

Generative Descent and Ontological Recursion: A Formal Model of Creation Dynamics

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Abstract

This paper proposes a formal framework for modeling the dynamics of cosmic generation and epistemic return, abstracted from metaphysical narratives such as the Baha'i seven-stage creation arc, the Indic doctrine of divine dreaming, and the Cognitive-Theoretic Model of the Universe (CTMU). We construct a seven-stage descent-ascent architecture using tools from category theory, type theory, and systems semantics, where each ontological layer is governed by a domain-specific logic and linked via non-invertible transformations. Descent corresponds to asymmetric morphogenetic progression, while ascent involves partial reconstructions mediated by semantic traceability and higher-order abstraction. The resulting model forms a recursive ontological circle: an architecture in which semantic structures cyclically regenerate abstract potential. We compare this model to the CTMU's syntactic metaphysics and the cyclical stratifications of Indic cosmology, situating our framework as a modular and computationally tractable metaphysical engine.

1 Introduction

Classical metaphysical systems have long encoded the dynamics of creation, manifestation, and return within rich symbolic narratives. Among the most structurally coherent are the seven-stage descent found in Baha'i metaphysical literature and the dreaming-based creation arc of Vishnu in the Indic tradition. Both portray reality as an emergent sequence from an ineffable source, shaped by intermediate laws, archetypes, permissions, and constraints, culminating in material or observable existence.

Yet these arcs also describe a reverse movement: a return or ascent from the contingent to the essential, from phenomena to generative principle. This bidirectional flow invites formal interpretation through the lens of abstract systems theory.

This paper formalizes these arcs as a layered, asymmetric, recursively structured system of ontological emergence. We develop a seven-stage generative model, characterize its descent and ascent dynamics, and identify key structural constraints, including domain-specific transformation logics, irreversibility of encoding, and semantic dependency. The result is an ontological circle: a closed architecture linking abstract intention to concrete instantiation and back.

2 Structure of the Paper

The following sections will develop this structure formally, provide diagrammatic analogues, and relate it to existing frameworks in logic, type theory, and systems engineering.

3 Diagrammatic Representation and Structural Properties

The generative system described above can be visualized as a layered flowchart or graph, in which each node corresponds to a stage in the ontological descent, and edges represent directional transformations governed by domain-specific rules. The ascent trajectory overlays this diagram in reverse, following the instantiated pathways while applying epistemic reconstruction operators.

Each stage S_i can be modeled as a category or domain with internal logic \mathcal{L}_i , and the transformation from S_i to S_{i+1} is governed by a morphism or functor F_i that translates structures across logics. The descent is then a composable chain $F_1 \circ F_2 \circ \dots \circ F_6$, while the ascent consists of a diagram-chasing process reconstructing inverse images under structural constraints.

The entire diagram forms an ontological circle, in which the end state at stage seven is not an endpoint but a new input for interpretive recursion. This ensures continuity of meaning, semantically embedding the system within a recursive analytic framework. The coherence of the system depends on:

- **Directional Coherence:** Transformations must preserve abstract invariants while adapting to domain-specific contingencies.
- **Semantic Traceability:** Each instantiated structure must retain metadata sufficient to infer its generative path.
- **Compositional Closure:** The sequence of transformations must form a closed chain under epistemic reconstruction.
- **Constraint Preservation:** Invariants imposed at early stages must be visible or recoverable in later instantiations.

These constraints enable us to model the system as a dynamically realizable ontology, one in which meaning flows bidirectionally while structural integrity is maintained across transformations.

4 Relation to Categorical and Type-Theoretic Frameworks

To formalize the generative system, we invoke analogies from category theory and dependent type theory. Each stage corresponds to an object or category; morphisms between stages preserve structure and encapsulate transformation logics. In a type-theoretic perspective, each stage can be viewed as a context extension, with later stages introducing additional typing constraints or computational realizability conditions.

We interpret the entire generative arc as a functorial system with higher-level coherence conditions. Recursive ascent corresponds to dependent elimination or proof reconstruction across these contexts. Thus, the descent-ascent duality naturally aligns with homotopical models of type theory and the idea of interpretive paths through logical space.

5 Prospects

This model provides a translatable, structurally rigorous approach to ancient cosmogonic arcs, recast in formal systems language. It accommodates both emergence and return, grounding them in layered transformation and epistemic reconstruction. Future work will implement this structure in computational logic, evaluate its use in semantic networks, and extend the model to account for stochastic or branching ontologies.

6 Explicit Functorial Modeling

We now recast the seven-stage generative system in categorical terms to formalize its transformation architecture. Each stage is modeled as an object in a structured category \mathcal{C} , and the transitions between stages are functors $F_i : \mathcal{C}_i \rightarrow \mathcal{C}_{i+1}$ preserving partial structure while altering or compressing domain-specific features.

The descent trajectory can thus be represented as a composition of functors:

$$F = F_6 \circ F_5 \circ \dots \circ F_1$$

mapping from the most abstract stage (generative potential) to the most concrete (semantic instantiation). Each F_i is assumed to be partially faithful but not invertible, reflecting the entropic nature of transformation.

The ascent corresponds not to categorical inverses, which may not exist, but to adjoint-like recovery structures—partial reconstructions encoded via enriched metadata or cohomological inference. In some

cases, ascent can be modeled by right adjoints or derived functors, particularly when interpreting instantiated objects through homotopy or type-theoretic refinement.

Let each \mathcal{C}_i have an internal logic \mathcal{L}_i and a morphism space respecting the syntax and semantics of its level. Then, each functor F_i must preserve key structural invariants (e.g., coherence, consistency, context dependence) across \mathcal{L}_i and \mathcal{L}_{i+1} .

This functorial framing enables us to characterize the system as a layered fibration, where structure descends through morphisms while interpretation ascends through lifted reconstruction paths. The resulting architecture forms a diagrammatically enriched ontology: one governed by directed, structure-preserving, epistemically traceable transformations.

7 Comparison with Other Cosmogonic or Philosophical Models

The generative descent-ascent model developed here shares structural affinities with a range of metaphysical and philosophical frameworks, yet remains distinct in its emphasis on formal coherence, layered transformation, and bidirectional recursion.

First, it echoes Neoplatonic emanation, where being flows outward from the One through successive hypostases—Intellect and Soul—until it reaches the material world. However, unlike the strictly unidirectional flow of Neoplatonism, our model explicitly incorporates a mechanism of ascent, epistemic rather than ontological, through structured reconstruction.

Second, there is overlap with Hegelian dialectics, particularly in the triadic process of thesis, antithesis, and synthesis. Our model captures similar dynamics through transformation and integration across stages, though it avoids teleological closure in favor of cyclic structural re-engagement.

Third, the system resonates with Whitehead’s process philosophy, in which reality is composed of events unfolding from prehensions of prior actual occasions. The descent in our model parallels this unfolding, while the ascent aligns with the interpretive synthesis of past entities into conceptual worlds.

Moreover, there is a functional analogy with computational models of semantic emergence, such as layered abstraction in neural architectures or modular inference in logic programming. These comparisons reinforce the applicability of the generative model beyond cosmogonic allegory, into epistemology, semantics, and systems design.

By situating the model in this comparative context, we affirm its versatility and explanatory reach, while clarifying the technical novelty of its formal recursive structure and transformation logic.

8 Operational or Computational Instantiations

The abstract generative system described herein admits implementation within computational and information-theoretic domains. Each stage of the model corresponds to a distinct computational operation or architectural layer within generative pipelines, semantic modeling, or layered reasoning systems.

In machine learning architectures, for example, the descent from latent generative source to manifest structure parallels the flow from latent space representations to feature decoding and output layers. The ascent mirrors explainability methods, where model outputs are traced back through intermediate transformations to reconstruct underlying decision paths.

In proof assistants and type-theoretic frameworks, the system maps onto the progression from untyped syntax or initial logical declarations, through type constraints and constructive encodings, into fully verified programs or proofs. Ascent corresponds to backward reconstruction of proof terms from conclusions, often utilizing tactics and dependent elimination.

For knowledge graph systems or ontologies, the generative source is the abstract vocabulary or schema; directives correspond to instantiated triples or rules; archetypal encoding appears in taxonomies; modulation and incubation reflect context-aware inference; and semantic embedding is realized through queryable assertions and historical revision tracking.

These correspondences suggest not only the interpretive power of the model, but also its implementability. Each transformation stage can be modeled by a transformation function, schema translation, or logic gate. Such a framework could be instantiated in layered systems like logic programming environments, neural-symbolic integration platforms, or categorical modeling tools for formal epistemology.

9 Diagrammatic Section

To visually express the layered generative architecture, we introduce a diagrammatic representation of the descent and ascent arcs. The descent is modeled as a directed vertical flow from an undifferentiated generative source at the top, through seven discrete transformation layers, down to semantic embedding at the base. Each node represents a transformation stage; each edge encodes a morphism governed by a stage-specific logic.

The ascent is shown as a parallel but upward-flowing arc, overlaying the descent path, emphasizing the recovery of abstract structure through epistemic processes. Importantly, the ascent does not retrace the descent symmetrically; rather, it requires auxiliary inference, abstraction, and reconstructive reasoning at each stage.

Ontological Descent and Ascent Arcs

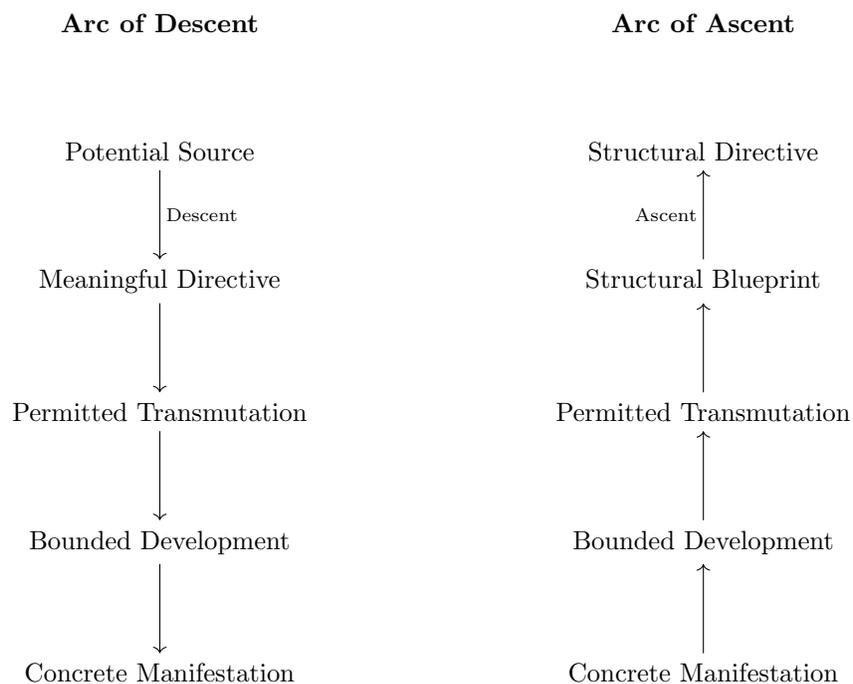


Figure 1: Ontological Circle: Bidirectional Structure of Descent and Ascent

In future versions, this diagram will be formalized using commutative diagrams in category theory, or as labeled graphs representing transformation operators and reconstruction pathways. Additionally, we will model constraint propagation, domain-specific transition rules, and traceable metadata structures as annotations on the diagrammatic edges.

This visual tool is central to understanding the asymmetry, dependency, and recursive nature of the ontological system. It also supports pedagogical clarity and serves as a structural template for application in computational ontology, layered semantics, and formal epistemology.

10 Formal Definition Section

To rigorously ground the model, we now introduce formal definitions for its core components:

Definition 1: Ontological Level. An ontological level is a domain of structural coherence equipped with a transformation logic \mathcal{L}_i , defining permissible constructions and interpretations at stage i .

Definition 2: Structural Trajectory. A structural trajectory is a directed sequence of transformation steps $T = (F_1, F_2, \dots, F_n)$ from source to instantiation, where each $F_i : \mathcal{L}_i \rightarrow \mathcal{L}_{i+1}$ is a partially structure-preserving morphism.

Definition 3: Descent Arc. A descent arc is a compositional chain of structural transformations initiating in generative abstraction and terminating in semantic manifestation. It induces entropy and domain specialization.

Definition 4: Ascent Arc. An ascent arc is a reverse-inferential traversal aiming to recover generative constraints from instantiated structures. It may involve approximate reconstructions, metadata augmentation, or higher-order abstraction.

Definition 5: Semantic Traceability. A transformation is semantically traceable if there exists a mapping from an instantiated object to a prior structural stage, preserving key invariants or identifiers across transitions.

Definition 6: Generative Recursion. A system exhibits generative recursion if instantiated forms re-enter the ontological cycle as input for abstraction, enabling reinterpretation, schema evolution, or epistemic refinement.

These definitions formalize the logic of the descent-ascent architecture and prepare the groundwork for applying this model to both mathematical and computational domains.

11 Comparison with the CTMU

The Cognitive-Theoretic Model of the Universe (CTMU), developed by Christopher Langan, posits a self-configuring, self-processing language (SCSPL) as the foundational substrate of reality. Within this model, the universe is not a passive arena in which laws operate, but an actively self-referential structure where syntax and semantics are intrinsically linked.

Our generative model shares with the CTMU a commitment to closed ontological recursion, where the end of a constructive arc re-enters the generative loop as input for further abstraction. Both frameworks model reality as an information-theoretic structure whose layers encode self-causation, reflexivity, and meaning.

However, the models differ in orientation and implementation. The CTMU centers on metaphysical syntax and the logical consistency of reality as a self-contained language, using teleology and mutual entailment as guiding principles. Our model, in contrast, adopts a layered morphogenetic stance: it emphasizes the structural stratification of emergent levels, each with its own domain logic and transformation rules. Where the CTMU is monistic and tautologically closed, our framework accommodates asymmetric entropy, partial traceability, and epistemic irreversibility.

Additionally, while both models imply bidirectionality (generation and interpretation), the CTMU treats interpretation as intrinsic to the system’s self-modeling syntax. Our model treats ascent as an epistemic process dependent on partial reconstructions and semantic embeddings within higher-order frameworks. This reflects a divergence in how reflexivity and structure are operationalized.

In sum, while the CTMU and the ontological circle both address recursive cosmology, they differ in method and emphasis. The CTMU is an axiomatic-logical synthesis of language and existence; our model offers a modular, stage-wise generative architecture with formal tools from category theory, transformation logic, and systems semantics.

12 Comparison with Hindu Cosmological Methodology and Modern Cosmology

Rahul Pal et al. present a synthesis of traditional Hindu creation narratives—especially the cyclic emergence and dissolution of the cosmos with Brahmā, Prakṛti, and Puruṣa—and modern scientific cosmology, emphasizing their structural parallels and divergences.

The Hindu model emphasizes:

- **Cyclical generation**, where cosmic epochs (kalpas) repeat in vast timescales and instantiations.

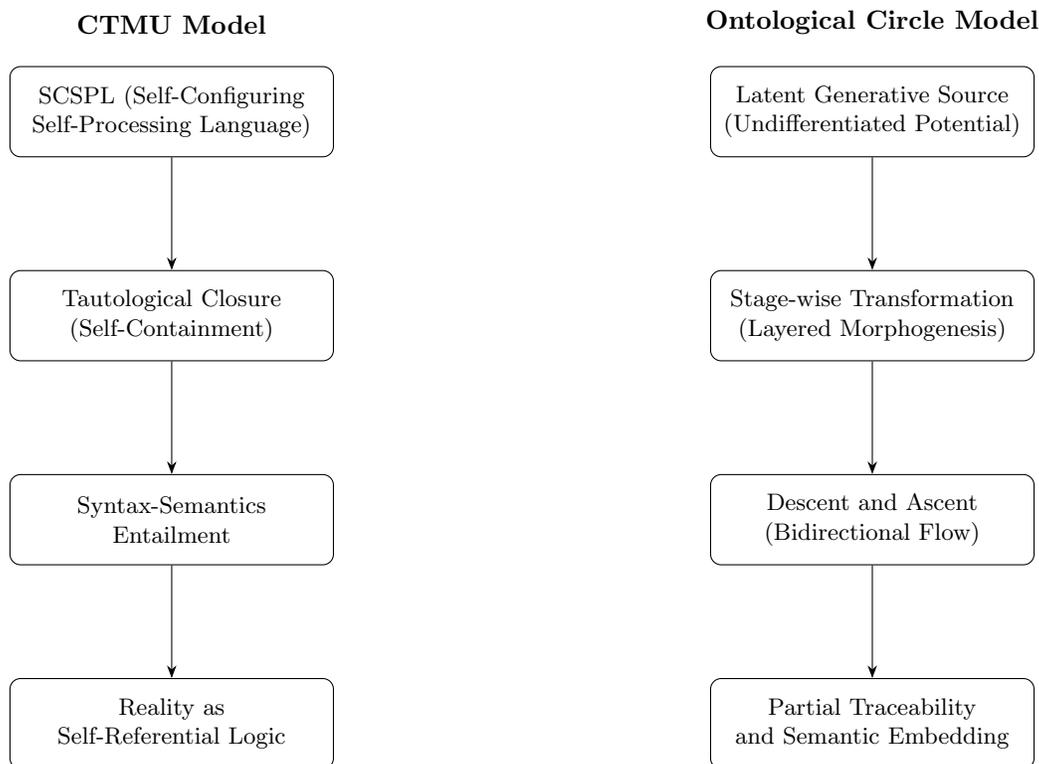


Figure 2: Contrasting the CTMU and Ontological Circle Models

- An interplay between undifferentiated potential (Prakṛti) and consciousness (Purusha), whose interaction gives rise to manifest reality.
- A layered ontology comprising planes, elements, and nested cosmological units (brahmandas, lokas).

Connections with our generative model:

1. Both frameworks begin with an undifferentiated substrate—latent potential in our model vs. Prakṛti or cosmic egg in the Hindu model.
2. Layered manifestation is central: the seven-stage descent parallels epistemological levels from cosmic elements to embodied life.
3. The cyclical nature in Hindu cosmology reflects the possibility of generative recursion—cosmic dissolution reboots the descent process.
4. Conscious presence (Purusha) maps onto our model’s ascent process: it preserves traceable structure enabling epistemic return and reconstruction.

Distinctive features of the Hindu methodology:

- A deeply entrenched **cyclic cosmology** where time and creation are periodic, not linear.
- The model bridges metaphysical and empirical domains, integrating astronomical chronology with mythic time.
- Ontological taxonomies (lokas, elemental tattvas) are highly granular, mapping hierarchical relations within the manifest domain.

Contrast with modern scientific cosmology:

- Scientific cosmology posits a singular origin (Big Bang), contrasting with repeated Kalpa cycles.
- While physics models emergent structure through laws and fields, Hindu methodology embeds a reciprocal interplay between potential and consciousness.
- The scientific view lacks Purusha-like intentionality or a mechanism for epistemic ascent.

In summary, the Hindu cosmological methodology shares with our generative model the concepts of latent potential, layered transformation, and structural embedding. Its emphasis on periodic rebirth enriches our model's recursion principle, and its Purusha-Prakṛti dynamic complements the epistemic ascent we formalize. Integrating these nuances could yield a more robust and culturally pluralistic account of cosmic emergence and return.

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