-like understanding, but they demonstrate how much structured linguistic behavior can arise from large systems of learned relational constraints. For AO, that makes language a promising domain for formal investigation of distinguishability, relation, context, composition, and Level.

7. Historical pieces: Smuts, Hegel, Jung, Russell, and others

Several historical thinkers can be treated as contributors of partial structures rather than predecessors whose systems AO must adopt. Russell emphasizes logical distinction, identity, decomposition, and explicit relation; this guards against a holism in which differences disappear. Hegel emphasizes determination through difference and transformation; AO need not import dialectic wholesale to recognize the importance of relational identity and change. Jung provides psychologically rich examples in which opposed or differentiated contents can become formative through their relation.

Smuts is particularly close to the present inquiry. His whole is not a mere aggregate, and his Holism concerns whole-making rather than merely a modern methodological preference to "look at the whole." AO's System and Level may overlap substantially with this insight. The possible difference is that AO is asking what makes identity, distinguishability, relation, transformation, composition, and persistence possible before assuming that the result must be a bounded whole.

Smuts's refusal to accept a simple border between science and philosophy is also methodologically important. AO need not posit separate ontological territories called science, philosophy, and theology. It should instead distinguish kinds and strengths of warrant: observation, formal derivation, theoretical inference, structural interpretation, metaphysical possibility, and theological interpretation.

8. ~P and the unnamed question mark

The present exploration also weakens an assumption that the non-physical (~P) must possess one singular nature. Meaning, relation, number, logical form, organization, normativity, experience, and other proposed non-physical categories need not be made of a common non-physical "substance." ~P may name a heterogeneous domain or supertype whose members participate in a common formal architecture without sharing one material-like essence.

The same caution applies more strongly to the question mark that has appeared throughout this inquiry. We have sometimes placed ? above a sequence, as though an unknown entity generated identity, distinction, relation, and transformation. That diagram may already contain too much metaphysics. The unknown may be a relation, condition, family of structures, recurrent organization, or something for which existing categories are inadequate. It may not possess a distinct or singular nature.

Accordingly, AO should permit question marks between its concepts rather than insisting that the unknown occupy one privileged box. The coherence among identity, distinguishability, relation, transformation, and persistence may itself be the phenomenon requiring explanation.

9. Borders, horizons, and open ontology

AO should explicitly reject the assumption that Reality is a finite picture with a knowable border. A crucial distinction is between an ontological boundary and an epistemological horizon. Reality may or may not possess an outer boundary; AO currently has no basis for deciding. A knower, however, can plainly be limited by its World, Level, embodiment, representational capacities, and methods.

This suggests that distinguishability itself may be relative to World, Level, and observer or system of inquiry. Two things distinguishable at one Level may participate in one identity at another. Conversely, distinctions permitted by Reality may be inaccessible to a particular knower. AO can investigate such horizons without turning them into claims about the ultimate boundary of Reality.

10. AO and concepts of God

The relationship between AO and humanity's concepts of God may ultimately be as important as AO's internal formalism, but it should be approached only after the framework is better constrained. AO should neither identify an unknown generative feature with God nor assume that all God-concepts refer to one singular entity.

Human traditions variously emphasize creation, unity, law, relation, transformation, persistence, meaning, mind, normativity, immanence, transcendence, and that which exceeds predication. AO may eventually provide a neutral formal vocabulary for comparing which aspects of these concepts correspond to structures identified elsewhere in the framework and which require additional predicates such as agency, consciousness, intention, goodness, or moral authority.

The strongest current conclusion is methodological: encountering a formative or recurrent architecture does not license the inference to a personal or intentional God. Conversely, the inability to name or objectify the architecture does not make theological interpretations meaningless. AO's task is to distinguish what is derived, what is observed, what is possible, and what is interpretive.

11. Provisional synthesis

The session's central shift can be stated compactly. UPO began with polarity as a candidate universal primitive. AO now asks a more open question: what are the minimal conditions under which identities can be distinguished, related, transformed, composed, preserved, and re-identified across Levels and Worlds?

A provisional recurring structure is: Identity $\leftrightarrow$ Distinguishability $\leftrightarrow$ Relation $\leftrightarrow$ Transformation $\leftrightarrow$ Persistent Organization $\leftrightarrow$ New Identity. None of these terms should yet be treated as uniquely fundamental, and the arrows should not be assumed to denote temporal or efficient causation. Polarity is one structured form of distinguishability. Spherical geometry is one formal representation. Holism may describe a recurrent consequence of organized composition. Language supplies a rich non-physical case. Fundamental physics supplies constraints

and counterexamples. The framework remains open to structures for which adequate words or mathematics do not yet exist.

AO is therefore best understood at present as an open axiomatic program of ontological inquiry, not a completed ontology of Reality.

12. The inductive reconstruction program

The next substantive program should proceed in the order Matter -> Life -> Mind -> Social Organization. This is an order of investigation, not an assumed reductive hierarchy or causal ladder. Each stage begins from the strongest current knowledge in that domain and reconstructs its fundamental concepts through explicit axiomatic systems and models.

Matter is the first and most constraining test. AO should investigate fundamental fields and interactions, quantum states, symmetry and conservation, spacetime and gravitation, particles, atoms, chemistry, condensed matter, and increasingly organized physical systems. The recent iron/ferromagnetism example illustrates the method: elemental identity is non-polar; the same identity admits distinguishable states; microscopic interactions and collective organization can generate macroscopic polarity; and the emergent polarity then constrains later relations and transformations. Thus polarity can be emergent and subsequently formative without being the first or only form of distinguishability.

Life is then examined with the reconstructed physical categories held open to revision. AO asks whether identity, interaction, organization, field, transformation, and persistence remain sufficient, and whether regulation, self-maintenance, reproduction, inheritance, function, information, adaptation, and evolution require new formal categories or specialized forms of earlier ones.

Mind repeats the test rather than importing biological or physical vocabulary metaphorically. Representation, meaning, reference, experience, intention, self-modeling, valuation, and normativity must be classified as specializations, transformations, or genuinely new structures according to what reconstruction and modeling show.

Social organization provides a further Level at which identities can persist despite replacement of constituents and can constrain the behavior of those constituents. Institutions, languages, legal systems, organizations, markets, and cultures therefore offer demanding tests of System identity, regulation, context, mapping, whole-part reciprocity, and cross-Level persistence.

Only after these reconstructions should AO perform a cross-Level synthesis. The objective is not to force a single vocabulary across domains, but to identify structural invariants, transformed analogues, and genuinely new categories. This cross-Level synthesis is where the relationship between AO and Holism can be evaluated.

13. Next steps

1. Complete the formal UPA -> AO reconstruction already underway, including canonical theorem and axiom versioning, so that historical UPA claims remain distinct from new AO hypotheses.
2. Begin Matter Reconstruction as the first major AO domain study. Build a domain ledger from contemporary physics and chemistry recording candidate identities, distinctions, states, interactions, transformations, fields, invariants, organizations, system-level properties, and Levels.
3. Use explicit models and countermodels to determine which physical categories are universal within the matter domain and which belong only to particular theories or scales. Do not generalize a shared word across Levels without a formal preservation relation.

4. After the matter model stabilizes sufficiently, repeat the reconstruction at Life, Mind, and Social Organization, tracking retained, transformed, rejected, and newly required categories at each transition.

5. Perform a cross-Level synthesis and only then assess whether the resulting architecture is best described as Axiomatic Holism, an elaboration/successor to Smutsian Holism, or a different integrative ontology.

1. Recover the formal UPO baseline. Reconstruct Papers 1–9 and later revisions, separating axioms from metaphors and later interpretations. Record exact definitions of World, Level, System, Polarity, Origin, and Transformation, and identify which results depend specifically on spherical geometry.

2. Create an axiom ledger. For every current AO proposition, classify it as definition, axiom, derived result, empirical constraint, analogy, conjecture, or open question. This will prevent exploratory language from silently becoming ontology.

3. Formalize identity and distinguishability. Test whether identity and distinguishability can be independently axiomatized or are mutually implicating. Explore World-relative and Level-relative distinguishability and the role of invariants in identity through transformation.

4. Generalize beyond polarity. Develop a taxonomy of distinguishability that includes polar, categorical, graded, multi-valued, compositional, temporal, and contextual forms. Determine whether polarity is mathematically a subtype of a more general relation.

5. Test against all fundamental interactions. For strong, weak, electromagnetic, and gravitational phenomena, identify distinctions, allowed relations, transformations, symmetries, invariants, composition rules, and emergent persistent identities. Do not force a common pattern where physics does not support one.

6. Use language as a second formal test domain. Model contextual meaning, compositionality, multiple physical realizations, and whole-to-part constraint. Compare classical structuralist accounts with contemporary computational representations without assuming that linguistic behavior settles questions of understanding.

7. Revisit System, Level, and World. Ask whether a System is best characterized by acquired identity, whether Level describes recurrent re-identification of organized wholes, and whether a World is a coherent domain of possible identities, distinctions, relations, compositions, and transformations.

8. Reconstruct the geometry. Retain the sphere as the first worked AO geometry, then test alternative mathematical structures. Ask whether wheel, spiral, helix, sphere, and polarity are useful projections of different formal structures rather than literal geometries of Reality.

9. Investigate ~P without assuming substance. Specify candidate non-physical types and determine what, if anything, formally unifies them. Give special attention to meaning, relation, mathematical identity, organization, normativity, and representation across physical realizations.

10. Delay naming the unknown. Maintain explicit placeholders where the framework lacks an adequate concept. Avoid prematurely calling the unknown generative, relational, informational, holistic, divine, or any other inherited term until the formal and comparative work warrants it.

11. Undertake the God-concept comparison last. After the AO core is stable enough, compare major God-concepts by the predicates they add: unity, creation, immanence, transcendence, agency, consciousness, intention, normativity, sustaining relation, and ineffability. Distinguish structural correspondence from theological inference.

14. Research discipline

Three disciplines should govern the next phase. First, no metaphor—sphere, puzzle, wheel, spiral, helix, field, network, or whole—should be allowed to become an axiom merely because it is illuminating. Second, no historical thinker should be recruited as authority for AO; each should be used to expose a structure, objection, or

prior formulation that AO must understand. Third, every move from formal structure to physical, psychological, linguistic, or theological interpretation should be marked explicitly.

The goal is discovery rather than retrofitting: existing axioms, mathematical consistency, empirical knowledge, and clear distinctions in epistemic warrant take precedence over preserving any favored interpretation.

Working propositions to carry forward

- Spherical geometry and polarity are foundational examples for AO, not exhaustive claims about Reality.
- Polarity is one manifestation of distinguishability; distinguishability is the broader problem.
- 1 may usefully represent identity, but identity need not mean one bounded entity or one primordial substance.
- Identity and distinguishability may be mutually implicating rather than linearly ordered.
- Persistent organization can acquire identity and thereby participate in new relations and transformations at another Level.
- The recurrence of this structure need not have a privileged starting point, repeat exactly, terminate, or possess an outer border.
- $\sim P$ need not be one substance or even one singular kind of thing.
- The unnamed formative/generative aspect may not be an entity and may not possess a singular nature.
- Epistemological horizons must not be mistaken for ontological boundaries.
- AO should compare concepts of God only after distinguishing structural findings from added predicates such as agency, consciousness, intention, and normativity.
- The explicit AO method is axiomatic systems, reconstruction, and modeling; its mathematical character is implicit in these practices.
- Matter, life, mind, and social organization should be reconstructed sequentially as domains of inquiry, without assuming that later domains reduce to earlier ones.
- Cross-Level recurrence of a word such as field, regulation, structure, or whole does not establish a common formal category; preservation must be demonstrated.
- Holism is presently a historically motivated and testable cross-Level hypothesis, not a foundational AO axiom.

Status

This is a working synthesis of an exploratory session, not a statement of settled AO doctrine. Its purpose is to preserve the discoveries, corrections, and open questions in a form suitable for the next formal phase. Terms such as identity, distinguishability, relation, transformation, generative, non-physical, whole, World, and Level remain subject to reconstruction against the existing UPO papers and subsequent mathematical work.