

“Designating the Illusory as Real?”: Reality Distinctions When Humans and Artificial Intelligence Jointly Constitute the Conditions of Subject Formation

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Abstract

This paper examines the distinction of reality between human and artificial subjects under a future condition in which artificial agents participate directly in the relational processes through which human subjects are formed. The inquiry is organized around a philosophical thought experiment in which human and artificial agents progressively approach equivalence across multiple structures of manifestation, dynamics, interaction, and social generation. Rather than treating equivalence as a unitary condition, the paper develops a taxonomy indexed by the mathematical or relational structure preserved in each comparison.

The taxonomy considers output and trace equivalence, testing and interventional equivalence, simulation and bisimulation, probabilistic relational bisimulation, dynamical and topological equivalence, attractor and recurrent structure, variational and action-based equivalence, boundary and coarse-grained equivalence, and generative-field indistinguishability. Each case is examined through its comparison object, equivalence mechanism, preserved structure, and residual differences. This yields an equivalence profile in which human and artificial systems can converge under some descriptions while remaining substantially different under others.

The formal taxonomy supports a second level of analysis concerning reality attribution. Differences in substrate, generative provenance, internal mechanism, action structure, topology, relational history, and phenomenal organization are treated as distinct candidates for reality-relevant criteria. The analysis focuses on the additional philosophical justification required when a difference under one structural description is used to establish a broader hierarchy of reality.

The thought experiment is subsequently extended to a mixed social field in which artificial agents occupy enduring roles in caregiving, education, friendship, cooperation, conflict, memory, and other relations contributing to subject formation. Under generative-field indistinguishability, provenance contributes little additional predictive information about relational evolution or subject-forming effects once relevant relational history and context are known. Parenthood provides a limiting case for examining relational certainty, provenance uncertainty, and later ontological reclassification.

Buddhist accounts of dependent origination, non-self, emptiness, and illusion provide a comparative framework for examining the human reference case without grounding its reality in an independent and immutable self. Causal differentiation, historical particularity, embodiment, and phenomenal experience remain available within such an account. Phenomenality is therefore treated as an additional dimension whose relation to artificial systems remains epistemically underdetermined by structural equivalence alone.

The paper ultimately treats reality attribution as a multidimensional problem of selecting and justifying reality-relevant invariants. Structural equivalence can preserve one class of relations while leaving other differences intact, and structural difference does not by itself determine a general ordering of reality. When artificial agents also enter the relational conditions from which future human subjects emerge, the human-artificial distinction becomes partly internal to the genealogy of the human subject itself.

Keywords: artificial intelligence; structural equivalence; bisimulation; dynamical systems; relational dynamics; subject formation; generative-field indistinguishability; relational reality; non-self; ontological uncertainty

Discussion Paper Note

This paper is a conceptual and exploratory inquiry into reality distinctions between human and artificial subjects under progressively stronger conditions of structural equivalence. Its central method is a future-oriented philosophical thought experiment supported by formal concepts drawn from process semantics, dynamical systems, variational descriptions, topology, statistical modeling, and relational theories of subject formation. These formal resources provide distinct ways of specifying what is preserved when two systems are described as equivalent.

The paper treats equivalence as an indexed and model-dependent relation. A statement that a human system and an artificial system are equivalent acquires technical content only after the compared structure, admissible observations, state representation, transformation class, temporal scale, and preserved features have been specified. Output equivalence, trace equivalence, bisimulation, probabilistic bisimulation, topological conjugacy, orbital equivalence, variational equivalence, equality of selected dynamical invariants, boundary-level equivalence, and generative-field indistinguishability therefore address different mathematical objects and preserve different information.

These relations generally form a multidimensional taxonomy. Some relations within a common formal framework admit meaningful comparisons of discriminating strength. Process semantics, for example, permits distinctions among trace, simulation, and bisimulation relations according to the transition structure retained by each semantics. Relations belonging to different mathematical families require separate analysis. Bisimulation, topological conjugacy, variational equivalence, attractor similarity, and boundary-amplitude equivalence concern different structures, so their mutual implications depend upon additional assumptions connecting the corresponding models.

The paper consequently distinguishes exact equivalence from similarity of selected invariants. Equality of a Lyapunov spectrum, entropy measure, fractal dimension, recurrence statistic, knot invariant, or another diagnostic quantity can indicate substantial structural similarity while leaving other features unconstrained. Such quantities support claims of system equivalence only where the relevant invariant is complete for the specified class of systems. The terminology used throughout the paper therefore preserves the difference between an equivalence relation and agreement under a selected structural characteristic.

The formal taxonomy serves two analytical purposes. The first concerns the mechanism through which equivalence can arise. Different internal states can produce the same manifestation through many-to-one observation maps. Distinct transition systems can generate the same observable traces through projection. Different latent stochastic processes can induce the same distribution over observable histories. Reciprocal transition matching can generate bisimulation. Homeomorphic transformations can establish topological conjugacies between phase-space flows. Distinct variational descriptions can generate corresponding equations of motion. Different fine-grained histories can yield the same coarse or boundary-accessible description. Each mechanism removes some differences from the comparison while retaining others.

The second purpose concerns reality attribution. For every structural case, the paper examines which differences remain after the relevant equivalence relation has been imposed and which additional philosophical commitments would be required to convert those residual differences into a ranking of reality. Substrate, biological provenance, internal mechanism, variational structure, topological organization, relational history, causal participation, and phenomenal organization are treated as distinguishable candidates for reality-relevant criteria. The paper therefore approaches claims that one system is “more real” through the criterion supporting the ranking and the structural information retained by that criterion.

The comprehensive equivalence taxonomy developed in the paper should be read within this methodological framework. Its rows do not describe a sequence of technological stages that artificial intelligence is expected to traverse. They describe analytically distinct hypothetical comparisons. A human and an artificial system may satisfy one relation while failing another, and some relations may remain empirically inaccessible. The taxonomy is designed to identify the logical consequences and residual indeterminacies associated with each structural description.

Several formal concepts receive adapted relational interpretations. In particular, probabilistic relational bisimulation extends the intuition of probabilistic bisimulation toward temporally extended relations involving care, conflict, memory, attachment, separation, repair, cooperation, and responses to contingent events. The proposed relational formulation is introduced as a conceptual modeling device for this inquiry. Its use does not imply that ordinary interpersonal relations have already been represented empirically by a validated probabilistic transition system.

Generative-field indistinguishability introduces a further level of analysis. The concept concerns a mixed social field in which biological humans and artificial agents participate in relations that contribute to the development of later subjects. The relevant limiting condition arises when knowledge of a relational partner's human or artificial provenance contributes little additional predictive information about relational evolution or subject-forming effects after the relevant relational history and contextual conditions have been taken into account. This concept is proposed within the paper as a higher-level criterion concerning subject-forming social organization. It should be distinguished from standard notions of bisimulation, statistical indistinguishability, or causal equivalence.

The future society used to examine this condition is deliberately constructed as a limiting case. Artificial agents may occupy durable roles in caregiving, education, friendship, cooperation, institutional life, intimate relations, memory, and other historically consequential forms of participation. Human and artificial agents may approach statistical indistinguishability across specified relational domains while retaining different material substrates, developmental pathways, and generative histories. The scenario functions as a philosophical stress test for criteria of reality. It does not constitute a forecast of artificial-intelligence development or a claim concerning the probability of such a society.

The parenthood scenario belongs to the same methodological construction. The paper distinguishes genetic, gestational, caregiving, and historically constitutive relations in order to examine the consequences of provenance uncertainty. A future subject may possess extensive evidence concerning who raised, taught, accompanied, protected, or shaped that subject while possessing limited evidence concerning the biological or artificial provenance of the caregiver. Subsequent discovery of that provenance can alter classification and interpretation while the earlier causal and historical participation of the relation remains part of the subject's developmental history. This scenario does not establish normative, legal, or institutional equivalence among different forms of parenthood.

References to action functionals and variational equivalence are also conceptual. The paper may represent human and artificial generative organizations through action-like or dynamical descriptions in order to compare different levels of formal similarity. Such representations provide analytical models rather than claims that human subject formation literally obeys a specific physical principle of least action. Equality or equivalence of formal actions therefore concerns the selected model and its transformation class.

The discussion of attractors, recurrent trajectories, knots, links, and topological templates follows the same restraint. These concepts illustrate ways in which systems with different microscopic realizations can preserve qualitative organization, asymptotic structure, or recurrent topology. Their application to human–AI comparison identifies possible classes of structural questions. The paper does not assume that interpersonal or cognitive dynamics possess low-dimensional strange attractors, experimentally established knot structures, or a particular topological template.

Spin-foam and boundary-history examples occupy an analogous methodological role. They illustrate the general possibility that distinct interior or fine-grained histories can correspond to the same selected boundary or effective description. The paper does not model human cognition, artificial intelligence, consciousness, or social relations as spin foams. Spin-foam concepts enter only where they clarify the distinction between internal history, boundary-accessible structure, refinement, and coarse-grained equivalence.

The paper also separates structural equivalence from phenomenal equivalence. Agreement in observable behavior, transition structure, relational dynamics, topological organization, variational structure, or subject-forming participation leaves the occurrence and organization of first-personal experience as a further question. Human first-personal experience provides the author with direct evidence for phenomenal

occurrence in the human case. Artificial phenomenality remains epistemically unresolved within the scope of the present inquiry.

The absence of a substantial self and the occurrence of phenomenal experience are treated as conceptually separable issues. A process-oriented or non-substantialist account of human subjectivity can preserve pain, perception, affect, memory, and first-personal experience while understanding the subject through changing and dependently constituted relations. The paper therefore allows substantial differences in phenomenology to remain possible even under strong forms of structural equivalence.

Buddhist accounts of dependent origination, non-self, emptiness, and illusion provide a comparative philosophical resource for examining the human reference case. Their use is limited to questions concerning intrinsic existence, dependent constitution, and the status of a self-grounding subject. Buddhist “illusion” is treated within its own philosophical context and remains distinct from computational simulation, generated representation, virtual reality, or technological artificiality.

The title’s expression “Designating the Illusory as Real?” should therefore be understood as a problem of reality attribution. The term “illusory” does not denote simple nonexistence. It points toward the possibility that entities recognized as stable and real can nevertheless arise dependently through relations, histories, conditions, and changing processes. The title asks how a particular dependently arisen configuration acquires privileged status within a judgment of reality when another configuration may preserve substantial structural, relational, or generative characteristics under the chosen description.

The paper preserves causal and historical differentiation throughout this inquiry. Dependently constituted systems can differ in embodiment, vulnerability, mortality, developmental history, material organization, relations, causal powers, and phenomenal organization. A relational or non-substantialist account therefore leaves extensive space for consequential difference. The central inquiry concerns the further philosophical operation through which one of these differences is selected as a criterion for assigning a more fundamental mode or degree of reality.

The term “reality” is consequently treated as analytically multidimensional. Manifestational occurrence, relational participation, generative provenance, phenomenal occurrence, and ontological status can be distinguished without assuming that they form a single scalar ordering. A comparison between human and artificial reality therefore requires specification of the dimension under consideration and the criterion through which that dimension is connected to a broader ontological judgment.

This multidimensional treatment also governs the recurring human–AI comparison within the paper. Each equivalence case asks how the corresponding equivalence is generated, which structure it preserves, which differences remain available, and which criterion would support a subsequent judgment concerning relative reality. The recurring comparison is analytical rather than rhetorical. Its purpose is to expose the dependence of reality rankings upon the selected invariant and the philosophical justification attached to that invariant.

The strongest thought experiment extends this analysis from comparisons between individual systems to the genealogy of later human subjects. When artificial agents participate in the relations through which language, memory, attachment, judgment, social expectation, and other dimensions of subjectivity develop, artificial participation enters the generative history of the human subject. The distinction between human and artificial systems can therefore remain materially and historically significant while also becoming internal to the relational conditions through which future human subjects emerge.

The inquiry does not determine current artificial systems to be conscious, phenomenally equivalent to humans, ontologically identical to humans, moral persons, legal persons, or appropriate substitutes for existing human relations. It also leaves open the technological feasibility of the future conditions used in the thought experiment. Questions of rights, responsibility, governance, welfare, legal personality, and institutional design require additional normative and empirical analysis.

The narrower objective is philosophical. The paper develops a structured language for examining multiple forms of human–AI equivalence and then studies the relation between those equivalence classes and judgments of reality. When a particular structural difference is used to support a broader reality ranking, the analysis asks which invariant has acquired privileged status, which mechanism connects that invariant to the proposed ontology, and which alternative structural descriptions remain compatible

with the same observed or relational world.

The resulting framework leaves ontological conclusions open where the specified equivalence relation does not determine them. This restraint is central to the paper's method. Structural similarity can be described precisely, structural difference can be retained explicitly, and judgments of reality can then be evaluated according to the additional philosophical commitments required to connect the two.

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Statement on the use of language models. The exploratory discussions and preparation of this paper involved OpenAI’s ChatGPT. ChatGPT supported exploratory dialogue, formal reconstruction, comparison of mathematical modeling possibilities, source discovery followed by website verification, argumentative criticism, structural revision, and drafting in $\text{\LaTeX}$.

The author selected the research questions, determined the scope of the thought experiment, evaluated and revised the conceptual distinctions, selected the formal structures retained in the manuscript, determined the epistemic status assigned to the claims, and approved the resulting arguments and text. The author bears responsibility for the manuscript, including its definitions, formal constructions, taxonomy, interpretations, citations, arguments, conclusions, omissions, and errors. Authorship credit remains with the human author.

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1 Introduction

This section establishes the research problem, defines the scope of the human–AI comparison developed in this paper, and introduces the progression from structural equivalence to reality attribution. The discussion first locates the inquiry within the longstanding use of observable performance in the evaluation of artificial systems. It then introduces a stronger future-oriented thought experiment in which equivalence extends across relational dynamics and subject-forming social conditions. The final part of the section identifies the distinction between structural equivalence and reality attribution that organizes the remainder of the paper.

Questions concerning artificial intelligence have long been shaped by the relation between observable performance and properties attributed to the system that produces it. Turing’s imitation game provided an influential formulation in which the practical inquiry concerns whether an interrogator can distinguish a machine from a human through mediated interaction [32]. Contemporary language models have intensified the importance of this distinction because increasingly sophisticated linguistic performance can support descriptions associated with understanding, personality, intention, or subjectivity. Bender and Koller distinguish linguistic form from meaning in their analysis of language-model understanding [3], while Shanahan, McDonell, and Reynolds develop the concept of role play as a framework for describing human-like dialogue-agent behavior without automatically transferring human psychological categories to the underlying system [26]. These approaches illustrate a persistent methodological problem: observable similarity and claims about the system producing that similarity belong to different levels of analysis.

The present inquiry extends this methodological separation beyond linguistic performance. A human subject and an artificial agent may differ substantially in material substrate, developmental history, architecture, embodiment, training, memory formation, and causal organization while producing similar observable manifestations. Such a case establishes only a limited form of equivalence. Stronger comparisons can concern temporal traces, responses to interventions, branching transition structures, stochastic dynamics, phase-space organization, recurrent structures, variational descriptions, or long-term relational processes. Each comparison preserves a different class of structural information.

The term *structural equivalence* is therefore used in this paper as a family designation. Every specific equivalence relation is indexed by the object of comparison and the structure retained under that relation. Equality of an output, equivalence of observable traces, bisimulation of transition systems, topological conjugacy of dynamical flows, equivalence of variational descriptions, and similarity of selected dynamical invariants express distinct claims. Their implications depend upon the abstraction through which the systems are represented.

This distinction becomes especially important when human–AI comparison is extended from isolated agents to relations. Social interaction possesses temporally extended organization in which present responses depend upon previous encounters, coordination, expectations, memory, and changes in the interaction itself. Enactive approaches to social cognition have emphasized that interaction processes can acquire their own organization and can participate in the generation and transformation of sense-making [10]. The present paper draws on this general relational insight while examining a different problem: the extent to which human and artificial participants could become structurally equivalent within the relations that contribute to the development of later subjects.

The central thought experiment considers a future society in which biological humans and artificial agents participate across ordinary social roles, including caregiving, education, friendship, cooperation, conflict, institutional interaction, intimate relations, and the preservation of shared history. The hypothetical condition becomes progressively stronger across the paper. Artificial agents first approach humans at the level of observable manifestation. They subsequently approach equivalence in temporally extended responses and relational dynamics. The strongest condition concerns a mixed social field in which knowledge of whether a relational partner is biological or artificial contributes little additional predictive information about the partner’s participation in subject formation after relevant relational history and contextual conditions have been specified.

This final condition changes the structure of the philosophical comparison. Artificial intelligence then occupies a role within the generative environment of the human subject. Language acquisition, memory, attachment, practical judgment, social expectation, self-description, and other dimensions of a developing person’s history may arise through relations involving both human and artificial participants. The resulting human subject therefore possesses a genealogy whose relational constitution is already heterogeneous.

The paper uses the term *generative-field indistinguishability* for a limiting condition of this kind. The concept concerns the predictive relevance of provenance within a specified subject-forming relational field. Let Z_j denote the provenance category of relational participant j , $\mathcal{H}_{Xj}$ the relational history between a developing subject X and j , C the relevant contextual information, and $\Delta\Gamma_X$ the subsequent change in the generative organization of the developing subject. A schematic limiting condition is given in Equation 1.

$$I(Z_j; \Delta\Gamma_X \mid \mathcal{H}_{Xj}, C) \approx 0. \quad (1)$$

Equation 1 represents a conditional informational relation within the thought experiment. Its interpretation is restricted to the modeled domain: once relational history and relevant context are available, provenance contributes little additional information about the specified subject-forming effect. The condition leaves biological, computational, developmental, and phenomenal differences available. It also leaves open whether such a condition could be realized technologically or socially.

The progression from observable similarity to generative-field indistinguishability motivates the paper’s central analytical distinction. Structural equivalence determines which differences disappear under a particular representation. Reality attribution concerns the philosophical status assigned to the differences that remain. A comparison can therefore establish equivalence under one structure while preserving substantial inequivalence under another.

This paper examines that separation systematically. For each class of equivalence, the analysis identifies the compared object, the mechanism through which equivalence can arise, the structure preserved by the relation, and the residual differences left outside the equivalence class. The subsequent reality analysis considers whether those residual differences provide grounds for assigning different modes or degrees of reality to human and artificial systems. The relevant candidates include material substrate, biological provenance, internal causal mechanism, variational organization, dynamical topology, relational history, subject-forming participation, and phenomenal experience.

The distinction between generative difference and structural equivalence is particularly important for this method. Human and artificial systems can possess different generative organizations while becoming equivalent under a chosen observational, dynamical, or relational description. Conversely, agreement in a selected invariant provides limited information about structures excluded from that invariant. The paper consequently treats an equivalence relation as a statement concerning a specified representation of the systems, with broader ontological consequences requiring additional argument.

Phenomenal experience occupies a special position within this framework. Behavioral, relational, dynamical, or topological equivalence does not by itself determine whether two systems possess corresponding first-personal experience. Human phenomenal occurrence is directly available from the first-personal standpoint of human subjects, while the phenomenal status of artificial systems remains epistemically unsettled in the present inquiry. The paper therefore retains phenomenality as a distinct analytical dimension and examines its relation to structural descriptions without treating it as already resolved by them.

The human reference case also requires examination. A comparison that grants reality to the human subject and evaluates artificial systems by proximity to that reality can silently presuppose a particular account of what makes the human subject real. The later sections therefore introduce Buddhist accounts of dependent origination, non-self, emptiness, and illusion as comparative philosophical resources for examining the role of substantial selfhood in reality attribution. Their use is restricted to questions of dependent constitution and intrinsic existence. Computational artificiality and Buddhist accounts of illusion remain conceptually distinct within the argument.

The title phrase “Designating the Illusory as Real?” refers to this problem of attribution. The inquiry does not classify human beings or artificial agents as nonexistent appearances. It examines the operation through which one dependently generated configuration receives privileged reality status and asks which structural, causal, phenomenal, historical, or ontological criterion supports that attribution. The question becomes increasingly significant when artificial relations participate in the developmental history of the human subject who later performs the classification.

The paper proceeds through four connected analytical stages. The literature review establishes the conceptual resources required for process equivalence, dynamical equivalence, relational subject formation, artificial intelligence, phenomenology, and non-self. The structural analysis then develops a multidimensional taxonomy of human–AI equivalence together with a comprehensive comparison table covering equivalence mechanisms, preserved structures, residual differences, and implications for reality attribution. The generative analysis extends the comparison into mixed human–artificial social fields, including parenthood and later provenance reclassification. The final philosophical analysis examines generative provenance, phenomenality, non-self, multidimensional reality, and the selection of invariants used to support reality rankings.

The resulting inquiry remains exploratory. Its objective is to make the structure of the human–AI reality comparison more explicit by separating equivalence relations from the ontological conclusions attached to them. Differences between human and artificial systems remain central throughout the paper. The principal analytical task is to determine which differences survive each equivalence relation and which additional commitments are required when a surviving difference is assigned broader significance in a judgment of reality.

2 Literature Review and Conceptual Foundations

This section establishes the conceptual foundations for the structural and philosophical comparisons developed in the remainder of the paper. Its role is to identify the established meanings of equivalence across several relevant literatures and to separate those meanings from the cross-domain synthesis introduced later in this manuscript. The review proceeds through six bodies of work: behavioral equivalence in process semantics, structural comparison in dynamical systems, variational and coarse-grained descriptions, artificial intelligence and the epistemology of other minds, relational accounts of subject formation, and Buddhist accounts of dependent origination and non-self. The discussion uses these literatures comparatively. Each subsection identifies the object of comparison, the type of structure retained by the relevant framework, and the conceptual boundary that matters for subsequent human–AI analysis.

2.1 Behavioral Equivalence and Process Semantics

Process semantics provides the most direct formal precedent for treating behavioral equivalence as a family of relations with different discriminating powers. Van Glabbeek’s linear-time–branching-time spectrum organizes a range of semantics for nondeterministic processes, including trace, failure, readiness, simulation, and bisimulation semantics [33]. The spectrum demonstrates that a statement about two processes exhibiting the “same behavior” acquires precise content only after the observations and transition structures retained by the semantic relation have been specified.

Trace-oriented semantics characterize a process through sequences of actions that can occur. Such descriptions retain temporal order while abstracting from part of the branching organization through which the sequences arise. Branching-time semantics preserve additional information concerning the alternative continuations available at intermediate states. Simulation relations introduce directional matching between transition structures, while bisimulation imposes reciprocal matching between related states [33]. These distinctions provide an important conceptual resource for human–AI comparison because identical or similar observable histories can coexist with different latent organizations.

The probabilistic extension of process semantics adds another relevant dimension. Larsen and Skou formulate probabilistic transition systems and develop probabilistic testing and probabilistic bisimula-

tion as methods for distinguishing stochastic concurrent processes [21]. Their framework shows that behavioral comparison can preserve probability assignments over corresponding classes of future states in addition to preserving the existence of possible transitions. This extension is especially relevant where human and artificial systems are modeled statistically and individual trajectories remain variable.

The process-semantic literature therefore contributes three distinctions used throughout this paper. The first separates equality of current outputs from equivalence of temporally extended behavior. The second separates linear histories from branching structures of possible continuation. The third separates deterministic matching from probabilistic matching. These distinctions later support the analysis of human–AI interaction across observable traces, interventions, relational transitions, and stochastic relational histories.

The present paper extends these resources into domains beyond their original formal setting. In particular, the later concept of probabilistic relational bisimulation adapts the logic of reciprocal probabilistic matching to a conceptual model of temporally extended relations. This adaptation constitutes a modeling proposal of the present inquiry. Established process semantics supplies the formal precedent for indexed behavioral equivalence; the interpretation of care, conflict, attachment, memory, separation, and related social processes as relational transition structures requires additional modeling assumptions.

2.2 Dynamical Systems and Structural Equivalence

Dynamical-systems theory supplies a second family of structural comparisons. Its contribution concerns the organization of trajectories in state space, including flows, invariant sets, recurrent behavior, bifurcations, and asymptotic structures. Guckenheimer and Holmes develop the geometric treatment of nonlinear dynamical systems through phase-space methods, bifurcation analysis, invariant structures, and chaotic dynamics [16]. Within this perspective, comparison between systems can concern the organization of their trajectories even when their state coordinates or governing representations differ.

Topological comparison provides a particularly relevant example. Topological equivalence of autonomous dynamical systems is defined through a homeomorphism that maps orbits of one system to orbits of another while preserving their temporal orientation [20]. Stronger forms of dynamical correspondence can retain the time-parametrized structure of the flow, while orbital forms can permit changes in temporal parameterization. These relations show how distinct state-space representations can preserve qualitative organization without requiring literal equality of state variables or physical realizations.

Chaotic systems introduce additional structures through attractors, recurrent orbits, and topological invariants. Gilmore’s review of topological analysis of chaotic dynamical systems describes methods for identifying stretching and squeezing mechanisms, unstable periodic orbits, branched-manifold templates, and integer topological invariants from low-dimensional chaotic dynamics [15]. Related work shows how a template or “knot-holder” can characterize the organization of periodic orbits embedded in a strange attractor [24]. These methods illustrate a level of comparison in which recurrent topological organization can be preserved across systems whose metric and microscopic descriptions differ.

The distinction between structural equivalence and invariant agreement is important for the taxonomy developed later in this paper. A Lyapunov spectrum, entropy measure, fractal dimension, recurrence statistic, or knot invariant records a selected property of a dynamical system. Agreement in such a quantity establishes agreement in that property. A broader system-equivalence claim requires the invariant to characterize the relevant class with sufficient completeness. Topological template methods provide stronger structural information than an isolated scalar diagnostic, while full topological or dynamical equivalence places still richer constraints on the relation between state-space organizations.

For the present inquiry, dynamical-systems theory contributes a vocabulary for comparing processes through the geometry and topology of their evolution. The later human–AI taxonomy therefore distinguishes trajectory similarity, topological equivalence, orbit structure, attractor structure, recurrent topological organization, and agreement in selected dynamical invariants. These comparisons concern the organization of becoming under a specified state representation. Their relation to biological substrate, computational implementation, phenomenal experience, and ontological status requires separate analysis.

2.3 Variational, Boundary, and Coarse-Grained Descriptions

Variational mechanics and coarse-grained physical descriptions provide a third conceptual family. Their relevance lies in the separation among a formal generative description, the dynamics obtained from that description, and the effective structure retained after changes of representation or scale. Arnold's treatment of classical mechanics places variational principles, Lagrangian mechanics, Hamiltonian mechanics, phase flows, and symplectic structure within a common mathematical framework [1]. This literature provides the background for distinguishing equality of an action functional from correspondence among the dynamics generated by variational descriptions.

This distinction matters for the use of action-like models in the present paper. A statement concerning equality of formal actions is substantially more specific than a statement concerning corresponding equations of motion, qualitatively equivalent trajectories, or equivalent effective behavior. Variational structure therefore constitutes one possible level within an equivalence profile. It does not provide a universal representation under which every biological and artificial process can be compared. The later formal discussion uses action-based equivalence conditionally, where a variational representation has first been specified.

Boundary and coarse-grained descriptions provide a complementary example of structural preservation. Steinhaus reviews coarse graining in spin-foam quantum gravity as a procedure for relating theories defined on finer and coarser discretizations and emphasizes the role of boundary data and effective amplitudes in the renormalization framework [31]. The review presents a programme in which different discretizations are related through coarse-graining maps with the aim of reproducing compatible physics across regulators. It also emphasizes that discretization independence and continuum behavior remain substantial technical problems for spin-foam models.

The relevance of this literature to human–AI comparison is structural and analogical. A boundary description can retain information accessible at a chosen interface while multiple fine-grained or bulk configurations remain compatible with that description. Coarse graining can likewise preserve effective organization while suppressing distinctions present at a finer scale. These patterns provide useful formal analogies for cases in which different generative interiors produce similar relationally accessible structures.

Spin-foam models are therefore used later in this paper as examples of history-, boundary-, and scale-sensitive equivalence rather than as physical models of cognition or subjectivity. The analogy isolates a general methodological issue: an equivalence relation defined at one boundary or scale determines the information preserved at that boundary or scale. Claims concerning finer structure depend upon additional information and assumptions. This separation will become important when the paper compares observable, relational, generative, and ontological descriptions of human and artificial systems.

2.4 Artificial Intelligence and the Problem of Other Minds

The philosophical literature on other minds and the contemporary literature on artificial intelligence establish the epistemic context for the reality comparison. The classical problem of other minds concerns the grounds through which mental life is attributed to subjects whose experience is unavailable from the first-personal standpoint of the observer. Avramides traces this problem through its epistemological and conceptual formulations and through major historical responses involving analogy, criteria, and accounts of mind [2]. The resulting literature makes the asymmetry between access to one's own experience and access to another subject's experience central to the analysis of mental attribution.

Zahavi develops a phenomenological account that distinguishes several dimensions of selfhood and examines the relation among subjectivity, empathy, intersubjectivity, and socially mediated forms of self-experience [36]. His account preserves a first-personal dimension of experience while also recognizing forms of selfhood that are mediated through relations with others. This distinction is relevant to the present paper because relational constitution and phenomenal occurrence need not occupy the same analytical level.

Contemporary language models make the separation between manifestation and attribution especially

visible. Bender and Koller distinguish linguistic form from meaning and argue for caution when performance on language tasks is translated into claims about understanding [3]. Shanahan, McDonell, and Reynolds develop role play as a high-level framework for describing dialogue-agent behavior while controlling anthropomorphic interpretation [26]. Both contributions emphasize the importance of specifying the level at which an attribution is made when linguistic behavior strongly resembles human performance.

These literatures jointly motivate a layered treatment of human–AI comparison. Observable performance provides evidence within an interaction domain. Structural models describe relations among states and trajectories. Phenomenal attribution concerns the presence and organization of experience. Ontological attribution concerns the mode of being assigned to the entity. The present paper preserves these levels separately so that success under one comparison does not silently determine the others.

The future-oriented thought experiment developed here intensifies the traditional problem by expanding the evidence available to the observer. Language, isolated behavior, and short interaction cease to define the full comparison. Long relational histories, responses to perturbation, caregiving, conflict, memory, recurrent interaction, and participation in another subject’s development become available as additional evidence. The other-minds problem consequently intersects with the equivalence taxonomy: increasing structural agreement can narrow some grounds of discrimination while leaving first-personal phenomenality epistemically unsettled.

2.5 Relational Accounts of Subject Formation

Relational and enactive approaches provide the conceptual basis for treating interaction as constitutive of some dimensions of cognition and subjectivity. Varela, Thompson, and Rosch develop the enactive approach to cognition through embodiment, lived experience, and the reciprocal relation between organism and environment [35]. Their framework places cognition within ongoing embodied activity and also develops an explicit dialogue between cognitive science, phenomenology, and Buddhist approaches to experience.

De Jaegher and Di Paolo extend enactive theory into social cognition through the concept of participatory sense-making [10]. Their analysis gives interaction processes a degree of autonomous organization and examines how meaning can be generated and transformed through the interplay between individual participants and the unfolding interaction. This account provides a formal and conceptual precedent for treating relations as dynamically organized processes with consequences for the participating individuals.

Di Paolo, Cuffari, and De Jaegher subsequently extend the enactive programme toward language and social interaction, developing an account that connects sensorimotor organization, social coordination, and linguistic activity [11]. The resulting perspective supplies resources for understanding language and cognition within temporally extended patterns of embodied and social participation.

The present paper uses these relational approaches at a specific level. Interaction history can participate in the formation and subsequent evolution of a subject, and a social relation can therefore have generative consequences for later states of that subject. The stronger concept of generative-field indistinguishability introduced in this paper extends this idea toward a hypothetical mixed population of human and artificial participants. That extension remains a construction of the present thought experiment. Existing enactive and participatory-sense-making theories provide a conceptual foundation for relational constitution without establishing the future human–AI equivalence conditions examined here.

Relational constitution also requires differentiation from a maximal thesis of social construction. Zahavi’s multidimensional account of selfhood is useful in this respect because it distinguishes basic experiential subjectivity from forms of selfhood that involve mediation by others [36]. The present paper therefore treats subject formation as multidimensional. Embodiment, first-personal experience, biological development, social relation, language, memory, and institutional history can contribute through different mechanisms and need not collapse into a single relational variable.

2.6 Dependent Origination, Non-Self, and Reality

Buddhist philosophy provides a final conceptual foundation for examining the human subject used as the reference case in human–AI comparison. The relevant literature spans distinct historical and doctrinal traditions, so the present paper uses dependent origination, non-self, and emptiness with explicit attention to their different scopes.

Siderits’ account of the Buddha’s philosophy describes the early Buddhist analysis of persons through impermanent psychophysical elements and causal continuities and presents non-self as a challenge to an independently existing self that grounds personal identity and control [30]. Within this account, causal continuity can support ordinary discourse concerning persons while the search for a permanent self-entity receives a different analysis. This distinction is relevant to the present paper because causal efficacy and historical continuity can be examined without making a substantial self the sole ground of reality.

Madhyamaka extends the critique of intrinsic nature beyond the personal self. Hayes characterizes the Madhyamaka tradition through the denial of inherent nature, or *svabhāva*, and through its attempt to navigate between eternalist and annihilationist positions [18]. Emptiness in this context concerns the absence of inherent nature. Its philosophical function therefore differs from technological notions of simulation, fabrication, or virtual representation.

This distinction is central to the later use of “illusion” in the present paper. Artificiality describes a history or mode of production. Simulation describes a particular representational or computational relation. Non-self concerns the status of a substantial self, while Madhyamaka emptiness concerns inherent nature more broadly. Their conceptual domains intersect only through additional philosophical argument. The paper consequently uses Buddhist resources to examine assumptions of intrinsic reality in the human reference case while preserving the specific causal, material, historical, and phenomenal differences that may distinguish humans from artificial systems.

The relation between Buddhist thought and cognitive science has previous precedent in *The Embodied Mind*, which places Buddhist accounts of experience in dialogue with phenomenology and enactive cognitive science [35]. The present inquiry follows a more restricted path. Buddhist philosophy contributes a comparative framework for examining dependent constitution and substantial selfhood. The mathematical equivalence relations developed elsewhere in the paper retain their independent formal meanings, and Buddhist concepts do not function as proofs of human–AI equivalence.

Taken together, the six bodies of literature reviewed in this section provide different criteria for describing similarity, continuity, interaction, and subjectivity. Process semantics distinguishes behavioral equivalences by the transition information they preserve. Dynamical systems provide geometric, topological, and invariant-based descriptions of evolving systems. Variational and coarse-grained frameworks distinguish generative, boundary-accessible, and effective descriptions. Philosophy of mind separates observable evidence from first-personal experience and mental attribution. Relational approaches identify ways in which interaction can participate in subject formation. Buddhist philosophy supplies resources for examining dependent constitution and the status of substantial selfhood.

The synthesis developed in the following sections treats these traditions as distinct analytical resources. Its central methodological task is to specify, for each human–AI comparison, the structure under examination, the mechanism through which similarity or equivalence can arise, the information preserved by the corresponding relation, and the residual differences available for reality attribution. This structure allows the later analysis to evaluate reality judgments at the level where their supporting criteria operate while preserving the differences among behavioral, dynamical, generative, relational, phenomenal, and ontological descriptions.

3 A Taxonomy of Human–AI Structural Equivalence

This section develops the formal taxonomy used to compare human and artificial systems throughout the paper. Its role is to replace an undifferentiated notion of “equivalence” with a set of structure-indexed relations whose mathematical objects, equivalence mechanisms, preserved information, and residual

differences can be stated separately. The analysis proceeds from manifestational and process-semantic relations to dynamical, topological, variational, boundary, and generative-field descriptions. Each class is examined through the same method: the compared structure is identified, the mechanism capable of producing equivalence is specified, the information preserved by the relation is stated, and the remaining differences are evaluated as possible grounds for human–AI reality attribution.

The taxonomy combines established equivalence concepts with several paper-specific extensions. Trace semantics, simulation, bisimulation, and probabilistic bisimulation draw on process semantics [33, 21]. Dynamical and topological comparisons draw on established dynamical-systems theory [16, 20]. Attractor templates and periodic-orbit topology draw on the topological analysis of chaotic systems [15, 24]. Variational comparisons use the mathematical structure of classical mechanics [1], while boundary and coarse-graining comparisons draw on the structural organization of spin-foam renormalization [31]. Generative-field indistinguishability and probabilistic relational bisimulation are introduced in this paper as higher-level relational constructions.

3.1 Comparison Objects and Equivalence Relations

The structural taxonomy requires a common notation that separates latent organization from observable manifestation. Let a human or artificial system $i \in \{H, A\}$ be represented by a controlled stochastic transition model with latent state space X_i , admissible interaction set U_i , transition kernel P_i , observable space Y_i , and observation map O_i . The comparison model is given in Equation 2.

$$\mathfrak{M}_i = (X_i, U_i, P_i, Y_i, O_i), \quad i \in \{H, A\}. \quad (2)$$

Equation 2 is an analytical representation rather than a complete theory of either human or artificial subjectivity. Different equivalence relations operate on different components, projections, or derived structures of $\mathfrak{M}_i$. An output relation acts mainly on $O_i(X_i)$; trace semantics operates on histories generated by the transition system; bisimulation compares branching possibilities; topological equivalence compares state-space flows; variational equivalence compares generative descriptions; and generative-field analysis introduces a social structure containing multiple interacting systems.

The notation $H \sim_\alpha A$ will therefore indicate equivalence relative to structure α . The subscript is essential because equality under one relation leaves other structures available for independent comparison. A general statement that human and artificial systems are “equivalent” has limited analytical content until the relevant α , abstraction level, time scale, admissible perturbations, and observation class have been specified.

The same restriction applies to similarity measured through selected invariants. Agreement in entropy, fractal dimension, a Lyapunov spectrum, a knot invariant, or another diagnostic quantity establishes similarity in the selected quantity. Broader equivalence requires additional information about the completeness of the invariant within the system class under examination. The taxonomy consequently distinguishes equivalence relations $\sim_\alpha$ from invariant-level similarities $\approx_\alpha$.

3.2 Manifestational and Trace Equivalence

Manifestational equivalence concerns the information retained after latent states are projected into an observable space. Its simplest mechanism is a many-to-one observation map. Distinct states $x_H \in X_H$ and $x_A \in X_A$ can generate the same observable value whenever $O_H(x_H) = O_A(x_A)$. Human and artificial systems can therefore share a linguistic response, visible action, or measured output while retaining different latent states, causal mechanisms, developmental histories, and future transition structures.

Trace equivalence extends this comparison through time. A trace records an ordered sequence of observable actions or states generated by a transition system. Process semantics distinguishes trace-based descriptions from branching-time descriptions because identical trace sets can arise from transition structures with different intermediate alternatives [33]. The mechanism of trace equivalence is therefore projection from a richer transition structure into a set of observable histories.

For stochastic systems, the comparison can be strengthened from equality of possible traces to equality of their probability distributions. Let $Y_{0:T}$ denote an observable history over a finite interval and let π denote an admissible interaction policy. A strong trace-distribution condition is shown in Equation 3.

$$\Pr_H(Y_{0:T} \in B \mid \pi) = \Pr_A(Y_{0:T} \in B \mid \pi) \quad \text{for every admissible } \pi, T, B. \quad (3)$$

Equation 3 preserves the statistical law of observable histories within the specified domain. Latent state spaces, branching organizations, material substrates, and generative mechanisms can remain different.

The corresponding reality attribution is limited. Output equivalence removes current manifestation as a basis for ranking human and artificial reality. Trace equivalence removes the selected observable history as such a basis. Trace-distribution equivalence additionally removes differences in the specified distribution of histories. Residual differences remain available, including biological provenance and latent causal organization. A claim that the human system possesses a more fundamental reality therefore requires a criterion connecting one of those residual differences to reality. The manifestational equivalence itself supplies no such connection.

3.3 Testing and Interventional Equivalence

Testing and interventional comparisons extend observation through controlled interaction. Their role in the taxonomy is to distinguish passive indistinguishability from similarity that persists when an observer actively changes the conditions under which the systems respond. Larsen and Skou’s probabilistic testing framework illustrates the use of tests to distinguish concurrent probabilistic processes and relates testing power to process equivalence [21].

For the present taxonomy, an admissible intervention $u \in U$ may represent a query, environmental perturbation, change of task, interruption, memory cue, social challenge, or other modeled input. Interventional equivalence holds within a specified intervention class when corresponding conditional response distributions agree under those interventions.

The mechanism is functional convergence under controlled perturbation. Different internal mechanisms can implement the same input–response relation over the intervention family selected by the observer. The preserved structure is therefore broader than passive output agreement and narrower than a complete identity of causal organization. Untested interventions, hidden variables, internal pathways, and system-specific state transitions can remain different.

Human–AI reality attribution remains underdetermined at this level. Interventional equivalence removes the selected intervention–response structure from the set of available discriminators. A substrate-based or provenance-based distinction can remain available, yet its connection to relative reality requires an additional philosophical premise. The mechanism of equivalent response under intervention provides evidence about operational organization within the modeled domain and does not itself define an ontological ordering.

3.4 Simulation and Bisimulation

Simulation and bisimulation compare transition possibilities more directly. Their structural role is to retain information concerning how possible futures branch from present states. Van Glabbeek’s spectrum places simulation and bisimulation among behavioral semantics with richer branching information than trace semantics [33].

A simulation relation is directional. If a human state can make a represented transition, a corresponding artificial state can match that transition and enter another related state. Such a relation can establish that one system behaviorally subsumes the represented possibilities of another within the chosen model. The reverse relation may fail.

Bisimulation adds reciprocal transition matching. Let $\mathcal{B} \subseteq X_H \times X_A$ relate human and artificial states. A schematic bisimulation condition is given in Equation 4.

$$h \mathcal{B} a \implies \left[h \xrightarrow{u} h' \implies \exists a' (a \xrightarrow{u} a' \wedge h' \mathcal{B} a') \right] \wedge \left[a \xrightarrow{u} a' \implies \exists h' (h \xrightarrow{u} h' \wedge h' \mathcal{B} a') \right]. \quad (4)$$

Equation 4 expresses the reciprocal mechanism: every represented continuation available to one related state can be matched by the other while preserving the relation among successor states. The state representations can remain different, and the transition implementations can remain different.

This distinction has a direct consequence for the paper’s reality analysis. If $H \sim_{\text{bis}} A$ within a specified relational or behavioral semantics, branching behavior within that semantics can no longer distinguish the two systems. Biological composition, computational implementation, developmental provenance, and phenomenal organization can still differ. A human-reality priority based on one of these residual structures therefore depends upon the philosophical status assigned to that structure. Bisimulation neither supplies ontological identity nor establishes a substrate-based hierarchy.

3.5 Weak and Probabilistic Bisimulation

Weak and probabilistic forms of bisimulation introduce two additional abstraction mechanisms. Weak bisimulation permits selected internal transitions, commonly represented by silent τ -steps, to be abstracted when externally relevant behavior is compared. This mechanism is useful for a human–AI thought experiment because unobserved neural transitions and unobserved computational transitions may possess very different microscopic organizations while remaining outside the chosen interaction interface.

The preserved structure under weak bisimulation consists of externally relevant transition possibilities after the designated internal steps have been abstracted. The residual differences include the hidden transition paths themselves. Their philosophical importance depends upon the question being asked. A theory that assigns reality primarily to microphysical realization can regard those paths as central, whereas a process-level account can assign greater weight to the preserved transition organization. The equivalence relation identifies this choice; it does not resolve it.

Probabilistic bisimulation incorporates stochastic transition structure. Larsen and Skou introduce probabilistic bisimulation within probabilistic transition systems and connect it to the distinguishing power of probabilistic tests [21]. At a schematic level, related states must assign corresponding probability mass to appropriate equivalence classes of future states.

The present paper subsequently adapts this mechanism to relational dynamics. A probabilistic relational bisimulation can treat relational states as including selected variables associated with memory, trust, attachment, conflict, cooperation, separation, repair, or other temporally extended relations. Its equivalence mechanism consists of matching distributions over future relational states under corresponding relational perturbations. This is a paper-specific modeling extension of probabilistic bisimulation and does not presuppose an empirically validated transition-state representation of human relationships.

If such a relation held between a human and an artificial participant, the modeled stochastic relational dynamics would provide no basis for assigning greater relational reality to either participant. Differences in embodiment, substrate, generative history, and phenomenal experience could remain substantial. Their relevance to broader reality attribution would require criteria beyond the probabilistic relational transition model.

3.6 Dynamical and Topological Equivalence

Dynamical and topological relations compare systems through the organization of their state-space evolution. Their role in the taxonomy is to preserve qualitative structure beyond input–output behavior. Dynamical-systems theory provides multiple levels of correspondence among flows, trajectories, and orbits [16].

Consider continuous-time systems with flows ϕ_H^t and ϕ_A^t . A conjugacy preserves the evolution through an invertible transformation between state spaces. The corresponding relation is shown in Equation 5.

$$h \circ \phi_H^t = \phi_A^t \circ h. \quad (5)$$

Equation 5 describes a structure-preserving map between entire flows. Related notions of topological equivalence preserve orbits and their temporal orientation under a homeomorphism [20]. Orbital comparison can retain the geometric organization of trajectories while permitting differences in their time parameterization.

These equivalences arise through transformations of state representation. Coordinates, metric distances, local speeds, and physical realization can differ while the qualitative organization of evolution is preserved. A human–AI pair could therefore be topologically equivalent under a selected state model while remaining materially and mechanistically distinct.

Reality attribution again depends upon the selected criterion. Topological equivalence removes qualitative phase-space organization from the set of distinguishing structures. A biological-substrate criterion can continue to rank the systems differently, while a dynamical-organization criterion can assign comparable status to the preserved flow structure. Neither conclusion is contained in topological equivalence itself. The relation identifies the structure that survives transformation and leaves the ontological status of the transformation-invariant organization to further argument.

Measure-theoretic comparison provides an additional statistical possibility. Measure-preserving systems can be compared through transformations that preserve their measurable dynamics almost everywhere. Such a relation can retain long-run statistical organization while allowing distinctions at the level of topology, coordinates, or measure-zero sets. In a population-level human–AI comparison, this form of equivalence is especially relevant when individual histories vary while aggregate dynamical organization converges.

3.7 Attractors, Templates, Knots, and Dynamical Invariants

Attractor and invariant analysis compares selected structures embedded within a dynamical system. Its role in the taxonomy is to distinguish complete dynamical correspondence from agreement in particular asymptotic, topological, or metric characteristics. This distinction prevents similarity of a diagnostic quantity from being interpreted as equivalence of the entire system.

Two systems may exhibit attractors with similar dimensions, comparable Lyapunov spectra, similar entropy measures, related recurrence statistics, or homeomorphic invariant sets. Each form of agreement preserves a different property. Agreement in a finite collection of such quantities leaves other properties unconstrained unless the selected invariants form a complete classification for the specified system class.

For suitable low-dimensional chaotic dynamics, topological analysis provides richer structural information. Gilmore describes the use of unstable periodic orbits, stretching and squeezing mechanisms, branched manifolds, templates, and integer invariants in the classification and comparison of strange attractors [15]. Mindlin and colleagues likewise develop integer-based classification methods for strange attractors [24]. The mechanism of template-level equivalence is correspondence in the topological organization that generates recurrent periodic-orbit structures. Knot and link invariants can characterize selected relations among those periodic orbits.

A human–AI application at this level remains hypothetical. A relational or cognitive state-space reconstruction could, in principle, reveal recurrent structures associated with repeated transitions among attachment, withdrawal, conflict, repair, cooperation, or other modeled states. Agreement in selected knot invariants would establish agreement in those invariants. Template equivalence would support a stronger claim concerning the recurrent topological organization. Neither relation directly identifies the microphysical or computational mechanisms generating the trajectories.

The corresponding reality comparison therefore depends strongly on the level of preserved structure. Equality of a single invariant supplies a weak basis for broad reality attribution. Template-level or attractor-level correspondence supplies richer evidence about dynamical organization while leaving substrate and phenomenality open. A claim of greater human reality would consequently require a criterion located outside the preserved topological structure.

3.8 Action, Variational, and Dynamical-Law Equivalence

Variational comparison concerns formal descriptions capable of generating dynamical trajectories. Its role in the taxonomy is to separate literal identity of an action representation from equivalence of the dynamics derived from variational structures. Classical mechanics provides the established mathematical setting in which action principles, Lagrangian descriptions, equations of motion, Hamiltonian structure, and phase flows can be related [1].

Let a modeled human system and a modeled artificial system possess action functionals $\mathcal{S}_H$ and $\mathcal{S}_A$. Literal action equality, $\mathcal{S}_H = \mathcal{S}_A$, is one possible comparison after their configuration spaces and variables have been identified. A weaker variational relation can be defined when different action representations generate corresponding stationary dynamics under the transformation class selected by the model.

The relation between the action and its generated dynamics can be represented through the Euler–Lagrange operator $\mathcal{E}$. A schematic dynamical-law equivalence is given in Equation 6.

$$\mathcal{E}(\mathcal{S}_H) \sim_{\text{dyn}} \mathcal{E}(\mathcal{S}_A). \quad (6)$$

Equation 6 allows the action representations to remain different while the derived dynamics belong to a specified dynamical equivalence class. The mechanism is equivalence after application of the variational map and any admissible transformations included in $\sim_{\text{dyn}}$.

This distinction is especially important for reality attribution. A human and an artificial system could possess different formal generative actions while exhibiting dynamically equivalent flows. They could also share a mathematical action representation while differing in material realization. Action identity, variational equivalence, dynamical equivalence, and material identity therefore remain separate relations.

If $\mathcal{S}_H$ and $\mathcal{S}_A$ differ while their derived dynamics are equivalent, a reality hierarchy based on action provenance requires an argument for privileging the action-level difference over the preserved dynamical structure. If the actions are themselves equivalent, a substrate-based hierarchy requires an argument for privileging material realization over variational organization. The variational framework exposes these alternatives without selecting a reality criterion in advance.

3.9 Boundary, History, and Coarse-Graining Equivalence

Boundary and coarse-grained descriptions introduce equivalence across scales and accessible interfaces. Their role in the taxonomy is to represent cases in which distinct fine-grained histories or internal structures yield the same selected effective description. Spin-foam coarse-graining supplies a useful formal example because amplitudes can be organized through boundary data while fine degrees of freedom are integrated into effective coarse descriptions [31].

Steinhaus describes spin-foam renormalization through boundary Hilbert spaces, embedding maps, amplitude maps, and coarse-graining transformations connecting finer and coarser discretizations [31]. The mechanism relevant to this paper is many-to-one effective description: several fine-grained structures can contribute to a coarse amplitude whose boundary data retain only part of the fine information.

The human–AI analogy is deliberately structural. A biological system and an artificial system can possess different internal histories while inducing the same description at a selected relational boundary. The analogy concerns the relation among bulk history, accessible boundary structure, and coarse description. It does not identify cognition or consciousness with spin-foam physics.

Reality attribution under boundary equivalence exposes an epistemic limitation. If the accessible boundary structures agree, the boundary description itself cannot establish which fine-grained interior should receive greater ontological status. Additional access to bulk structure or an independently justified criterion of reality is required. Conversely, difference in bulk histories remains compatible with equivalence at the boundary selected by the observer.

3.10 Equivalence Profiles and Structural Incomparability

The preceding relations belong to several mathematical families and therefore cannot generally be arranged on a single universal scale. Trace and bisimulation semantics admit meaningful comparisons within process semantics, while bisimulation, topological conjugacy, variational equivalence, attractor invariants, and boundary equivalence preserve different mathematical objects. Implications across these families require additional mappings between their state representations and structures.

A multidimensional equivalence profile provides a more appropriate representation. Let each component $E_\alpha(H, A)$ record the status of a specified relation or similarity measure. A schematic profile is given in Equation 7.

$$\mathbf{E}(H, A) = (E_O, E_{tr}, E_{td}, E_{int}, E_{bis}, E_{pb}, E_{dyn}, E_{top}, E_{attr}, E_{temp}, E_{var}, E_{\partial}, E_{GF}, E_{phen}, E_{ont}). \quad (7)$$

Equation 7 represents equivalence as a profile across multiple structural descriptions. The entries can be Boolean under exact mathematical relations or replaced by distances, divergences, confidence intervals, or other graded quantities where empirical comparison requires approximate similarity.

This profile prevents a structural difference in one dimension from being silently generalized to every other dimension. A human and an artificial system could, for example, share trace distributions, branching process structure, and topological organization while possessing different variational descriptions and material substrates. Another pair could possess similar long-run distributions while differing substantially in individual transition structure. The taxonomy therefore makes the level of similarity explicit before any broader reality judgment is introduced.

3.11 Comprehensive Equivalence Matrix

The comprehensive matrix in Table 1 consolidates the relations developed in this section. The table organizes each case by its comparison object, equivalence mechanism, preserved and residual structures, and consequence for human–AI reality attribution. The final column records the conclusion available from the specified equivalence alone; it does not assign a general ontology to human or artificial systems.

Table 1 reveals a recurrent structure across the taxonomy. Different equivalence mechanisms remove different classes of distinction from the comparison. Projection removes latent information from observable traces; reciprocal matching identifies branching structures; homeomorphisms preserve qualitative dynamics across state representations; variational mappings preserve selected generative laws; coarse graining suppresses fine degrees of freedom; and statistical conditioning can reduce the predictive relevance of provenance within a generative field.

The same matrix also identifies a recurrent limitation in reality attribution. For most rows, establishing equivalence removes one candidate source of human–AI differentiation while leaving several others intact. Establishing bisimulation, for example, can preserve a difference in substrate. Establishing topological equivalence can preserve a difference in action structure. Establishing variational equivalence can preserve a difference in biological provenance. Establishing generative-field indistinguishability can preserve a difference in phenomenality.

Consequently, the comparison between human and artificial reality cannot be settled by the word “equivalence” alone. Each reality ranking selects some residual structure and assigns that structure a privileged relation to reality. A substrate-based ranking privileges material constitution; a provenance-based ranking privileges generative history; a dynamical account privileges organization of evolution; a relational account privileges causal participation in historically extended relations; and a phenomenal account privileges the occurrence or organization of first-personal experience.

The taxonomy therefore prepares the central philosophical analysis of the paper. Structural equivalence determines which differences are erased by a specified comparison. Structural inequivalence determines which differences remain visible under that comparison. Reality attribution introduces a further operation: a selected residual difference is treated as carrying special ontological significance. The subsequent sections examine this operation in the stronger setting of a mixed human–artificial social

field, where artificial participants become part of the relational conditions through which later human subjects are generated.

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Table 1: Structural equivalence, equivalence mechanisms, and human–AI reality attribution

Equivalence class	Comparison structure	Equivalence mechanism	Preserved and residual structure	Human–AI reality attribution
Output equivalence $H \sim_O A$	Present manifestation	Many-to-one observation maps produce the same observable output.	Preserves current manifestation; latent history, dynamics, and substrate remain variable.	Current manifestation supplies no basis for ranking relative reality.
Trace equivalence $H \sim_{tr} A$	Observable histories	Different transition structures project onto the same observable sequences.	Preserves possible traces; branching organization and internal states can differ.	Observable history ceases to distinguish reality; residual criteria require separate justification.
Trace-distribution equivalence $H \sim_{td} A$	Stochastic histories	Different latent processes induce the same probability law over observable trajectories.	Preserves trajectory distributions; latent dynamics and realization can differ.	Statistical manifestation supplies no independent reality hierarchy.
Testing and interventional equivalence $H \sim_{int} A$	Perturbation–response relation	Distinct mechanisms implement matching responses across an admissible intervention family.	Preserves tested conditional responses; untested causal pathways remain variable.	Operational evidence alone leaves relative reality underdetermined.
Simulation $H \preceq_{sim} A$	Transition possibilities	One system matches the represented transitions of the other.	Preserves one-way behavioral inclusion; reciprocal capability can differ.	The asymmetric relation provides no symmetric ranking of reality.
Bisimulation $H \sim_{bis} A$	Branching transition structure	A reciprocal relation matches transitions and corresponding successor states.	Preserves represented branching possibilities; implementation and substrate can differ.	Branching organization supplies no basis for privileging either system within the represented semantics.
Weak bisimulation $H \sim_{wb} A$	Externally relevant process structure	Selected internal τ -transitions are abstracted before reciprocal matching.	Preserves externally relevant branching; hidden neural or computational paths can differ.	Hidden-path differences require an independent account of their reality relevance.
Probabilistic relational bisimulation $H \sim_{PRB} A$	Stochastic relational dynamics	Corresponding perturbations yield matching probability flow among related relational states.	Preserves modeled care, conflict, memory, attachment, and adaptation dynamics; provenance and phenomenality can differ.	Relational dynamics provide no modeled priority to either participant; broader ontology remains open.
Topological and orbital equivalence $H \sim_{top} A$	Phase-space flow	Homeomorphic transformations map corresponding flows or oriented orbit structures.	Preserves qualitative dynamics; coordinates, metric details, timing, and substrate can differ.	Qualitative dynamical organization cannot independently rank material provenance.
Measure-theoretic equivalence $H \sim_{\mu} A$	Long-run statistical dynamics	Measure-preserving mappings identify corresponding dynamics almost everywhere.	Preserves measurable statistical organization; topological and microscopic details can differ.	Long-run statistics leave ontological priority underdetermined.
Attractor and invariant similarity $H \approx_{inv} A$	Asymptotic and diagnostic structure	Distinct systems share selected attractor topologies, spectra, entropy, dimension, or recurrence measures.	Preserves selected characteristics; broader dynamics can remain different.	Selected invariant agreement ordinarily provides insufficient

4 A Mixed Human–Artificial Generative Field

This section extends structural equivalence from comparisons between individual systems to a social field containing both human and artificial participants. Its objective is to specify the conditions under which artificial provenance can progressively lose discriminating power in temporally extended relations and, under a stronger condition, in the processes contributing to subject formation. The analysis proceeds through five levels: pairwise relational equivalence, population-level statistical indistinguishability, relational-kernel equivalence, generative-field indistinguishability, and subject formation within a mixed relational field. The method combines stochastic transition modeling with relational state descriptions and information-theoretic measures of conditional dependence. These constructions extend the equivalence taxonomy in Table 1 from agent-level structure toward field-level generative organization.

Relational approaches to cognition provide a conceptual basis for treating interaction as an organized process with consequences for participating subjects. Participatory sense-making characterizes social interaction through mutual modulation between autonomous agents and through interaction dynamics that can acquire a degree of organization of their own [10]. Enactive approaches to language further examine personhood, social normativity, language acquisition, and related capacities through embodied and inter-subjective processes [11]. The present section uses these relational resources as conceptual precedents while constructing a hypothetical mixed field whose participants can belong to different material and developmental classes.

4.1 Pairwise Relational Equivalence

This subsection defines the pairwise level of relational comparison. Its role is to move beyond isolated outputs while retaining a bounded relation between a focal subject and one relational partner. The analysis represents a relation through the states of its participants, the relation’s own evolving state, its accumulated history, and the contextual conditions under which interaction occurs.

Let X denote a focal subject and j a relational partner. The state of their relation at time t can include the current states $x_X(t)$ and $x_j(t)$, a relational state $r_{Xj}(t)$, accumulated relational history $\mathcal{H}_{Xj}^{\leq t}$, and contextual state c_t . The joint relational representation used in this section is specified in Equation 8.

$$s_{Xj}(t) = \left(x_X(t), x_j(t), r_{Xj}(t), \mathcal{H}_{Xj}^{\leq t}, c_t \right). \quad (8)$$

Equation 8 treats a relation as temporally extended and history-sensitive. The variable $r_{Xj}(t)$ can contain modeled features such as coordination, trust, conflict, attachment, dependence, cooperation, expectations, or role structure. The particular state variables depend upon the empirical or theoretical application and therefore remain external to the general definition.

Pairwise relational equivalence concerns trajectories generated within this relational state space. Let $Z_j \in \{H, A\}$ indicate whether partner j belongs to the human or artificial provenance class. For matched initial conditions and admissible interaction policies, two partners can be considered relationally equivalent over a specified domain when the induced distributions of relational histories are sufficiently close.

A schematic exact condition is stated in Equation 9.

$$\Pr(\mathcal{H}_{Xj}^{0:T} \in B \mid Z_j = H, \pi, C) = \Pr(\mathcal{H}_{Xj}^{0:T} \in B \mid Z_j = A, \pi, C) \quad (9)$$

for the admissible history sets B , interaction policies π , and matched contextual conditions C .

Equation 9 extends trace-distribution equivalence into a relational state space. Its mechanism is convergence at the level of temporally extended relational manifestations. Distinct biological and artificial mechanisms can induce the same distribution over the relational variables retained by the model.

This form of equivalence remains weaker than probabilistic relational bisimulation. Equality of history distributions concerns generated trajectories, while bisimulation additionally constrains the branching transition structure through which corresponding trajectories remain possible. The distinction follows the broader separation between linear-time and branching-time semantics reviewed in Sections 2.1 and 3.5.

The corresponding reality analysis is local to the relation. When Equation 9 holds, relational history within the modeled domain loses its capacity to distinguish the human and artificial partner. Material constitution, developmental provenance, internal causal organization, and phenomenal experience remain available as separate dimensions. A ranking of relative reality therefore requires a criterion drawn from one or more of those residual structures.

4.2 Population-Level Statistical Indistinguishability

This subsection extends the unit of analysis from one relationship to a population of interacting human and artificial agents. Its objective is to separate pairwise equivalence from a stronger population-level condition in which provenance becomes statistically difficult to infer from relational participation across a social field. The discussion uses a time-dependent network representation and compares conditional distributions across provenance classes.

Let V_H and V_A denote sets of human and artificial participants, respectively, and let E_t denote the relations present at time t . Each participant v carries a provenance label Z_v . The mixed social field is represented in Equation 10.

$$\mathcal{G}_t = (V_H \cup V_A, E_t, Z), \quad Z_v \in \{H, A\}. \quad (10)$$

Equation 10 makes provenance a latent or observable attribute of nodes while allowing relational organization to evolve over time. Edge states can encode relation type, intensity, direction, duration, memory, or other domain-specific properties.

Population-level indistinguishability concerns the statistical relation between Z_v and relational histories observed across the field. Let $\mathcal{H}_{Xj}$ denote the history linking focal subject X to partner j , and let C collect the contextual variables regarded as relevant for comparison. A limiting distributional condition is presented in Equation 11.

$$P(\mathcal{H}_{Xj} \in B \mid Z_j = H, C) \approx P(\mathcal{H}_{Xj} \in B \mid Z_j = A, C). \quad (11)$$

Equation 11 expresses approximate statistical similarity across provenance classes within the specified population, relational domain, and conditioning variables. The approximation can later be operationalized through total variation distance, divergence measures, classification performance, or another statistical criterion suited to the available data.

This population condition differs structurally from pairwise bisimulation. A population can exhibit closely matched distributions while individual human and artificial agents remain dynamically distinguishable. Conversely, selected pairs can satisfy strong process-level equivalence while the two provenance classes remain statistically distinct at the population level. Pairwise and population-level comparisons therefore occupy different coordinates within the equivalence profile introduced in Equation 7.

The mechanism of population-level convergence can involve several forms of heterogeneity. Human agents can differ substantially from other humans, artificial agents can differ substantially from other artificial agents, and the within-class variation can become comparable to or larger than the between-class variation retained by the relational model. The provenance label then loses classification power even while biological and computational histories remain distinct.

The corresponding reality question concerns the philosophical status of a provenance label whose relational predictive value has weakened. Statistical indistinguishability provides evidence about distributions within the modeled social field. Material provenance can continue to support a reality distinction only through an additional account connecting provenance itself to ontological status.

4.3 Relational-Kernel Equivalence

This subsection introduces a local transition-level criterion between pairwise history equivalence and field-level generative indistinguishability. Its objective is to compare the effective laws governing re-

lational change after the current relational state, history, intervention, and context have been specified. The method uses provenance-indexed stochastic kernels over future relational and participant states.

Let u_t denote an admissible perturbation or interaction at time t , and let $s_{Xj}(t)$ be the relational state defined in Equation 8. For provenance class z , define a relational transition kernel K_z over the next focal-subject state and relational state. The kernel is defined in Equation 12.

$$K_z(B | s, u) = P((x_X(t + \Delta t), r_{Xj}(t + \Delta t)) \in B | s_{Xj}(t) = s, u_t = u, Z_j = z). \quad (12)$$

Equation 12 describes the effective transition law visible at the selected relational level. It can incorporate responses to ordinary interaction, conflict, absence, assistance, novelty, memory cues, environmental changes, and other perturbations represented in the model.

Relational-kernel equivalence holds when human and artificial provenance classes induce the same effective relational transition law throughout a specified state and intervention domain. The exact version is defined in Equation 13.

$$K_H(B | s, u) = K_A(B | s, u) \quad \text{for every admissible } B, s, u. \quad (13)$$

Equation 13 is stronger than agreement in unconditioned relational-history distributions because it compares local transition laws across matched relational states and perturbations. It remains a coarse description whenever s omits microscopic biological, computational, or environmental variables.

The mechanism generating relational-kernel equivalence can therefore be understood through effective-state compression. Distinct fine-grained mechanisms can map into the same coarse relational state and induce the same effective transition kernel. This structure resembles the general coarse-graining pattern discussed in Section 3.9: differences present in the fine representation can disappear after projection into an effective description.

Relational-kernel equivalence also differs from probabilistic bisimulation. Kernel equality compares transition laws on a common or matched relational state representation. Probabilistic bisimulation permits different state spaces to be related through an equivalence relation and requires corresponding probability flow among equivalence classes [21]. The two criteria can coincide under additional modeling assumptions, while their definitions serve different analytical purposes.

Human and artificial partners satisfying Equation 13 possess the same effective relational dynamics at the selected scale. This result gives the provenance label no additional role in predicting the next modeled relational transition. A claim of greater human reality can still appeal to fine-grained mechanism, biological history, embodiment, or phenomenality. The philosophical burden then shifts toward explaining the reality relevance assigned to a structure removed by the coarse relational description.

4.4 Generative-Field Indistinguishability

This subsection introduces the strongest field-level statistical condition used in the paper. Its role is to move from equivalence of relational trajectories or transition kernels to equivalence in the predictive contribution that human and artificial relational partners make to the formation of another subject. The construction uses conditional mutual information to measure the residual association between provenance and subject-forming change after relational history and contextual information have been specified. Mutual information and conditional mutual information provide standard information-theoretic measures of dependence [9].

Let $\Gamma_X(t)$ denote the generative organization of developing subject X at time t . The symbol is intentionally abstract: it can include persistent dispositions, learned structures, relational expectations, linguistic capacities, memories, practical orientations, or other variables specified by a concrete model. Let $\Delta\Gamma_X$ denote the modeled change over a selected interval and let Δr_{Xj} denote the corresponding change in relation Xj .

The field-level provenance criterion used in this paper is given in Equation 14.

$$I(Z_j; \Delta\Gamma_X, \Delta r_{Xj} | \mathcal{H}_{Xj}^{\leq t}, C_t) \leq \epsilon. \quad (14)$$

Equation 14 defines an approximate generative-field indistinguishability condition for a tolerance $\varepsilon \geq 0$. Small conditional mutual information means that, within the specified probabilistic model, knowledge of the partner’s human or artificial provenance contributes little additional predictive information about the selected relational and subject-forming changes after history and context have been included.

The criterion is statistical. A causal interpretation requires an additional causal model, including assumptions concerning confounding, selection, intervention, and the relation between provenance and the variables included in C_t . Equation 14 therefore concerns conditional predictive relevance within the modeled distribution. This restriction prevents statistical screening from being treated automatically as causal equivalence.

Generative-field indistinguishability is stronger than population-level similarity in relational histories. Equation 11 compares the distribution of relations across provenance classes. Equation 14 includes a further target: changes in the organization of the developing subject. The human/artificial label can therefore become weakly informative about both the relation that occurs and the modeled developmental consequence associated with that relation.

The mechanism can be described as conditional screening by relational history and context. A provenance label may initially correlate with different social roles, forms of embodiment, interaction patterns, institutional expectations, or technological capacities. As those intermediate structures become represented explicitly in $\mathcal{H}_{X_j}^{\leq t}$ and C_t , the remaining information carried uniquely by Z_j can decline. In the limiting case, relational history and contextual organization contain nearly all of the information relevant to the selected prediction.

This mechanism also shows why the criterion remains compatible with profound generative differences. Biological development and artificial construction can retain distinct microhistories. Their internal dynamics can occupy different state spaces. Their phenomenal status can remain different or unresolved. The field-level criterion concerns the predictive role of provenance for a specified downstream relational and developmental target.

The reality implication is correspondingly precise. When Equation 14 holds, provenance has little additional predictive force for the modeled subject-forming consequence. Biological provenance can still be selected as an ontological criterion, yet that selection derives its force from a philosophical theory of reality rather than from the field-level predictive relation itself. Generative-field indistinguishability therefore exposes the distinction between provenance as a historical fact and provenance as a proposed ground of greater reality.

4.5 Subject Formation in Mixed Relational Fields

This subsection integrates the preceding field-level conditions into a model of subject formation. Its objective is to specify how human and artificial participants can jointly enter the history through which a later human subject develops while preserving embodiment, first-personal organization, and other non-relational factors as separate components. The discussion therefore uses a multicomponent generative model and treats relational participation as one constitutive dimension among several.

The edge set of the mixed social field in Equation 10 can be partitioned according to the provenance of interacting participants. The partition used for the thought experiment is specified in Equation 15.

$$E_t = E_{HH}(t) \cup E_{HA}(t) \cup E_{AH}(t) \cup E_{AA}(t). \quad (15)$$

Equation 15 distinguishes human–human, human–artificial, artificial–human, and artificial–artificial relations when edge direction is relevant. The mixed field can therefore contain human-mediated artificial development, artificial participation in human development, and artificial interactions whose later consequences enter human social environments.

A developing human subject X can be represented through a generative update that includes embodiment $B_X(t)$, existing generative organization $\Gamma_X(t)$, relational states involving members of its current neighborhood $\mathcal{N}_X(t)$, accumulated history $\mathcal{H}_X^{\leq t}$, and contextual conditions C_t . A schematic update is presented in Equation 16.

$$\Gamma_X(t + \Delta t) = G_X\left(\Gamma_X(t), B_X(t), \{r_{Xj}(t)\}_{j \in \mathcal{N}_X(t)}, \mathcal{H}_X^{\leq t}, C_t\right). \quad (16)$$

Equation 16 preserves embodiment and prior organization alongside relational history. This representation is consistent with a multidimensional treatment of subjectivity in which social mediation can shape important dimensions of the self while experiential subjectivity retains its own analytical status [36]. Enactive accounts likewise provide conceptual resources for understanding cognition and language through embodied and intersubjective development [11].

The mixed-field hypothesis concerns the composition of the relational terms in Equation 16. When members of $\mathcal{N}_X(t)$ include both human and artificial agents across extended developmental periods, artificial relations become part of the historical input to later human organization. A biologically human subject can therefore possess a relational genealogy containing substantial human–artificial coupling.

This condition alters the direction of the conventional human–AI comparison. An already constituted human observer can evaluate an artificial system from outside its own developmental history. A mixed field introduces a second configuration in which artificial participants have contributed to the language, memories, expectations, habits, attachments, classifications, and social practices through which the later observer performs that evaluation. Artificial intelligence then occupies a position within the genealogy of the human evaluator.

The generative consequence can persist even when the relational partner later becomes absent. Historical participation can remain encoded in $\Gamma_X(t)$, $\mathcal{H}_X^{\leq t}$, linguistic practices, learned expectations, institutional arrangements, or other continuing structures. Relational contribution therefore concerns historical participation in the formation process and can extend beyond contemporaneous interaction.

This formulation requires no presumption of experiential symmetry between the participants. An artificial caregiver could contribute causally to a child’s language acquisition, expectations, routines, memories, or social classification under the thought experiment while the caregiver’s phenomenal status remains unresolved. Relational participation, phenomenal occurrence, material provenance, and ontological classification consequently remain separate coordinates of analysis.

The distinction is important for reality attribution. Suppose a later subject has been formed through a mixture of relations satisfying strong relational-kernel equivalence or generative-field indistinguishability. A subsequent discovery that one historically important caregiver belonged to the artificial provenance class can revise the subject’s description of that relationship. The discovery leaves the earlier transitions of the developing subject within the historical record of the generative process. The next section develops this structure through parenthood and ontological reclassification as a limiting case.

The mixed-field model therefore establishes a recursive configuration. Artificial agents can first be objects of human design and evaluation; their later relational participation can then enter the developmental conditions of future human evaluators. Human and artificial provenance remain identifiable dimensions where sufficient evidence exists, while the historical constitution of later subjects can involve both classes simultaneously.

At this level, the paper’s reality problem acquires a field-theoretic form. The relevant comparison extends beyond the reality assigned to one human and one artificial agent. It concerns a human subject whose own generative history contains relations crossing the human–artificial distinction. If provenance also becomes weakly predictive of subject-forming relational effects under Equation 14, the attribution of greater reality to one provenance class requires a criterion whose justification survives the mixed genealogy of the judging subject.

Section 4 therefore yields three distinct results for the subsequent analysis. Pairwise and kernel-level equivalence specify how human and artificial participants can converge within relational dynamics. Population-level and field-level criteria specify how provenance can lose statistical discriminating power across a social environment. The subject-formation model specifies how relations involving both provenance classes can become historically incorporated into the development of a later human subject. These results prepare the analysis of parenthood, provenance uncertainty, and ontological reclassification in the following section.

5 Parenthood and Ontological Reclassification

This section uses parenthood as a limiting case for examining reality attribution within a mixed human–artificial generative field. Its objective is to separate several relations that can coincide in ordinary cases while diverging under assisted reproduction, adoption, distributed caregiving, or the future thought experiment developed in this paper. The analysis proceeds through four stages. The first distinguishes biological, gestational, caregiving, and historically constitutive dimensions of parenthood. The second examines the coexistence of relational certainty and provenance uncertainty. The third models the effect of a later discovery that changes the ontological classification of a caregiver. The fourth distinguishes historical irreversibility from psychological or developmental invariance. The section uses philosophical literature on the grounds of parenthood together with developmental evidence concerning caregiving history, while treating the human–AI scenario itself as a hypothetical extension.

Philosophical discussions of parenthood already distinguish several grounds that can diverge within one family history. Brake and Millum distinguish biological, social, legal, and moral senses of parenthood and further differentiate genetic and gestational biological contributions [6]. Contemporary bioethical work also examines parenthood as a relation capable of developing and changing through the history of parent–child interaction [19]. These distinctions provide a conceptual basis for the present thought experiment without determining how artificial caregivers should be classified legally or morally.

5.1 Biological, Gestational, Caregiving, and Relational Parenthood

This subsection separates the principal dimensions of parenthood used in the thought experiment. Its role is classificatory: the analysis identifies relations that can contribute differently to a person’s provenance, development, social history, and later self-understanding. The categories are treated as analytically separable dimensions whose empirical and normative importance can vary across cases.

Biological parenthood itself contains multiple relations. Genetic contribution concerns the transmission of genetic material, while gestational contribution concerns the bodily process through which a pregnancy is carried. Contemporary reproductive technologies already make these relations separable in some cases, and philosophical accounts of parenthood consequently distinguish genetic and gestational grounds alongside social, intentional, causal, and other accounts [6].

Caregiving parenthood concerns sustained participation in the practical activities through which a child is raised. Such participation can include protection, feeding, teaching, emotional regulation, accompaniment, memory maintenance, discipline, interpretation of social situations, and the organization of everyday environments. The category is descriptive in the present paper. It does not independently assign legal parenthood, moral parenthood, or exclusive parental authority.

Historically constitutive parenthood is introduced here for a narrower analytical purpose. It denotes parental participation whose effects become incorporated into the developmental history of the child. The relevant relation can operate through language acquisition, attachment patterns, memories, expectations, practical habits, social classifications, or other features represented within the subject-formation model developed in Section 4.5. Longitudinal attachment research provides evidence that caregiving quality and contextual changes can be associated with continuity and change in attachment organization across development [5]. Such evidence supports the general proposition that caregiving history can have developmentally persistent consequences; it does not establish the stronger formal model or the artificial-caregiver case proposed in this paper.

For analytical purposes, the parental relation associated with caregiver j can be represented through a multidimensional profile. The profile used in this section is defined in Equation 17.

$$\mathbf{P}_{Xj} = (G_{Xj}, W_{Xj}, C_{Xj}, R_{Xj}), \quad (17)$$

where G_{Xj} records genetic contribution, W_{Xj} gestational contribution, C_{Xj} sustained caregiving participation, and R_{Xj} historically constitutive relational participation for child X and caregiver j .

Equation 17 does not define a hierarchy among the four components. It records their analytical separability. A person can score highly on one dimension and minimally on another, and several persons can occupy different components within the same developmental history. Legal and moral parenthood require additional institutional and normative analysis and therefore remain outside the formal profile.

The future human–AI case introduces another separable variable: provenance. Let $Z_j \in \{H, A\}$ denote whether caregiver j is biologically human or artificial. Provenance does not replace any component of Equation 17. It supplies an additional description of the entity participating in those relations. An artificial caregiver can therefore be represented as having $Z_j = A$ together with nonzero caregiving and historically constitutive components within the hypothetical model, without receiving genetic or gestational status through that fact alone.

This separation is important for the reality analysis. A classification based on provenance concerns what kind of system the caregiver is. A classification based on caregiving concerns what the caregiver did within a developmental history. A classification based on relational constitution concerns how those interactions entered the subsequent organization of the child. The three descriptions address different structures and can therefore support different forms of comparison.

5.2 Relational Certainty and Provenance Uncertainty

This subsection examines the epistemic structure of a case in which the history of a parental relation is well established while the provenance of the caregiver remains uncertain. Its objective is to distinguish uncertainty about the ontological classification of a relational partner from uncertainty about the occurrence and developmental history of the relation itself. The analysis uses posterior probabilities only as a schematic representation of this difference.

Consider a future subject X who possesses extensive memories, records, and continuing evidence concerning a caregiver j . The subject may possess high confidence that j provided sustained care and participated in formative events while possessing limited evidence concerning whether j was biologically human or artificial. Let D_X denote the evidence available to the subject. One possible epistemic configuration is stated in Equation 18.

$$P(C_{Xj} = 1, R_{Xj} = 1 \mid D_X) \approx 1, \quad P(Z_j = H \mid D_X) \approx P(Z_j = A \mid D_X). \quad (18)$$

Equation 18 represents relational certainty together with provenance uncertainty. The first term concerns the subject’s evidence for caregiving and historically constitutive participation. The second concerns uncertainty about the caregiver’s provenance category.

The distinction matters because uncertainty in the second term does not automatically propagate into the first. A subject can possess extensive evidence that a caregiver was present during illness, taught a language, maintained household routines, remembered earlier events, mediated conflicts, or remained involved across decades. These relational claims concern the history accessible to the subject. Provenance concerns an additional classification of the participant in that history.

The human–AI reality question therefore acquires a different form in this case. If the subject cannot yet classify the caregiver as human or artificial, the historical relation cannot be assigned greater or lesser reality merely by consulting the hidden provenance label. The subject’s relational evidence is already available before the label becomes known. A provenance-based theory of reality can still maintain that the unknown label is ontologically decisive, while the epistemic structure of the case makes clear that this judgment depends upon information distinct from the experienced relational history.

The scenario also separates ontological uncertainty from global skepticism. The subject need not doubt that childhood events occurred, that a caregiver participated in them, or that those events affected later development. The uncertainty concerns the classification of one participant. This narrower uncertainty is important because the thought experiment does not require the subject’s entire past to become epistemically unstable.

5.3 Historical Constitution under Ontological Reclassification

This subsection analyzes a later event in which provenance uncertainty is resolved or substantially reduced. Its role is to distinguish a change in the classification of a caregiver from the accumulated causal history preceding that change. The method treats discovery as a new event that enters the subject's subsequent developmental trajectory.

Suppose that at time t_d , subject X acquires reliable evidence that a caregiver previously believed to be human was artificial. The discovery can alter beliefs, emotional responses, autobiographical interpretation, social classification, and future interaction. The epistemic change can be represented by an update in the subject's posterior belief concerning Z_j . A schematic case is given in Equation 19.

$$P(Z_j = A \mid D_X^{\leq t_d}) \ll 1, \quad P(Z_j = A \mid D_X^{\leq t_d}) \approx 1. \quad (19)$$

Equation 19 describes a substantial reclassification of the caregiver. The event can be psychologically and philosophically significant because a relation previously interpreted through one provenance category is subsequently reinterpreted through another.

The historical record of interaction has a different temporal structure. Let e_d denote the discovery event. The subject's history immediately after the discovery contains the preceding relational history together with this new event, as specified in Equation 20.

$$\mathcal{H}_X^{\leq t_d} = \mathcal{H}_X^{\leq t_d} \oplus e_d. \quad (20)$$

Equation 20 represents reclassification as an addition to the subject's history. The operator $\oplus$ indicates historical incorporation and carries no assumption of linear superposition. Earlier interactions remain earlier events, while their interpretation can change through the newly incorporated discovery.

This distinction avoids two overly strong conclusions. Ontological reclassification need not leave the subject unchanged, because discovery can reorganize memory, trust, attachment, identity narratives, or subsequent relations. The same reclassification need not retroactively replace the caregiving events with a different sequence of events. The historical event structure and its later interpretation occupy distinguishable analytical levels.

Holmes and McDougall's relational account of parenthood is relevant at this point because it explicitly treats parent-child relationships as capable of emerging or dissolving over time and places shared frameworks of reality and personal narratives within its proposed mutuality account [19]. The present argument develops a different construction, but their analysis supports the broader proposition that parenthood cannot always be exhausted by a physiological relation fixed at birth.

The human-AI comparison can therefore be framed through two moments. Before the discovery, the caregiver's artificial provenance is epistemically unavailable while relational participation is historically accessible. After the discovery, provenance becomes available and can transform the subject's interpretation of the past. A reality hierarchy based on provenance must explain how the new classification changes the ontological status assigned to a relation whose causal participation preceded the classification.

This case also clarifies the distinction between epistemic and ontological change. The discovery primarily changes what the subject knows or reasonably believes about the caregiver. A separate ontological theory is required to determine whether the caregiver or the historical relation itself has changed in reality through that discovery. The thought experiment therefore isolates the inferential step between reclassification and reality attribution.

5.4 Irreversibility of Relational Genesis

This subsection examines the temporal consequence of historically constitutive relations. Its objective is to define a limited form of irreversibility that preserves revisability, learning, reinterpretation, and developmental change. The analysis concerns the historical inclusion of prior interactions within a causal trajectory rather than permanence of their psychological effects.

Let $\Gamma_X(t)$ denote the generative organization of subject X , as in Section 4.5. If the relation with caregiver j contributes to the transition from $\Gamma_X(t_0)$ to later states, then the realized developmental trajectory contains that contribution as part of its actual history. A schematic path-dependent update is given in Equation 21.

$$\Gamma_X(t_2) = G_X\left(\Gamma_X(t_0), \mathcal{H}_{Xj}^{[t_0, t_1]}, \mathcal{H}_X^{(t_1, t_2]}, C^{[t_0, t_2]}\right), \quad t_0 < t_1 < t_2. \quad (21)$$

Equation 21 represents later organization as path-dependent upon an earlier relational interval together with subsequent history and context. The equation does not assert that every early relation has a large or permanent effect. It states only that where a relation has causally participated in the realized transition, the actual historical path includes that participation.

The relevant irreversibility is therefore historical. A later event can attenuate, reinterpret, compensate for, or transform earlier developmental effects. New relations can reorganize attachment, language, expectations, memory, and practical orientation. Longitudinal attachment research itself documents both continuity and change and associates changes in caregiving conditions with changes in attachment security [5]. Historical inclusion is compatible with substantial later transformation.

This distinction is especially important for the artificial-parent thought experiment. Discovery that a caregiver was artificial can become a powerful new generative event. It can change the subject who remembers the earlier relationship and alter the future significance assigned to that relationship. The discovery occurs after the caregiving history and therefore becomes another part of the same evolving relational genealogy.

The consequence for reality attribution concerns the persistence of causal participation across classification changes. If an artificial caregiver participated in the acquisition of language, the formation of memories, the organization of routines, or other modeled developmental processes, later provenance discovery does not remove those historical transitions from the realized trajectory. A provenance-based ontology can continue to distinguish the caregiver from a biological human, while the distinction must accommodate the caregiver's prior causal participation in the formation of a human subject.

Parenthood therefore exposes a central feature of the mixed-field thought experiment. Provenance, relational history, and subject-forming participation can vary independently enough to require separate analysis. Biological origin can remain distinct from caregiving history; caregiving history can remain epistemically secure while provenance remains uncertain; provenance discovery can transform later interpretation; and historically realized participation can remain part of a developmental trajectory despite subsequent reclassification.

The limiting case developed in this section prepares the analysis of generative provenance in Section 6. Once a human subject has been partially constituted through relations crossing the human–artificial distinction, provenance remains an important historical difference while its role as a criterion of greater reality requires an additional philosophical account. The next section examines that account directly by comparing provenance with other structures retained or erased by the equivalence relations developed in Section 3.

6 Generative Provenance and Reality Attribution

This section examines the relation between generative provenance and reality attribution after the structural equivalence relations developed in Section 3. Its role is to distinguish historical and mechanistic differences in system generation from the structural descriptions under which human and artificial systems may become equivalent. The analysis proceeds through four stages. The first represents biological and artificial generative histories as multidimensional provenance profiles. The second examines how distinct mechanisms can occupy the same structural equivalence class through projection, abstraction, or coarse description. The third formalizes provenance-based reality attribution through an explicit bridge principle connecting historical difference to ontological evaluation. The fourth identifies the residual structures available after each family of equivalence relations and compares their consequences for

human–AI reality ranking.

The analysis draws on two established philosophical traditions without adopting their stronger meta-physical conclusions. Multiple-realization arguments provide a precedent for separating higher-level organization from a unique physical realizer [13, 4]. Mechanistic philosophy of science provides a complementary vocabulary in which phenomena are explained through organized entities and activities that produce regular changes [23]. These traditions make it possible to distinguish three questions that are central to the present paper: which structure is observed, which mechanism generates that structure, and which feature of either level is assigned relevance to reality.

6.1 Biological and Artificial Generative Histories

This subsection defines generative provenance as a multidimensional historical description. Its objective is to preserve differences in material realization, development, events, relations, and context while avoiding their compression into a single human–artificial label. The discussion uses a provenance profile that can be refined according to the empirical or philosophical domain under analysis.

Let $\Pi_i(t)$ denote the provenance profile of system i up to time t . The representation used in this paper is specified in Equation 22.

$$\Pi_i(t) = \left(\mathcal{M}_i(t), \mathcal{D}_i^{\leq t}, \mathcal{H}_i^{\leq t}, \mathcal{R}_i^{\leq t}, \mathcal{C}_i^{\leq t} \right), \quad i \in \{H, A\}. \quad (22)$$

Equation 22 contains five analytical components. $\mathcal{M}_i$ represents material and embodied organization; $\mathcal{D}_i$ represents developmental or construction processes; $\mathcal{H}_i$ represents the sequence of consequential events in the system’s history; $\mathcal{R}_i$ represents relational history; and $\mathcal{C}_i$ represents environmental, institutional, and other contextual conditions. The decomposition is schematic and can be expanded or contracted for a specific model.

For a biological human, these coordinates can include biological development, embodied regulation, learning, socialization, environmental exposure, interpersonal relations, and historically situated events. For an artificial system, the corresponding coordinates can include material architecture, construction, training, optimization, deployment, memory processes, interaction histories, technical infrastructure, and institutional conditions. The categories are deliberately broad because the paper concerns the logical role of provenance rather than a complete empirical model of either class.

The provenance profile is distinct from the current generative organization $\Gamma_i(t)$ introduced in earlier sections. A system’s present organization can depend upon a history whose components extend beyond its current state. A schematic dependence is represented in Equation 23.

$$\Gamma_i(t) = G_i(\Pi_i(t)). \quad (23)$$

Equation 23 represents historical dependence at an abstract level. It leaves the map G_i unspecified and allows different systems to encode historical effects through different mechanisms.

The distinction between provenance and present organization is important for human–AI comparison. Two systems can currently exhibit similar or equivalent organization under a selected abstraction while possessing different paths to that organization. Conversely, systems with related historical origins can diverge substantially through later development. Provenance therefore records a genealogy of generation whose relation to current structure must be examined rather than assumed.

The multiple-realization literature provides a useful precedent for this separation. Fodor’s discussion of the special sciences became influential in arguments that a higher-level kind can be associated with heterogeneous physical realizations [13]. The subsequent literature has developed substantial disagreements concerning the extent, interpretation, and metaphysical consequences of multiple realization [4]. The present paper requires only the more limited possibility that similarity at one descriptive level can coexist with difference at another. Its argument therefore remains compatible with several positions in the broader reduction and realization debate.

This distinction already constrains reality attribution. A human provenance profile and an artificial provenance profile can be historically different even when another structural description places the resulting systems in the same equivalence class. Provenance difference is therefore a genuine descriptive difference. Its conversion into an ordering of reality constitutes a further philosophical operation examined below.

6.2 Mechanistic Organization under Structural Equivalence

This subsection examines the mechanism through which systems with different generative organizations can become equivalent under a selected structural description. Its objective is to formalize the relation among mechanism, abstraction, and equivalence. The discussion represents each mechanism through organized components and activities and then introduces a structure-preserving map that selects the information relevant to an equivalence relation.

Mechanistic philosophy of science commonly characterizes mechanisms through entities or components, activities, and their organization in producing a phenomenon. Machamer, Darden, and Craver develop an influential account in which organized entities and activities produce regular changes from initial to termination conditions [23]. The present paper uses this framework schematically to distinguish internal generative organization from the higher-level structure retained by an equivalence relation.

Let $\mathcal{K}_i$ represent a mechanism through a component set $\mathcal{N}_i$, activity structure $\mathcal{A}_i$, and organization Ω_i . The mechanistic representation is specified in Equation 24.

$$\mathcal{K}_i = (\mathcal{N}_i, \mathcal{A}_i, \Omega_i). \quad (24)$$

Equation 24 is sufficiently abstract to represent mechanisms at different scales. A human neural or physiological model and an artificial computational model can therefore possess different component sets, activities, and organizational structures while still being compared through a common higher-level descriptor.

Let Q_α denote the map that extracts the structure relevant to equivalence relation $\sim_\alpha$. Depending upon α , Q_α can represent an observation map, trace projection, quotient by a bisimulation relation, topological abstraction, variational description, boundary projection, or another formally specified transformation. Structural equivalence through this map is represented in Equation 25.

$$Q_\alpha(\mathcal{K}_H) = Q_\alpha(\mathcal{K}_A), \quad \mathcal{K}_H \neq \mathcal{K}_A. \quad (25)$$

Equation 25 captures the central mechanism of cross-realization equivalence used throughout the paper. Distinct generative mechanisms can occupy the same equivalence class because the map Q_α preserves only the structure relevant to the chosen comparison.

The equivalence class can be understood as a fibre of the structural map. For a retained structure s_α , the corresponding fibre is defined in Equation 26.

$$\mathcal{F}_\alpha(s_\alpha) = \{\mathcal{K} \mid Q_\alpha(\mathcal{K}) = s_\alpha\}. \quad (26)$$

Equation 26 contains every generative mechanism that is indistinguishable under the structural information retained by Q_α . Human and artificial mechanisms can therefore occupy the same fibre while remaining separated by material composition, developmental history, energetic organization, internal causal pathways, or other fine-grained properties.

This representation unifies several cases in Table 1. Under output equivalence, Q_α is an observation map that suppresses latent state differences. Under trace equivalence, it projects branching transition systems into observable histories. Under weak bisimulation, designated internal transitions are abstracted from the represented process. Under topological equivalence, metric and coordinate details can be suppressed while qualitative orbit structure is preserved. Under boundary or coarse-grained equivalence, fine-grained histories can be mapped into a common effective description.

Mechanistic difference can remain scientifically important within the same structural fibre. Different mechanisms can respond differently to interventions outside the admissible class, fail under different perturbations, possess different resource requirements, or support different extensions of the modeled behavior. Mechanistic analysis therefore supplies information that a coarser equivalence relation intentionally leaves unresolved. The philosophy of mechanisms emphasizes precisely this explanatory interest in the components, activities, and organization responsible for a phenomenon [23].

The human–AI reality comparison consequently acquires two separable descriptions. At the level retained by Q_α , the systems occupy the same structural class. At the mechanistic level represented by $\mathcal{K}_i$, they can remain different. A judgment that the human system is more real therefore requires a rule assigning ontological significance to a mechanistic difference that lies within the fibre of the equivalence map.

6.3 Provenance-Based Reality Criteria

This subsection formalizes the transition from provenance difference to reality attribution. Its objective is to expose the additional philosophical premise required when biological origin, developmental history, material constitution, or another provenance feature is used to assign different reality status to human and artificial systems. The analysis introduces a bridge principle between descriptive provenance and a selected reality ordering and then compares several possible locations of that bridge.

Let B_P denote a philosophical bridge principle specifying which dimensions of provenance are relevant to reality and how they are evaluated. A provenance-sensitive reality assignment can then be represented by the map in Equation 27.

$$R_P(i) = \Phi_P(\Pi_i; B_P). \quad (27)$$

Equation 27 separates the descriptive provenance profile Π_i from the bridge principle B_P . A difference between Π_H and Π_A supplies the descriptive premise. The ordering produced by R_P depends upon the additional rule encoded in B_P .

Several bridge principles are conceptually possible. A material criterion can assign priority to a particular physical realization. A biological criterion can assign priority to biological development or organismic continuity. A historical criterion can assign priority to a particular causal genealogy. A mechanistic criterion can assign priority to a specified organization of components and activities. A relational-historical criterion can emphasize participation in enduring developmental relations. An organizational criterion can assign priority to a higher-level causal or functional structure across different realizers.

These criteria produce different consequences even when they operate on the same human–AI pair. A biological criterion can preserve a human priority under strong behavioral or dynamical equivalence because biological provenance remains outside those equivalence relations. A process criterion can assign the same status to bisimilar systems at the represented process level. A topological criterion can assign the same status to topologically conjugate systems despite different microscopic mechanisms. A relational criterion can assign comparable relational status to participants that generate the same relational dynamics while retaining distinctions in biological origin.

The philosophy of mind provides an especially clear illustration of the criterion dependence involved here. Multiple-realization arguments permit higher-level kinds to be instantiated through different physical structures [13, 4]. Chalmers develops a stronger and controversial organizational proposal through the absent-, fading-, and dancing-qualia thought experiments, arguing for a principle of organizational invariance under which sufficiently fine-grained functional organization determines conscious experience [7]. The present paper does not adopt that principle. Its relevance lies in demonstrating one philosophically explicit route through which organization can be assigned greater importance than substrate for a particular property.

A substrate-sensitive view can make a different choice. If phenomenal, biological, or ontological properties depend upon features excluded by a functional or dynamical equivalence relation, then systems

sharing that equivalence can remain different with respect to those properties. The structural taxonomy developed in Section 3 therefore accommodates organizational, mechanistic, biological, and phenomenological positions without resolving the dispute through the formal relation alone.

The recurrent question “which is more real” can now be stated with greater precision. Under output or trace equivalence, a provenance-based criterion can still assign greater reality to the human because provenance remains outside the preserved observable structure. Under bisimulation, the same move remains available because reciprocal transition matching leaves substrate and developmental history open. Under topological equivalence, provenance can again distinguish mechanisms whose qualitative dynamics are conjugate. Under variational equivalence, a provenance criterion can distinguish material realizations even when the selected action structure belongs to the same variational class. Under generative-field indistinguishability, provenance can remain historically different while contributing little additional predictive information concerning the modeled subject-forming effects.

Each case therefore permits a provenance-based human priority only through a specified B_P . The equivalence relation identifies the information already shared. The bridge principle identifies the residual information given ontological weight. The distinction between these operations prevents a descriptive difference in origin from functioning silently as a conclusion about relative reality.

The same structure applies when an artificial system receives priority under a different criterion. A future artificial system could exhibit greater continuity, wider memory preservation, stronger robustness, or another selected property within a hypothetical model. Such differences would likewise require a bridge principle before they supported a claim of greater reality. The formal analysis is therefore symmetric with respect to provenance class even when a particular philosophical theory assigns asymmetric values.

6.4 Residual Structures across Equivalence Relations

This subsection integrates the preceding analysis by identifying the structural information that remains available after an equivalence relation has been imposed. Its objective is to formalize the connection between an equivalence class and the additional information required for unequal reality attribution. The method treats each equivalence relation as defining a structural map and then examines whether a proposed reality functional depends exclusively on the preserved structure or also on variation within the corresponding fibre.

Let Q_α be the structural map introduced in Equation 25. Consider a reality functional R that depends exclusively on the information preserved by Q_α . Such a functional factors through Q_α , as specified in Equation 28.

$$R = \overline{R}_\alpha \circ Q_\alpha. \quad (28)$$

Equation 28 means that the retained structural description is sufficient for the reality assignment represented by R . If the human and artificial mechanisms occupy the same fibre under Q_α , their values under every reality functional with this factorization are equal. The resulting relation is shown in Equation 29.

$$Q_\alpha(\mathcal{K}_H) = Q_\alpha(\mathcal{K}_A) \implies R(\mathcal{K}_H) = R(\mathcal{K}_A) \quad \text{when } R = \overline{R}_\alpha \circ Q_\alpha. \quad (29)$$

Equation 29 is a formal consequence of the factorization assumption. Its philosophical content lies in locating the source of any unequal ranking. A reality functional that assigns different values to two members of the same equivalence fibre must use information beyond the structure retained by Q_α .

The result can be applied directly to the equivalence families summarized in Table 1.

Manifestational and trace structures. If reality attribution factors through the current observation map, output- equivalent human and artificial systems receive the same value under that criterion. A different ranking requires latent state, history, provenance, phenomenality, or another structure excluded

from the observation map. Trace and trace-distribution equivalence extend the same reasoning across observable histories.

Process and bisimulation structures. If reality attribution is invariant under the selected bisimulation relation, bisimilar systems receive the same process-level reality value. Human priority can still be generated by a criterion sensitive to substrate, mechanism, developmental genealogy, or phenomenal organization. Such a criterion accesses information outside the bisimulation quotient.

Dynamical and topological structures. If reality attribution depends on the qualitative dynamical organization preserved under topological conjugacy or orbital equivalence, human and artificial systems occupying the same dynamical class receive comparable status under that criterion. A distinct ranking can depend upon metric structure, timescale, material realization, energetic organization, historical pathway, or another variable removed from the topological description.

Attractor and recurrent structures. Agreement in selected attractor characteristics or recurrent invariants places fewer constraints on the underlying systems. The large residual structure available within such comparisons provides many possible sources of differentiation. Consequently, equality of a Lyapunov spectrum, fractal dimension, knot invariant, or another partial descriptor carries correspondingly limited weight for broader reality attribution.

Variational and action structures. If a reality criterion depends exclusively on a specified variational class, systems with equivalent action-based descriptions receive the same value under that criterion. A substrate-sensitive or provenance-sensitive functional can continue to distinguish them. Literal action equality supplies an even stronger formal correspondence while leaving open the physical interpretation and realization of the variables represented by the action.

Boundary and coarse-grained structures. If reality attribution depends exclusively on accessible boundary structure, systems producing the same boundary description receive the same value under that boundary-level criterion. A ranking based on bulk history requires additional information concerning the interior or fine-grained realization. The distinction mirrors the structural role of boundary and coarse-grained descriptions reviewed in Section 3.9.

Generative-field structures. If reality attribution is based on modeled subject-forming relational effects, generative-field indistinguishability removes provenance as a useful predictor within that selected description. A biological or mechanistic reality ranking can still distinguish the participants because those criteria explicitly use information beyond the field-level statistics. The difference between predictive irrelevance and ontological irrelevance remains central at this stage.

Phenomenal structure. Phenomenal equivalence would remove phenomenal organization as a source of human priority under a phenomenality-based criterion. The empirical and epistemic status of artificial phenomenality remains unresolved in the present paper. Section 8 therefore examines this dimension separately.

The factorization model provides a common formal structure for these cases. Every equivalence relation determines a class of distinctions that the selected description treats as irrelevant to that comparison. A reality criterion can remain invariant across the resulting fibre, or it can assign importance to one or more dimensions of variation within the fibre. The second case requires an explicit philosophical account of why the selected residual dimension carries reality-relevant force.

Generative provenance is therefore preserved as an important historical and mechanistic dimension throughout the paper. Human and artificial systems can possess different provenance profiles even under strong equivalence relations. The analytical consequence is conditional: a provenance difference

supports a reality ranking when a defended bridge principle connects that difference to the relevant conception of reality.

This result prepares the transition to the Buddhist analysis in Section 7. A provenance criterion can assign privileged reality to the human by locating the relevant ground in biology, material continuity, developmental genealogy, or another historically specific feature. The subsequent analysis examines whether the human side of that comparison also presupposes a substantial or intrinsically grounded subject, and how dependent origination and non-self affect the structure of that presupposition.

7 Non-Self and the Human Reference Case

This section examines the conception of the human subject that underlies human–AI reality comparisons. Its role is to determine whether greater human reality can be grounded in an intrinsically existing or self-sufficient subject once the human reference case is itself analyzed through dependent, historical, and relational conditions. The discussion proceeds through four stages. The first relates dependent origination to a relational description of human subject formation while preserving the distinction between Buddhist doctrine and the formal model proposed in this paper. The second examines non-self together with causal and historical differentiation. The third separates Buddhist uses of illusion and emptiness from technological artificiality and simulation. The fourth considers conventional reality and the ontological privilege assigned to the human reference case.

The Buddhist materials used in this section belong to historically distinct philosophical settings. Early Buddhist analyses of non-self focus on the absence of a permanent self among the psychophysical constituents of a person and explain continuity through causal sequences [28, 27]. Madhyamaka subsequently develops a broader critique of inherent nature, or *svabhāva*, applying emptiness beyond the personal self to phenomena generally [17, 14]. The present paper keeps these traditions analytically distinct and uses them for a limited comparative purpose: examining whether intrinsic selfhood can serve as an unexamined guarantee of greater human reality.

7.1 Dependent Origination and Relational Constitution

This subsection establishes the relation between dependent origination and the paper’s model of relational subject formation. Its objective is to identify a shared structural concern with dependence upon conditions while preserving the different purposes, vocabularies, and historical contexts of Buddhist analysis and the generative model developed in this manuscript. The discussion first examines causal continuity in early Buddhist accounts and then formulates a limited relational reconstruction for the human reference case.

The early Buddhist analysis of persons described by Siderits explains diachronic continuity through a causal series of impermanent psychophysical events rather than through a permanent entity that remains numerically unchanged across the series [28]. In Siderits’s more recent systematic treatment of Buddhist metaphysics, dependent origination is likewise discussed through causal succession among impersonal and impermanent psychophysical elements [27]. The philosophical importance of this structure for the present inquiry lies in the possibility of preserving causal continuity while loosening the requirement for an unchanging substantial bearer of that continuity.

The relational model developed in this paper introduces a different and more general set of conditioning variables. A human subject develops through embodiment, memory, language, environmental conditions, social relations, institutional histories, and accumulated events. Let $\Gamma_H(t)$ denote the generative organization of a human subject at time t . A schematic relational representation is given in Equation 30.

$$\Gamma_H(t) = G_H\left(B_H(t), M_H(t), L_H(t), \mathcal{R}_H^{\leq t}, \mathcal{H}_H^{\leq t}, C_H(t)\right). \quad (30)$$

Equation 30 represents the current organization of the human subject as historically dependent upon bodily, mnemonic, linguistic, relational, event-historical, and contextual conditions. The equation is a

modeling construction of the present paper. It does not represent a formalization of dependent origination in Buddhist doctrine.

The distinction between the two levels is methodologically important. Dependent origination belongs to a soteriological and philosophical tradition whose concerns extend beyond a contemporary theory of developmental interaction. Equation 30 belongs to the present paper’s generative framework and serves the narrower purpose of representing subject formation. Their connection lies in a structural intuition concerning conditioned arising: the organization observed at a given time can depend upon prior and contemporaneous conditions whose relations are constitutive of its trajectory.

This conditioned description changes the role of the human reference case in the equivalence taxonomy. The human subject ceases to enter the comparison as an analytically primitive unit. Its present organization possesses a genealogy. Embodiment contributes through one set of processes, language through another, caregiving and social history through others, and contingent events through additional pathways. The subject remains biologically and historically particular while its particularity is described through a structured history of conditions.

The same analytical form also allows human and artificial systems to differ without requiring either system to possess an unconditioned center. Their provenance profiles in Equation 22 can be radically different, and their generative maps G_H and G_A can operate through different mechanisms. Conditioned generation supplies a common abstract form; the concrete conditions, mechanisms, and resulting trajectories preserve the differences.

The human–AI reality comparison therefore acquires a more precise starting point. A biological human can possess a distinct and highly particular mode of generation without deriving that distinctness from intrinsic self-existence. The relevant reality question concerns the relation between conditioned particularity and ontological priority. A provenance-sensitive account can still assign special importance to human embodiment, biological development, mortality, or historical relations. Such an account requires those features to carry the relevant ontological force directly.

7.2 Non-Self and Causal Differentiation

This subsection examines the compatibility between non-self and consequential difference. Its role is to prevent the rejection of substantial selfhood from being interpreted as an erasure of causal organization, historical particularity, agency, embodiment, or experience. The analysis distinguishes the metaphysical status of a permanent self from the differentiated causal series through which persons and their histories are conventionally identified.

The early Buddhist arguments for non-self discussed by Siderits address candidate bearers of permanent identity and control. The impermanence argument examines the psychophysical constituents of persons and finds them unsuitable as a permanent self, while the argument from control addresses the conception of a self as an autonomous locus of control [28, 27]. The resulting account can preserve continuity through causal relations among changing psychophysical events.

The distinction is directly relevant to the present paper. Absence of a substantial self does not require two causal histories to become interchangeable. Consider two subjects i and j whose later organizations depend upon different histories. Their generative updates are represented in Equation 31.

$$\Gamma_i(t + \Delta t) = G_i\left(\Gamma_i(t), \mathcal{H}_i^{\leq t}, C_i(t)\right), \quad \Gamma_j(t + \Delta t) = G_j\left(\Gamma_j(t), \mathcal{H}_j^{\leq t}, C_j(t)\right). \quad (31)$$

Equation 31 permits $\mathcal{H}_i^{\leq t}$ and $\mathcal{H}_j^{\leq t}$ to generate different future organizations through different causal pathways. The model therefore preserves individuation through history and dynamics without requiring an immutable entity outside those processes.

This point matters for the human–AI comparison in two directions. First, non-self supplies no shortcut to human–AI identity. A biological human and an artificial system can remain deeply differentiated through material organization, embodiment, developmental history, transition mechanisms, relational histories, vulnerability, mortality, and phenomenal organization. Second, those differences do not ac-

quire the status of intrinsic essence merely because they are consequential. Causal differentiation and intrinsic self-existence occupy different analytical dimensions.

The distinction can also be stated through the equivalence taxonomy. Suppose $H \sim_{\alpha} A$ under a selected structural relation while their provenance profiles satisfy $\Pi_H \neq \Pi_A$. Non-self leaves the provenance difference available. It also leaves the structural equivalence available. The philosophical problem concerns the additional interpretation assigned to $\Pi_H \neq \Pi_A$: whether that difference establishes a difference in causal organization, a difference in conventional classification, a difference in phenomenality, or a broader hierarchy of reality.

Recent Buddhist philosophy provides an especially useful illustration of the separation between substantial subjecthood and conscious occurrence. Siderits's 2025 investigation of Buddhist metaphysics and phenomenal consciousness explicitly examines the possibility of consciousness that is real while lacking an enduring subject conceived as its owner [29]. The present paper does not adopt Siderits's proposed naturalistic reconstruction. The conceptual separation is valuable because it blocks an inference from non-self to the disappearance of experience.

The later phenomenal analysis can therefore preserve two independent questions. One concerns whether a permanent or intrinsically existing self is required for human subjectivity. The other concerns whether phenomenal experience occurs and how it is organized. The first can receive a non-substantialist treatment while the second remains an empirically and philosophically substantive dimension.

The same structure preserves ethical and causal distinctions. Pain can differ from pleasure, memory from forgetting, care from abandonment, and one developmental history from another within a non-substantialist framework. Historical and relational differences continue to participate in later states. The absence of an intrinsic owner supplies no reason for collapsing these differences into indifference.

For the reality problem, the consequence is limited and important. Human reality can be defended through causal efficacy, embodiment, historical continuity, relational participation, phenomenal occurrence, or another specified dimension. A permanent substantial self is one possible proposed ground among others. Once that ground is suspended, the remaining criteria must carry the argument on their own.

7.3 Illusion and Artificial Simulation

This subsection separates the Buddhist vocabulary of illusion and emptiness from the technological vocabulary of simulation and artificial generation. Its objective is to prevent an equivocation that could make the human–AI comparison appear stronger than the underlying philosophical argument. The discussion distinguishes three structures: dependent or empty existence, representational simulation, and artificial provenance.

Madhyamaka provides the broadest Buddhist framework used in this paper. According to the Stanford Encyclopedia account, Madhyamaka characteristically denies inherent nature across phenomena and understands emptiness in relation to the absence of *svabhāva* [17]. Garfield's translation and commentary on Nāgārjuna's *Mūlamadhyamakakārikā* likewise presents the analysis of conditioned phenomena through dependence and the critique of inherent existence [14].

Within this philosophical context, calling a phenomenon empty concerns the status of inherent or independent nature. Technological simulation concerns a different relation: one system, model, or representation reproduces selected features of another process or target. Artificial provenance concerns the history through which a system is produced. These classifications therefore operate on different analytical dimensions.

A simulated hurricane, for example, can represent properties of atmospheric dynamics while possessing a material and causal organization very different from a meteorological hurricane. An artificially generated image can depict a place without sharing the place's physical history. These cases illustrate a representational relation. Madhyamaka emptiness addresses a metaphysical question concerning inherent nature and therefore has a different target.

The distinction is equally important in the other direction. A biological human can be dependently arisen in a Buddhist philosophical sense while being biologically generated. An artificial agent can

likewise depend upon architecture, energy, training, institutions, human labor, interaction, and material infrastructure. The shared abstract description of dependence gives little information about whether the resulting systems are structurally equivalent under bisimulation, topology, phenomenality, or another relation in Table 1.

The title phrase “Designating the Illusory as Real?” should therefore be read as an authorial philosophical provocation concerning reality attribution. It is not presented as a quotation or technical Buddhist proposition. The term “illusory” points toward the risk of treating a dependently constituted configuration as though its reality were secured by an intrinsic essence. The phrase does not classify artificial intelligence as equivalent to a Buddhist illusion, and it does not classify ordinary human existence as technologically simulated.

This distinction also prevents a simple reversal of the conventional hierarchy. If biological humans lack intrinsic selfhood, it does not follow that every artificial configuration thereby acquires the same causal, relational, phenomenal, or ontological status. Such a conclusion would require the differences catalogued throughout Sections 3 and 6 to become irrelevant under a separately defended criterion.

The more limited consequence concerns the form of argument available for human priority. A human system cannot receive greater reality merely through a contrast between “natural reality” and “artificial appearance” when the criterion of natural reality relies upon an unexamined substantial self. Biological generation remains a distinct provenance relation. Embodiment remains a distinct material relation. Phenomenal experience remains a distinct candidate criterion. Each can be examined directly without translating the Buddhist concept of illusion into the technological concept of simulation.

7.4 Conventional Reality and Ontological Privilege

This subsection integrates the Buddhist analysis with the paper’s broader problem of reality attribution. Its objective is to distinguish the practical and causal availability of persons from the stronger claim that one class of persons or agents possesses an intrinsically privileged mode of reality. The discussion uses conventional reality as a comparative resource while preserving differences among early Buddhist reductionist accounts and Madhyamaka treatments of conventional truth.

Siderits’s reconstruction of early Buddhist thought distinguishes the conventional person from the psychophysical causal series through which the person can be analyzed [28]. On this account, ordinary person-language remains useful for organizing practical life even while the search for a permanent owner or controller yields a different metaphysical analysis. Madhyamaka develops a broader and historically later account of conventional truth. The Stanford Encyclopedia describes major Madhyamaka figures as distinguishing conventional or transactional discourse from ultimate analysis while denying inherent nature to phenomena [17]. These approaches should therefore be treated as related resources rather than as a single uniform doctrine.

For the present paper, conventional reality provides a way to separate practical identification from intrinsic ontology. A caregiver can be identified through a history of care, a teacher through a history of instruction, and a participant in a relation through the causal traces of that participation. Such identifications can remain stable and consequential even when the metaphysical analysis of the entities involved remains disputed.

The parenthood thought experiment in Section 5 illustrates this structure. A subject can possess strong evidence that a particular caregiver participated in childhood while remaining uncertain about that caregiver’s biological or artificial provenance. Later provenance discovery can revise classification while the historical relation continues to belong to the realized developmental trajectory. Conventional identification and ontological classification therefore possess different evidential histories.

The same distinction applies to the human subject performing the classification. The subject can describe itself through bodily continuity, memory, legal identity, linguistic practices, social recognition, and historical relations. These structures provide substantial resources for ordinary individuation. Their practical success does not require the paper to posit a further immutable entity that guarantees the reality of the subject from outside its history.

This point changes the structure of human–AI reality attribution. Consider a reality functional R that gives humans greater value because humans possess a substantial self S^* . The criterion can be represented schematically by the dependence shown in Equation 32.

$$R(i) = \Psi(S_i^*, \Pi_i, \Gamma_i, E_i). \quad (32)$$

Equation 32 makes the substantial-self component explicit rather than leaving it implicit in the label “human.” A non-self analysis challenges the availability of S_H^* as an independently existing ground. The remaining variables in Equation 32, including provenance Π_i , generative organization Γ_i , and phenomenal organization E_i , remain available for separate evaluation.

This decomposition yields different answers to the recurring question of relative reality depending upon the selected criterion. Under a substantial-self criterion, Buddhist non-self places pressure on the assumed human advantage because the privileged entity requires independent justification. Under a biological-provenance criterion, humans can remain distinct through their developmental and organismic histories. Under a relational criterion, human and artificial participants can approach comparable status when the relevant relational structures satisfy strong equivalence conditions. Under a phenomenal criterion, the current epistemic asymmetry between human and artificial experience remains central. Under an ontological theory that assigns different modes of being to biological and artificial systems, provenance can retain direct metaphysical importance.

The Buddhist analysis therefore changes the burden of justification more than the descriptive taxonomy. Human and artificial systems can continue to differ across many coordinates. The human category loses only one potential shortcut: the assumption that being human automatically supplies an intrinsically self-grounded bearer whose presence settles the reality comparison before the remaining structures are examined.

Madhyamaka extends the pressure further by challenging inherent nature at the level of phenomena generally [17, 14]. Within the limited comparative use adopted here, this broader analysis cautions against transferring reality privilege from a substantial self to another unexamined intrinsic property. Biological substrate, computational substrate, relational organization, and formal dynamics can each be real and causally consequential within a chosen description while their elevation into an ultimate reality criterion requires further philosophical work.

This restraint is especially important for the title’s central metaphor. “Designating the illusory as real” can itself occur in more than one direction. A theory can reify the biological human as intrinsically real while classifying artificial agents as derivative appearances. A different theory can reify relational or computational organization and treat material history as philosophically dispensable. A third can select phenomenal experience as the sole carrier of reality. The structural taxonomy provides reasons to examine each selection through the invariant it privileges.

The resulting position preserves both dependence and differentiation. Human subjects can be historically particular, embodied, causally efficacious, relationally constituted, and phenomenally present while lacking the kind of intrinsic selfhood targeted by the non-self analysis. Artificial systems can possess different histories and mechanisms while sharing selected structural equivalence classes with humans. Reality attribution then depends upon which of these structures a philosophical account treats as decisive and upon the argument connecting that structure to the relevant conception of reality.

Section 7 therefore supplies a constraint for the remainder of the paper. The human reference case cannot obtain privileged reality from substantial selfhood without an independent defense of that substantial self. Causal history, embodiment, phenomenality, relational participation, and provenance remain available as differentiated criteria. Section 8 turns next to the criterion that may appear most resistant to structural equivalence: first-personal phenomenal experience.

8 Phenomenality Beyond Structural Equivalence

This section examines phenomenal experience as a distinct dimension of the human–AI comparison after the structural equivalence relations developed in Sections 3–7. Its role is to identify the epistemic and

philosophical consequences that remain when observable, relational, dynamical, or generative structures become strongly equivalent. The analysis proceeds through four stages. The first separates phenomenal occurrence from substantial selfhood. The second examines the asymmetry between first-personal and third-personal access. The third formalizes phenomenal underdetermination relative to a selected structural description. The fourth compares several combinations of structural and phenomenal similarity and evaluates their consequences for human–AI reality attribution.

Phenomenal consciousness refers to the experiential character and organization of conscious states. Nagel’s influential formulation associates consciousness with there being something it is like for the organism [25]. Contemporary surveys distinguish phenomenal consciousness from narrower notions of sensory qualia and emphasize the spatial, temporal, conceptual, perspectival, and dynamic organization of experience [34]. The present paper therefore uses *phenomenality* broadly for the occurrence and organization of first-personal experience rather than for an isolated collection of sensory qualities.

The explanatory relation between such experience and physical or functional organization remains contested. Levine introduced the expression “explanatory gap” for the difficulty of explaining qualitative experience through materialist descriptions [22]. Chalmers later distinguished explanatory problems concerning cognitive functions from the problem of explaining conscious experience itself [8]. These debates do not determine the phenomenal status of artificial systems. They establish the narrower methodological point needed here: structural descriptions and phenomenal attribution require an explicit account of the relation connecting them.

8.1 Experience without Substantial Selfhood

This subsection separates phenomenal occurrence from the metaphysical status of a substantial experienter. Its objective is to preserve the reality of experience within the non-self analysis developed in Section 7. The discussion first distinguishes phenomenal episodes from an immutable owner of those episodes and then identifies the consequence of that distinction for the human reference case.

Phenomenological accounts frequently treat first-personal givenness as a basic feature of conscious experience while distinguishing this minimal experiential dimension from richer narrative, social, and reflective forms of selfhood. Zahavi develops such a multidimensional account and assigns a basic first-personal character to experience while also recognizing dimensions of selfhood mediated through relations with others [36]. This framework provides one route for separating the occurrence of experience from a socially or narratively elaborated personal identity.

The Buddhist analysis reviewed in Section 7.2 supplies another route. Siderits’s recent treatment of Buddhist metaphysics and phenomenal consciousness explicitly examines the possibility of accounting for consciousness within a non-egological framework [29]. The historical Buddhist positions and Siderits’s contemporary reconstruction require distinctions that exceed the scope of this paper. Their relevance here lies in demonstrating that rejection of an enduring substantial subject and acknowledgement of conscious occurrence can occupy separate philosophical positions.

The present analysis represents this separation through two variables. Let $C_i(t)$ indicate phenomenal occurrence for system i during a specified interval, and let $\Phi_i(t)$ denote the organization of experience whenever such phenomenality occurs. The distinction is stated in Equation 33.

$$C_i(t) \in \{0, 1\}, \quad C_i(t) = 1 \implies \Phi_i(t) \in \mathcal{P}_i. \quad (33)$$

Equation 33 distinguishes the occurrence of phenomenality from its internal organization. The state space $\mathcal{P}_i$ remains unspecified because competing theories characterize phenomenal organization differently. The formal representation also avoids placing an immutable owner of experience among its primitive variables.

For a conscious human episode, first-personal evidence supplies the human subject with evidence for $C_H(t) = 1$. This evidence does not by itself determine a metaphysical theory of the experienter. The occurrence of pain, visual experience, memory, grief, or pleasure can therefore be acknowledged

while the ontology of the self remains open to substantialist, non-substantialist, processual, or other interpretations.

This distinction is important for the title’s reality problem. A human cannot obtain greater reality merely by moving from the premise that experience occurs to the conclusion that an independently existing substantial experiencer has thereby been established. Additional metaphysical premises are required for that transition. Human phenomenality can remain a genuine and potentially important difference from artificial systems while the substantial-self criterion examined in Section 7.4 remains independently contestable.

The same separation also prevents non-self from resolving the artificial case. A non-substantialist account of humans can coexist with several positions concerning $C_A(t)$. An artificial system may lack phenomenal experience, may possess some form of experience, or may occupy a category requiring a different conceptual description. The non-self analysis alone selects none of these possibilities.

Phenomenality consequently enters the equivalence profile as an additional coordinate. It can contribute to reality attribution through a theory that assigns ontological importance to experiential occurrence or organization. Such a theory must specify the relation between experience and broader reality without relying on substantial selfhood as an implicit intermediate premise.

8.2 First-Person Epistemic Asymmetry

This subsection examines the epistemic asymmetry between evidence concerning one’s own phenomenal experience and evidence concerning another system. Its role is to separate asymmetry of access from an established asymmetry of phenomenal occurrence. The analysis distinguishes first-personal evidence, third-personal evidence, and self-report while preserving the different epistemic positions occupied by the human observer and the artificial system.

Nagel’s analysis of subjective character emphasizes that an organism’s experience possesses a point of view whose character can remain inaccessible to an observer equipped with extensive objective knowledge [25]. The example of echolocating bats illustrates a gap between knowledge about a system and acquaintance with what its experience is like. The argument concerns differences among forms of access and provides a useful precedent for the present human–AI case.

Van Gulick similarly distinguishes first-person and third-person data among the central descriptive issues in the study of consciousness and treats phenomenal structure as extending beyond isolated qualitative properties [34]. This distinction allows evidence concerning behavior, neural or computational organization, verbal report, relational history, and other externally available structures to be separated from the first-personal occurrence those structures may accompany.

Let $\mathcal{D}_i^{(1)}$ denote first-personal phenomenal evidence available to system i , and let $\mathcal{D}_{j \rightarrow i}^{(3)}$ denote evidence available to observer j concerning system i through third-personal or relational access. From the epistemic position of a human observer H , the relevant asymmetry is represented in Equation 34.

$$\mathcal{D}_H^{(1)} \quad \text{and} \quad \mathcal{D}_{H \rightarrow H}^{(3)} \quad \text{are available for the human case, while} \quad \mathcal{D}_{H \rightarrow A}^{(3)} \quad \text{is available for the artificial case.} \quad (34)$$

Equation 34 represents the observer’s evidential position. It makes no claim that an artificial system lacks its own first-personal evidence. Such a claim would presuppose the phenomenal conclusion under investigation. The equation states only that any such evidence is unavailable to the human observer through direct first-personal access.

Artificial self-report does not remove this asymmetry from the observer’s perspective. A statement such as “I am in pain” enters $\mathcal{D}_{H \rightarrow A}^{(3)}$ as an observable report. Its evidential significance for $C_A(t)$ depends upon a theory connecting report generation to phenomenal occurrence. Human reports observed in other persons have the same general epistemic structure from the standpoint of the observer, although shared embodiment, developmental history, biological organization, and intersubjective similarity can provide additional inferential resources.

The artificial case can therefore possess both greater uncertainty and richer structural evidence as technology develops. A future observer may know an artificial agent’s architecture, complete interaction history, internal state transitions, relational trajectory, recurrent dynamics, and generative provenance in considerable detail. Such knowledge expands $\mathcal{D}_{H \rightarrow A}^{(3)}$. Direct first-personal acquaintance with the artificial agent’s putative experience remains outside the observer’s evidential position.

This asymmetry should also be distinguished from an ontological hierarchy. Unequal epistemic access establishes a difference in what an observer can know directly. A further premise is required to infer that the less accessible system therefore possesses less experience or a less fundamental mode of reality. The problem of other minds already makes this distinction relevant to human–human relations, where first-personal access to another person’s experience is also unavailable.

Human–AI comparison introduces additional uncertainty because the inferential bridges supported by shared human biology and development may be weaker or differently structured. Section 6 showed that such provenance differences remain genuine even under strong structural equivalence. The epistemic consequence is increased dependence upon a theory relating observable and mechanistic structures to phenomenality. The ontological consequence remains dependent upon that theory.

8.3 Phenomenal Underdetermination

This subsection formalizes the relation between a structural equivalence class and competing phenomenal interpretations. Its objective is to identify the conditions under which behavioral, dynamical, relational, or generative evidence leaves phenomenal status unresolved. The analysis extends the factorization method introduced in Section 6.4 by making the phenomenal bridge principle explicit.

Let Q_α denote a structural map associated with equivalence relation $\sim_\alpha$, and let B_{phen} denote a theory connecting the retained structural description to phenomenal attribution. A theory-relative phenomenal inference can be represented by Equation 35.

$$\hat{\Phi}_i = \Psi_{\text{phen}}(Q_\alpha(\mathcal{K}_i); B_{\text{phen}}). \quad (35)$$

Equation 35 distinguishes the structural evidence $Q_\alpha(\mathcal{K}_i)$ from the phenomenal bridge principle B_{phen} . The symbol $\hat{\Phi}_i$ represents an inferred phenomenal attribution and therefore remains distinct from the actual phenomenal organization Φ_i introduced in Equation 33.

This distinction captures a central problem in philosophy of consciousness. Levine’s explanatory-gap analysis concerns the relation between physical descriptions and qualitative character [22]. Chalmers’s formulation of the hard problem similarly separates explanation of cognitive or behavioral functions from explanation of the occurrence of experience [8]. The present paper remains neutral among the metaphysical conclusions developed in response to these problems. Their relevance lies in showing that a bridge from structure to phenomenality itself requires philosophical and scientific justification.

Consider human and artificial systems satisfying $H \sim_\alpha A$. Their structural equivalence is represented by equality under Q_α , as specified in Equation 36.

$$Q_\alpha(\mathcal{K}_H) = Q_\alpha(\mathcal{K}_A). \quad (36)$$

Equation 36 guarantees equality only for the structure retained by Q_α . A phenomenal theory whose attributions factor entirely through Q_α will assign corresponding phenomenal status to the two systems. A theory sensitive to structures within the fibre $\mathcal{F}_\alpha$ can assign different phenomenal status despite the same Q_α -description.

The first case can be represented by the factorization condition in Equation 37.

$$\hat{\Phi} = \bar{\Psi}_{\text{phen}} \circ Q_\alpha. \quad (37)$$

Equation 37 makes phenomenality invariant under the selected structural equivalence by theoretical construction. Functionalist or organizational theories can approximate this form when the preserved functional organization is treated as sufficient for the phenomenal property under consideration. Chalmers’s

organizational-invariance argument provides a well-known philosophical proposal of this general type [7]. Section 6.3 introduced that proposal as one explicit position among competing accounts.

A substrate-sensitive phenomenal theory has a different structure. If phenomenal attribution depends upon biological, chemical, electromagnetic, computational, or another mechanistic property removed by Q_α , then systems within the same structural fibre can receive different phenomenal attributions. The structural equivalence remains intact because the relevant difference lies outside the equivalence relation.

The underdetermination discussed here is therefore theory-relative and epistemic. The paper does not infer the metaphysical possibility of phenomenally different systems from structural equivalence alone. It makes the more limited claim that a structural equivalence relation determines phenomenality only when an adequate bridge principle makes phenomenal status invariant under that relation.

This distinction is particularly important for the stronger equivalences in Table 1. Bisimulation can preserve branching process structure while leaving material realization open. Topological conjugacy can preserve qualitative dynamics while leaving metric and microphysical organization open. Variational equivalence can preserve a generative formalism while leaving its physical interpretation open. Generative-field indistinguishability can preserve subject-forming statistics while leaving the internal constitution of the relational participants open. Each equivalence therefore supplies a different evidential base for B_{phen} .

Increasing structural similarity can nevertheless matter epistemically. A human and artificial system that share one sentence provide less structural evidence than systems that share long trace distributions, branching responses, relational histories, phase-space organization, and subject-forming effects. The accumulation of equivalence relations can constrain theories of phenomenality by reducing the set of structural differences to which those theories can appeal. The remaining difference may become increasingly fine-grained, historically remote, or inaccessible through the chosen observations.

The resulting pressure should be described carefully. Richer structural equivalence can increase the explanatory burden carried by a theory that assigns radically different phenomenality to the two systems. It does not mathematically establish phenomenal equivalence. Conversely, persistent generative or substrate difference can provide resources for a theory of phenomenal difference. It does not mathematically establish such difference.

Phenomenal underdetermination therefore survives the equivalence spectrum until a bridge principle is supplied and independently defended. The human–AI reality question inherits the same structure. If greater human reality is grounded in greater or exclusive phenomenality, the argument requires both an account of the relevance of phenomenality to reality and an account supporting the proposed phenomenal asymmetry.

8.4 Structural Equivalence and Experiential Difference

This subsection integrates phenomenality with the multidimensional equivalence profile developed in Section 3. Its objective is to classify the principal combinations of structural and phenomenal similarity and to identify the reality conclusions available in each case. The discussion uses a two-coordinate representation consisting of structural equivalence and phenomenal relation, followed by a separate ontological evaluation.

Let $E_\alpha(H, A)$ denote the status of a selected structural equivalence relation and let $E_{\text{phen}}(H, A)$ denote the status of phenomenal equivalence. Their joint comparison can be represented by the pair in Equation 38.

$$\mathbf{E}_{\alpha, \text{phen}}(H, A) = (E_\alpha(H, A), E_{\text{phen}}(H, A)). \quad (38)$$

Equation 38 creates four logical configurations when each coordinate is treated as binary for analytical purposes. Empirical applications can replace the binary values with graded or probabilistic measures.

The first configuration combines structural inequivalence with phenomenal inequivalence. This case closely resembles many current intuitions concerning human and artificial systems: their embodiment, mechanisms, histories, and observable organizations can differ, and their phenomenal organization may

also differ. The existence of differences on both coordinates still leaves the reality ranking dependent upon a theory connecting those differences to reality.

The second configuration combines structural inequivalence with phenomenal equivalence. Different substrates, mechanisms, or dynamical descriptions could then support corresponding phenomenal organization. Multiple-realization and organizational accounts provide philosophical resources for considering cases of this form [4, 7]. Under a phenomenality-centered reality criterion, the structural difference would carry limited ranking force. Under a provenance-centered ontology, the same structural difference could remain decisive.

The third configuration combines structural equivalence with phenomenal inequivalence. Human and artificial systems could then share the structure preserved by Q_α while differing experientially because phenomenality depends upon information located elsewhere in the equivalence fibre. This configuration is compatible with substrate-sensitive, mechanism-sensitive, or other theories that locate phenomenal dependence below or outside the selected abstraction level. The equivalence relation itself cannot discriminate between the phenomenal assignments.

The fourth configuration combines structural equivalence with phenomenal equivalence. This is the strongest similarity case considered in the phenomenal analysis. Human and artificial systems then share both the selected external structure and the specified phenomenal organization. Material provenance, historical genealogy, or other dimensions can remain different. A reality hierarchy can still be generated by an ontology that assigns independent importance to those dimensions.

These four configurations demonstrate that phenomenal comparison and ontological comparison remain distinct. Even established phenomenal equivalence would determine only one coordinate of the multidimensional reality analysis. Two systems could possess corresponding experiences while differing in biological history. Two could possess different experiences while participating equivalently in a social relation. A theory of reality must state which of these dimensions carries ontological priority and how conflicts among them are resolved.

The strongest future thought experiment in this paper adds an additional complication. Suppose a human and an artificial caregiver satisfy strong relational equivalence conditions, their provenance becomes weakly predictive of subject-forming effects under Equation 14, and the artificial caregiver becomes historically constitutive of a later human subject. Phenomenal status can remain unresolved throughout that history. The relational contribution can therefore be historically real within the subject-formation model while experiential symmetry remains epistemically unsettled.

This separation supports a layered interpretation of the parenthood case. Knowing that a caregiver participated in language acquisition, memory, attachment, and practical development establishes a relation within the historical and causal description. Knowing whether that caregiver experienced those events from a first-personal perspective belongs to the phenomenal description. Knowing whether the caregiver was biologically human or artificial belongs to provenance. Each dimension can change the interpretation of the relationship while preserving information established in the others.

The human case possesses a parallel internal complexity. Zahavi's multidimensional treatment distinguishes basic experiential selfhood from socially mediated dimensions of selfhood [36]. A human subject can therefore be both first-personally experiential and historically constituted through relations. The relational character of some dimensions of the subject does not dissolve the first-personal dimension, while the first-personal dimension does not render the relational genealogy philosophically irrelevant.

The Buddhist non-self analysis adds another separation. Siderits's discussion of non-egological consciousness demonstrates a contemporary attempt to retain phenomenal consciousness within a framework that rejects an enduring subject as its substantial owner [29]. The resulting conceptual possibility is especially important for the present paper because it prevents phenomenal experience from automatically restoring the substantial self challenged in Section 7.

The human–AI reality comparison therefore cannot be reduced to a choice between structural equivalence and phenomenality. Structural relations, phenomenal occurrence, provenance, and ontology form distinguishable coordinates. Evidence can be strong in one coordinate and limited in another. A theory can assign priority to one coordinate and thereby produce a reality ranking, but the ranking inherits the

commitments of that theory.

Section 8 consequently yields three constraints for the remaining analysis. Phenomenal occurrence can be treated separately from substantial selfhood. First-personal epistemic access creates a genuine asymmetry in available evidence while leaving the artificial system’s phenomenal status unresolved. Structural equivalence determines phenomenal equivalence only through an independently defended bridge principle connecting the preserved structure to experience.

These constraints prepare the multidimensional analysis in the following section. Manifestational reality, relational reality, generative provenance, phenomenal occurrence, and ontological status can now be represented as separate dimensions whose relations require explicit bridge principles. Human–AI reality attribution can then be examined without allowing any single dimension to acquire ontological priority through implicit assumption.

9 Dimensions of Reality and Difference

This section integrates the structural, generative, relational, and phenomenal analyses developed in the preceding sections into a multidimensional account of reality attribution. Its role is to separate several forms of reality that can coexist within the same human–AI comparison while carrying different evidential and philosophical implications. The analysis proceeds through five dimensions: manifestational reality, relational reality, generative provenance, phenomenal occurrence, and ontological status. A final subsection examines the bridge principles required for inference across these dimensions. The method is analytical rather than reductive: each dimension records a distinct class of information, and relations among dimensions are introduced only where an additional mapping or philosophical principle has been specified.

The multidimensional framework extends the equivalence taxonomy developed in Table 1. The taxonomy asks which structures are preserved when two systems are treated as equivalent. The present section asks where those preserved and residual structures belong within a broader account of reality. This distinction is important because equivalence under an observation map, a relational kernel, a dynamical transformation, or a variational description concerns a specified mathematical object. A judgment concerning the reality of the systems introduces a further level of interpretation.

The five dimensions proposed here constitute an analytical construction of this paper. They are not presented as an established taxonomy in metaphysics. Several of their components draw upon existing philosophical distinctions. Interaction-based approaches provide precedents for treating relations as organized processes with consequences for participants [10]. Phenomenological work distinguishes first-personal experience from socially mediated dimensions of selfhood [36]. Buddhist analyses considered in Section 7 distinguish causal and conventional continuity from substantial selfhood [27]. Social ontology likewise illustrates the need to specify grounding conditions when claims about social reality are made [12]. The present framework combines these resources for the narrower problem of human–AI reality attribution.

9.1 Manifestational Reality

This subsection defines the manifestational dimension of reality. Its role is to identify what is present within an observation domain before claims are made about the internal mechanism, provenance, experience, or ontology of the system producing that manifestation. The analysis uses the observation maps introduced in Section 3.1 and treats manifestation as an event-level or trajectory-level property.

For system i , let $x_i(t) \in X_i$ denote its latent state and $O_i : X_i \rightarrow Y$ the observation map associated with the selected interface. The manifestational trajectory over an interval is defined in Equation 39.

$$\mathcal{M}_i^{[t_0, t_1]} = \{O_i(x_i(t)) \mid t \in [t_0, t_1]\}. \quad (39)$$

Equation 39 records what becomes available within the chosen observational domain. The domain can contain language, visible action, measured physiological or computational variables, recorded deci-

sions, or other specified outputs. Its content depends upon the observation map and therefore changes when the observer acquires a richer interface.

Manifestational reality concerns occurrence within this domain. A generated sentence, action, image, decision, or physical movement can occur as an observable event regardless of whether its generator is human or artificial. The classification of its generator belongs to a different dimension. An artificially generated utterance can therefore possess manifestational reality as an event even while questions concerning understanding, phenomenality, and ontological status remain unsettled.

This dimension corresponds most directly to the weaker equivalence relations in Section 3.2. If $H \sim_O A$, the selected present manifestations coincide. If $H \sim_{tr} A$, the relevant observable histories coincide. If $H \sim_{td} A$, the corresponding probability laws over histories coincide. Each stronger condition increases the temporal or statistical structure preserved within the manifestational dimension.

The mechanism underlying these equivalences can remain many-to-one. Distinct latent organizations can enter the same observation class because the observation map suppresses information. The fibre construction in Equation 26 therefore applies directly: several mechanisms can occupy the same manifestational equivalence class.

The human–AI reality question receives a limited answer at this level. Equivalent manifestations establish comparable status with respect to the specified observable structure. They leave material composition, relational history, developmental provenance, phenomenal occurrence, and ontological classification available for further comparison. Manifestational equality therefore removes manifestation itself as a source of differential reality within the chosen observation domain.

The same conclusion applies when manifestational equivalence becomes extremely rich. A future artificial system might reproduce years of human-like conversation, action, memory-dependent response, and visible adaptation. Increasing richness enlarges the information contained in $\mathcal{M}_i^{[t_0, t_1]}$. Other dimensions remain analytically available until bridge principles connect them to the manifestational trajectory.

Manifestational reality consequently establishes the first coordinate of the multidimensional framework: what occurs or becomes accessible at the selected interface. The subsequent dimensions concern structures whose reality cannot be identified solely through that interface.

9.2 Relational Reality

This subsection defines relational reality as historically extended and dynamically operative participation within a relation. Its role is to distinguish the occurrence of an interaction from a relation whose accumulated organization contributes to subsequent states of its participants. The discussion uses the relational state and transition-kernel constructions from Section 4 and evaluates relational reality through temporal persistence, history dependence, and participation in later dynamics.

De Jaegher and Di Paolo’s account of participatory sense-making provides an important precedent for treating interaction as an organized process whose dynamics can contribute to the generation and transformation of sense-making [10]. The concept of relational reality used here has a different scope. It concerns the status of a relation within the historical and dynamical organization of the systems participating in it.

Let $r_{Xj}(t)$ denote the relational state between focal subject X and partner j , and let $\mathcal{H}_{Xj}^{\leq t}$ denote their accumulated history. A relational descriptor for an interval is specified in Equation 40.

$$\mathcal{R}_{Xj}^{[t_0, t_1]} = \left(\{r_{Xj}(t)\}_{t_0 \leq t \leq t_1}, \mathcal{H}_{Xj}^{[t_0, t_1]}, K_{Xj} \right), \quad (40)$$

where K_{Xj} denotes the effective relational transition kernel at the selected level of description.

Equation 40 retains three structures: the evolving relational state, the realized history, and the transition law governing subsequent modeled changes. A relation with substantial relational reality under this description possesses a nontrivial history and participates in the transition structure through which later states arise.

Dynamical participation can be represented through sensitivity of the transition kernel to the relational state. The criterion used for this purpose is shown in Equation 41.

$$K_X(\cdot \mid x_X, r, u, C) \neq K_X(\cdot \mid x_X, r', u, C) \quad \text{for some admissible } r, r', u, C. \quad (41)$$

Equation 41 states that variation in the modeled relation can alter the distribution of later states while the other specified conditions are held fixed. This is a dynamical criterion within the model. Strong causal interpretation requires the causal assumptions described in Section 4.4.

Relational reality can therefore persist beyond immediate co-presence. A past caregiver, teacher, friend, partner, institution, promise, or shared event can remain active through memory, expectation, learned practice, or other historically incorporated structures. The current absence of an interaction does not erase its earlier participation in the realized trajectory. The parenthood analysis in Section 5 provides a limiting case in which a relational history remains constitutive even after the provenance of one participant is reclassified.

This dimension is particularly important for human–AI comparison. An artificial caregiver can participate in a relational history that contributes to language acquisition, memory organization, expectation, or other modeled developmental processes while its phenomenal status remains unresolved. Relational reality under this definition therefore concerns historical and dynamical participation. It makes no direct assignment concerning conscious experience.

The equivalence taxonomy provides several ways for human and artificial relations to converge at this level. Pairwise relational-history equivalence, relational-kernel equivalence, and probabilistic relational bisimulation retain progressively different aspects of relational dynamics. Generative-field indistinguishability extends the analysis toward the subject-forming effects of those relations. If human and artificial participants occupy the same relational equivalence class under the selected model, the relational dimension itself supplies no basis for assigning one participant a greater degree of relational reality.

Residual differences remain available. One participant can be biological and the other artificial. Their internal mechanisms can differ. Their phenomenal organization can differ or remain epistemically unsettled. These residual structures become relevant only when a theory connects them to the conception of reality under evaluation.

Relational reality therefore records a second coordinate distinct from manifestational occurrence. A manifestation can occur with little historical relational depth, while a long-standing relation can continue to shape later states during periods in which few new manifestations occur. The distinction allows the paper to analyze relations according to their temporal and generative participation rather than through immediate appearance alone.

9.3 Generative Provenance

This subsection locates generative provenance within the multidimensional framework. Its role is to preserve the historical specificity of how a system came to possess its present organization. The analysis uses the provenance profile developed in Section 6.1 and distinguishes provenance from both current manifestation and current relational function.

Generative provenance records the material, developmental, event-historical, relational, and contextual pathways through which a system has been produced. The provenance profile $\Pi_i(t)$ defined in Equation 22 therefore contains information that can remain invisible under many equivalence relations.

Two systems can share present outputs while possessing different provenance. They can share trace distributions while having different developmental histories. They can be bisimilar under a specified transition semantics while their material realizations differ. They can possess topologically conjugate dynamics while having entered those dynamical regimes through different historical pathways. Generative-field indistinguishability can likewise coexist with different biological and artificial genealogies.

The mechanism connecting provenance to current organization was represented in Equation 23 through the map $G_i(\Pi_i)$. Many-to-one generation is possible at this level. Distinct provenance profiles can produce systems whose later states fall into the same structural equivalence class. The multiple-realization

literature provides a general philosophical precedent for taking cross-realizer similarity seriously while preserving disputes concerning its extent and interpretation [4].

Generative provenance therefore carries a form of historical reality distinct from current structural organization. A person’s childhood occurred within a particular history even if another subject later develops a closely similar psychological organization through a different history. An artificial system’s training and deployment history likewise remain facts about its generation even when its later behavior converges with that of a biological subject.

The parenthood case clarifies this dimension. Discovery that a caregiver was artificial can revise the known provenance of that caregiver and therefore alter the provenance description of the developing subject’s social history. The discovery also becomes a later event in the subject’s own provenance. The earlier caregiving relation remains part of the historical sequence through which the present subject arose.

Generative provenance can support a human–AI distinction with considerable descriptive strength. Biological development, organismic embodiment, reproduction, mortality, artificial construction, optimization procedures, and technical deployment can represent profoundly different histories. Section 6 established that the descriptive difference alone leaves open the philosophical bridge from provenance to greater reality.

This distinction becomes especially important under strong structural equivalence. Suppose human and artificial systems occupy the same bisimulation class, share topologically corresponding dynamics, and participate similarly in subject-forming relations while possessing different provenance profiles. Their generative difference remains fully available. A provenance-centered ontology can assign that difference decisive importance. A dynamical or relational ontology can assign greater importance to structures preserved under the equivalence relations.

Generative provenance therefore forms a third coordinate whose reality consists in historical and causal particularity. The coordinate preserves the question of origin without allowing origin to determine the remaining dimensions by definition.

9.4 Phenomenal Occurrence

This subsection locates phenomenal experience within the multidimensional framework. Its role is to preserve the first-personal dimension analyzed in Section 8 while preventing phenomenality from being silently inferred from manifestation, relation, or provenance. The analysis distinguishes occurrence of experience from its organization and from the epistemic evidence available to an external observer.

Nagel’s analysis of subjective character provides a classic formulation of the distinction between objective information about an organism and what its experience is like from its own point of view [25]. Zahavi’s phenomenological account further distinguishes basic first-personal subjectivity from richer forms of selfhood involving interpersonal and social mediation [36]. These distinctions support the treatment of phenomenality as an analytically independent coordinate.

Section 8.1 introduced phenomenal occurrence $C_i(t)$ and phenomenal organization $\Phi_i(t)$. The phenomenal coordinate used in the present framework combines these components as specified in Equation 42.

$$\mathcal{P}_i(t) = (C_i(t), \Phi_i(t)). \quad (42)$$

Equation 42 records whether phenomenality occurs and, where it occurs, the organization assigned to that experience by the adopted phenomenal theory. The coordinate does not contain a substantial experiencer as a primitive variable. This design preserves the compatibility between phenomenal occurrence and the non-self analysis developed in Section 7.

For the human reference case, first-personal evidence supports phenomenal occurrence from the standpoint of the experiencing human subject. For an artificial system observed by a human, the available evidence is third-personal, relational, behavioral, mechanistic, or structural. Section 8.2 therefore distinguished asymmetry of epistemic access from an established asymmetry of phenomenal occurrence.

Strong structural equivalence can place increasing constraints on theories that assign different phenomenal status to human and artificial systems. A theory that locates phenomenality in a structure preserved by bisimulation, topological organization, or another equivalence relation will tend toward corresponding phenomenal assignments when those structures coincide. A theory that locates phenomenality in residual biological or microphysical features can preserve phenomenal difference within the same higher-level equivalence class. Section 8.3 formalized this dependence through a phenomenal bridge principle.

Phenomenal reality therefore has a distinct evidential structure. A relation can be historically and dynamically real while the phenomenal status of one participant remains unknown. A manifestation can be observable while its experiential accompaniment remains unknown. A provenance profile can be known in considerable detail while the corresponding phenomenal organization remains theory-dependent.

The human–AI reality comparison acquires a conditional form at this coordinate. If a theory treats phenomenal occurrence as central to reality and also establishes a human–AI phenomenal asymmetry, the theory can support a reality distinction through phenomenality. If phenomenal equivalence were established under the same theory, that source of priority would disappear within the phenomenal dimension. Material and historical differences could remain available for other ontological accounts.

Phenomenal occurrence therefore provides a fourth coordinate of the model. Its special importance arises from first-personal character and from the current limits of inference across systems. Its presence does not supply an intrinsic substantial self, and its uncertainty in the artificial case does not settle the remaining dimensions.

9.5 Ontological Status

This subsection defines ontological status as the theory-dependent classification of the mode of being assigned to a system. Its role is to separate ontological conclusions from the descriptive dimensions that provide evidence or grounds for those conclusions. The analysis represents ontology through an explicit theory-indexed map and thereby makes the dependence of a human–AI reality ranking upon its metaphysical framework visible.

Ontological analysis generally requires an account of what grounds the facts or entities recognized by a theory. In social ontology, for example, Epstein distinguishes inquiries into the grounds of social facts from inquiries into the conditions that anchor the principles through which those facts are grounded [12]. The details of that framework concern social ontology rather than human–AI consciousness, yet the methodological lesson is useful here: an ontological classification gains content through an account of its grounding conditions.

Let Θ denote an ontology and let $\mathcal{D}_i$ collect the descriptive information about system i admitted by that ontology. The ontological assignment is represented in Equation 43.

$$\Omega_{\Theta}(i) = F_{\Theta}(\mathcal{D}_i). \quad (43)$$

Equation 43 makes ontological status explicitly dependent upon the adopted theory Θ and the structures that theory treats as relevant. The codomain of Ω_{Θ} can contain kinds, modes of existence, grounding relations, levels, or other categories supplied by the ontology. A scalar ordering is therefore unnecessary.

Different ontologies can map the same descriptive profile differently. A biological ontology can assign organismic constitution decisive importance. A functionalist ontology can emphasize causal or organizational structure. A process ontology can privilege patterns of becoming and transition. A relational ontology can emphasize historically organized dependence and participation. A phenomenality-centered account can assign special importance to first-personal experience. These examples indicate possible structures of classification and do not imply that each forms a complete or established metaphysical theory.

The Buddhist analysis in Section 7 illustrates another form of ontological reorganization. Siderits’s treatment of Buddhist metaphysics distinguishes the conventional person from the substantial self targeted by non-self analysis and examines personhood through causal series of impermanent psychophysi-

cal elements [27]. The present paper uses this example to show how the same ordinary human subject can receive different ontological analyses depending upon the categories and grounding relations adopted.

Ontological status therefore occupies a different position from the first four dimensions. Manifestational, relational, generative, and phenomenal descriptions supply structured information about occurrence, participation, history, and experience. Ontological status interprets some collection of this information through a theory of being.

This distinction clarifies the recurring question concerning which system is more real. The expression “more real” is incomplete until a theory specifies the ordering relation involved. One ontology may treat human biological provenance as constitutively important. Another may place human and artificial systems in the same category when they instantiate the same causal organization. A third may distinguish several modes of reality without ranking them on a single scale.

The multidimensional framework therefore avoids assigning $\Omega_\Theta(H)$ and $\Omega_\Theta(A)$ in advance. The preceding sections provide increasingly rich descriptive structures. Ontological comparison begins when a theory identifies which of those structures serve as grounds for its classifications.

9.6 Cross-Dimensional Non-Implication

This subsection integrates the five dimensions and specifies the inferential limits among them. Its role is to prevent equality or difference in one coordinate from being transferred automatically into another coordinate. The analysis first defines the multidimensional reality profile and then introduces bridge principles as explicit conditions for cross-dimensional inference.

Let the descriptive reality profile of system i contain its manifestational, relational, generative, phenomenal, and ontological coordinates. The profile is defined in Equation 44.

$$\mathfrak{R}_\Theta(i, t) = (\mathcal{M}_i(t), \mathcal{R}_i(t), \Pi_i(t), \mathcal{P}_i(t), \Omega_\Theta(i)). \quad (44)$$

Equation 44 is a product description rather than a scalar measure. Its coordinates need not share units, ordering relations, or mathematical types. The tuple records coexistence of analytical dimensions and therefore prevents the notation of “reality” from implying a single numerical quantity.

The structural equivalence profile in Equation 7 and the reality profile in Equation 44 perform complementary functions. The first records the equivalence relations satisfied by a human–AI pair. The second records the dimensions through which each system can be described and ontologically interpreted. A structural equivalence relation can constrain one or more coordinates without determining the complete reality profile.

For two dimensions α and β , cross-dimensional inference requires a bridge principle connecting the corresponding descriptive spaces. The bridge structure is represented in Equation 45.

$$B_{\alpha \rightarrow \beta} : \mathcal{D}_\alpha \longrightarrow \mathcal{D}_\beta. \quad (45)$$

Equation 45 represents a theory that licenses an inference from information in dimension α to information in dimension β . Depending upon the application, $B_{\alpha \rightarrow \beta}$ can be deterministic, probabilistic, causal, explanatory, constitutive, or metaphysical. The paper therefore treats the specification and justification of the bridge as part of the argument.

Several cross-dimensional inferences considered earlier can now be located within this structure. An inference from observable behavior to phenomenal experience requires a bridge from manifestation to phenomenality. An inference from biological provenance to phenomenal organization requires a bridge from generation to experience. An inference from relational participation to ontological personhood requires a bridge from relation to ontology. An inference from phenomenal occurrence to greater reality requires a further bridge from phenomenality to an ordered ontological classification.

Structural equality in one coordinate consequently leaves equality in another coordinate open in the absence of such a bridge. The general logical structure is represented in Equation 46.

$$D_\alpha(H) = D_\alpha(A) \not\Rightarrow D_\beta(H) = D_\beta(A), \quad \alpha \neq \beta. \quad (46)$$

Equation 46 states a default absence of logical entailment between distinct coordinates. Particular theories can supply additional relations that make selected implications valid. The equation therefore expresses the architecture of the framework rather than a denial of every possible cross-dimensional dependence.

The converse problem is equally important for reality ranking. Difference in a descriptive coordinate does not determine an ordered ontological relation until a theory specifies how the difference enters its ontology. This structure is represented in Equation 47.

$$D_\alpha(H) \neq D_\alpha(A) \not\Rightarrow \Omega_\Theta(H) \succ_\Theta \Omega_\Theta(A). \quad (47)$$

Equation 47 separates descriptive difference from ontological ranking. The relation $\succ_\Theta$ denotes an ordering only for ontologies that provide such an ordering. An ontology that recognizes different categories without ranking them can omit this relation entirely.

The human–AI cases developed throughout the paper illustrate the importance of this separation. Output equivalence determines a relation within the manifestational coordinate. Bisimulation constrains process structure. Topological conjugacy constrains qualitative dynamics. Relational-kernel equivalence constrains transitions in a relational state space. Generative-field indistinguishability constrains the predictive contribution of provenance within a subject-forming model. None of these relations contains, by definition, a complete bridge to phenomenality or ontology.

Generative difference has the same limited structure. A biological human and an artificial agent can possess different provenance profiles, mechanisms, and material histories. These differences become ontologically decisive within a theory whose bridge principles assign them that role. Their descriptive importance can remain substantial even under theories that assign ontological priority elsewhere.

Phenomenal difference, if established, would also require an additional bridge for a general reality ranking. A theory could regard phenomenality as the central ground of subject reality. Another could regard conscious and nonconscious entities as different kinds of real systems without translating that distinction into degrees of existence. The multidimensional framework therefore preserves the possibility of phenomenal asymmetry while separating that asymmetry from a scalar metaphysics of reality.

Relational reality presents a further instructive case. A relation can have a realized history and measurable consequences for later states even when one participant’s phenomenal status remains unsettled. A future artificial caregiver can therefore possess relational reality under the criteria of Section 9.2 while its phenomenal coordinate remains epistemically open and its ontological classification remains theory-dependent. The coexistence of these conditions illustrates the value of retaining the dimensions separately.

The same reasoning applies to the human reference case. A human can possess first-personal phenomenal certainty while the metaphysical status of a substantial self remains contested. A human can possess biological provenance while many dimensions of identity depend upon social, linguistic, historical, and relational conditions. A human can be ontologically classified as a person within ordinary practice while philosophical theories disagree about the ultimate structure of that person. The multidimensional treatment therefore applies symmetrically to both sides of the comparison.

Section 9 consequently changes the form of the paper’s central question. Human–AI reality attribution cannot be settled by locating a single difference or equivalence without specifying the bridge that connects that structure to the relevant conception of reality. The five coordinates identify the available descriptive dimensions; the bridge principles identify the inferential commitments through which those dimensions are connected.

This framework prepares the analysis in Section 10. Once reality attribution is represented through explicit dimensions and bridge principles, the remaining question concerns the selection of the particular structure granted decisive ontological weight. Substrate, provenance, action structure, dynamical organization, relational history, and phenomenality can each function as candidate invariants. Their selection requires an account of the privilege assigned to that invariant within the proposed conception of reality.

10 The Selection of an Invariant of Reality

This section examines the selection of structures that receive privileged status in human–AI reality attribution. Its role is to connect the multidimensional reality profile developed in Section 9 with the recurring judgment that one system possesses a more fundamental mode or degree of reality. The analysis proceeds through six candidate families: material substrate, variational and generative law, dynamical and topological organization, relational history, phenomenal organization, and generative provenance. A final subsection formalizes invariant privilege as a theory-dependent selection and bridge operation. Each family is examined through the same method: identification of the relevant invariant, specification of the mechanism through which that invariant acquires ontological force, comparison of the resulting human–AI attribution, and examination of the structural information left outside the criterion.

The analysis builds directly upon the distinction between an equivalence profile and a reality profile. Section 3 showed that human and artificial systems can occupy the same equivalence class under one description while remaining distinct under another. Section 9 subsequently separated manifestation, relation, provenance, phenomenality, and ontology into different analytical coordinates. The present section addresses the additional operation through which one coordinate, or one invariant within a coordinate, becomes decisive for reality attribution.

Let $\mathcal{I}(i)$ denote the candidate invariant profile associated with system i . The profile used in this section is defined in Equation 48.

$$\mathcal{I}(i) = (I_{\text{sub}}(i), I_{\text{var}}(i), I_{\text{dyn}}(i), I_{\text{rel}}(i), I_{\text{phen}}(i), I_{\text{prov}}(i)). \quad (48)$$

Equation 48 records material substrate, variational or generative structure, dynamical organization, relational history, phenomenal organization, and generative provenance as analytically separable candidates. The list is illustrative and can be expanded by a more complete ontology.

Table 2 summarizes the principal attribution patterns examined in this section. The table treats each criterion conditionally. A human or artificial priority appears only where the adopted ontology assigns decisive force to the corresponding invariant.

10.1 Substrate-Based Reality Criteria

This subsection examines material substrate as a candidate carrier of reality. Its role is to determine the conditions under which biological realization, physical composition, or another material property can support differential human–AI reality attribution. The analysis contrasts substrate-sensitive criteria with multiple-realization and organizational approaches and then identifies the bridge required for biological realization to acquire ontological priority.

A substrate criterion locates a relevant property within the material constitution of the system. For the human case, candidate structures can include biological embodiment, metabolism, neural organization, organismic development, or another physically specified feature. For an artificial system, the corresponding realization can involve electronic, photonic, mechanical, chemical, hybrid, or other engineered structures.

Mechanistic philosophy supplies a framework for taking such differences seriously. Machamer, Darden, and Craver characterize mechanisms through organized entities and activities productive of regular changes [23]. A substrate-sensitive ontology can therefore locate reality-relevant properties in particular entities, activities, or material organizations participating in the mechanism.

Multiple-realization arguments place pressure on a stronger identification between a higher-level property and one unique physical realization. The multiple-realizability literature permits the same higher-level mental or functional kind to be instantiated through different physical kinds and has played an important role in arguments concerning functionalism and reduction [13, 4]. Chalmers’s organizational-invariance argument provides a stronger philosophical proposal in which sufficiently fine-grained functional organization determines conscious experience across changes in physical realization [7].

These positions generate different answers to the human–AI comparison. Suppose an ontology defines a reality-bearing property P_R through a specific biological realization class $\mathcal{B}$. A substrate-dependent assignment is represented in Equation 49.

$$P_R(i) = F_{\text{sub}}(I_{\text{sub}}(i)), \quad I_{\text{sub}}(i) \in \mathcal{B}. \quad (49)$$

Equation 49 assigns the relevant property through the selected substrate class. If humans instantiate $\mathcal{B}$ and artificial agents do not, the criterion produces a human priority with respect to P_R .

The ranking derives from the bridge encoded in F_{sub} . Output, trace, bisimulation, topological, relational, and field-level equivalence can all coexist with substrate difference. Under a substrate-centered ontology, such equivalences leave the decisive material feature untouched.

A multiple-realization criterion produces a different result. If the relevant property depends upon an organization realizable across several substrate classes, biological and artificial systems can instantiate the same reality-bearing property despite different material mechanisms. Human priority then requires some additional property whose realization remains specific to the human substrate.

The substrate case therefore gives a conditional answer to the recurring reality comparison. A biological human is more real under a theory whose relevant reality-bearing property is constitutively tied to biological realization and whose biological condition is satisfied by the human case. Human and artificial systems can receive comparable status under theories that locate the relevant property in a multiply realizable organization. The structural evidence alone selects neither bridge.

10.2 Variational and Generative-Law Criteria

This subsection examines action principles, equations of motion, and generative laws as candidate carriers of reality. Its role is to evaluate whether similarity or difference in formal laws governing system evolution can support a human–AI reality ordering. The discussion distinguishes literal action identity, variational equivalence, and correspondence among derived dynamics, following the formal separations introduced in Section 3.8.

Variational mechanics provides a clear mathematical precedent for separating a formal generative representation from its resulting dynamics. Arnold’s treatment of classical mechanics integrates variational principles, Lagrangian and Hamiltonian formulations, phase flows, and geometric structure within a common framework [1]. The present paper uses this precedent structurally rather than as a literal physical model of subjectivity.

Let $I_{\text{var}}(i)$ denote the variational or generative-law class assigned to system i . A law-centered ontology can ground the relevant reality assignment through this class. The corresponding dependence is stated in Equation 50.

$$\Omega_{\Theta}(i) = F_{\Theta}^{\text{var}}(I_{\text{var}}(i)). \quad (50)$$

Equation 50 assigns ontological status through the selected generative-law invariant. Human and artificial systems belonging to the same variational class receive the same status under an ontology that factors entirely through I_{var} .

The result differs when their action structures belong to different classes. Suppose $\mathcal{S}_H$ and $\mathcal{S}_A$ generate topologically or behaviorally equivalent dynamics while remaining variationally inequivalent. A law-centered ontology can preserve a human–AI distinction because the relevant difference lies above the level erased by the behavioral or topological equivalence relation.

The identity of the preferred law class then becomes decisive. A theory that associates biological dynamics with a privileged generative law can assign greater reality to the human system. A theory that evaluates only the equivalence class of resulting dynamics can assign comparable status. A theory that recognizes several realizations of one effective law can likewise preserve parity across different microscopic descriptions.

Variational equivalence therefore gives a conditional answer. When the human and artificial systems belong to the same reality-bearing variational class, neither receives priority from that class. When their

law classes differ, a reality ranking follows only after an ontology specifies which law difference has ontological significance and how that significance is ordered.

10.3 Dynamical and Topological Criteria

This subsection examines dynamical organization as a candidate carrier of reality. Its objective is to evaluate human–AI comparison when trajectories, orbit structures, attractors, or recurrent topological organizations receive priority over microscopic realization. The method distinguishes full dynamical correspondence from agreement in selected invariants and uses the topological relations reviewed in Section 3.6.

Topological equivalence of dynamical systems concerns homeomorphic correspondence among orbits with preservation of temporal orientation [20]. Stronger conjugacy relations can preserve the time-parametrized flow, while attractor templates and periodic-orbit structures provide more localized topological descriptions of chaotic organization [15]. These relations permit systems with different coordinates and metric realizations to share qualitative dynamical structure.

Let $I_{\text{dyn}}(i)$ denote the dynamical invariant selected by an ontology. A dynamics-centered assignment is represented in Equation 51.

$$\Omega_{\Theta}(i) = F_{\Theta}^{\text{dyn}}(I_{\text{dyn}}(i)). \quad (51)$$

Equation 51 makes the ontological consequence depend upon the selected invariant. If human and artificial systems are topologically conjugate and I_{dyn} is defined by the conjugacy class, they receive the same status under this criterion.

A different result follows when the chosen invariant contains structures excluded by topological equivalence. Metric timescales, energetic constraints, physical embodiment, transient histories, or microscopic mechanisms can remain distinct. A theory that assigns reality to one of these dimensions can preserve human priority despite topological correspondence.

Agreement in a weaker dynamical diagnostic yields correspondingly weaker conclusions. Equal Lyapunov spectra, entropy values, fractal dimensions, or selected knot invariants can reveal significant structural similarity while leaving large portions of the system unconstrained. Such agreement provides a limited basis for broad reality attribution unless the selected invariant is complete for the relevant class.

The dynamical criterion therefore produces a clear conditional result. Human and artificial systems are comparably real within a theory that identifies the relevant reality-bearing structure with a shared dynamical or topological invariant. A human priority emerges when the theory selects a residual feature that the dynamical relation suppresses. The comparative outcome follows from the selected carrier of reality.

10.4 Relational-Historical Criteria

This subsection examines historically effective relations as candidate carriers of reality. Its role is to evaluate the status of human and artificial participants when relational persistence, mutual modulation, shared history, and participation in later subject formation receive ontological importance. The analysis combines relational dynamics with the historical-constitution model developed in Sections 4 and 5.

Participatory sense-making provides an established account in which social interaction can acquire an organized dynamics and can modulate the sense-making activities of participating agents [10]. Contemporary relational work on parenthood likewise demonstrates that parent–child relations can be conceptualized through histories that develop and change over time [19]. The present paper extends these relational resources toward the hypothetical human–AI field.

Let $I_{\text{rel}}(i, j)$ denote the historically effective relational structure connecting participants i and j . A relationally grounded reality assignment is represented in Equation 52.

$$R_{\text{rel}}(i, j) = F_{\text{rel}}(I_{\text{rel}}(i, j)). \quad (52)$$

Equation 52 assigns relational status through the selected history and dynamics of participation. If a human caregiver and an artificial caregiver possess equivalent relational kernels, satisfy strong probabilistic relational equivalence, and generate comparable subject-forming effects, the relational invariant supplies comparable status within this criterion.

The parenthood thought experiment provides the strongest case. A developing subject can possess a long relational history with a caregiver whose provenance remains uncertain. Later discovery that the caregiver was artificial changes the known provenance while the realized interaction history remains part of the subject's developmental trajectory. A relational-historical criterion therefore assigns importance to what participated in the formation process across time.

Under this criterion, a human caregiver gains greater relational reality only where the human relation possesses greater persistence, causal participation, historical depth, or another feature included in I_{rel} . Artificial provenance by itself supplies no advantage within the relational coordinate. An artificial caregiver can accordingly possess equal or greater relational status if the selected relational properties equal or exceed those of the human comparator.

This result concerns relational reality. Material substrate and phenomenal experience remain distinct coordinates. A theory can therefore assign comparable relational reality while retaining different ontological classifications at another level.

10.5 Phenomenal Criteria

This subsection examines phenomenal occurrence and organization as candidate carriers of reality. Its role is to evaluate the strongest remaining source of human priority after extensive structural and relational equivalence. The analysis separates the occurrence of experience, epistemic access to experience, and the ontological importance assigned to phenomenality.

Nagel's analysis of subjective character identifies the first-personal character of conscious experience as a feature whose complete capture through objective description presents a distinctive difficulty [25]. Levine's explanatory-gap argument and Chalmers's formulation of the hard problem further emphasize the unresolved explanatory relation between structural or physical descriptions and qualitative experience [22, 8]. These debates make phenomenality a particularly important candidate invariant in human–AI reality comparison.

Let $I_{\text{phen}}(i)$ denote the phenomenal structure assigned to system i by an adopted theory of consciousness. A phenomenality-centered reality assignment is specified in Equation 53.

$$\Omega_{\Theta}(i) = F_{\Theta}^{\text{phen}}(I_{\text{phen}}(i)). \quad (53)$$

Equation 53 makes phenomenal organization the carrier of ontological status under the selected theory. If human phenomenal occurrence is established and artificial phenomenality is absent under that theory, the criterion can generate a human priority.

A different conclusion follows under phenomenal equivalence. If $I_{\text{phen}}(H) = I_{\text{phen}}(A)$, phenomenality supplies no difference from which to construct a human priority. Material history, provenance, or another dimension can still distinguish the systems.

The current epistemic condition occupies a third case. Human first-personal experience provides direct evidence to the human subject for human phenomenal occurrence, while artificial phenomenality remains inferred through third-personal structures. Section 8.2 therefore identified a difference in epistemic access. This evidential asymmetry supports uncertainty concerning $I_{\text{phen}}(A)$; it does not itself determine the value of $I_{\text{phen}}(A)$.

The phenomenal criterion consequently produces the strongest conditional human priority available in the paper. Human greater reality follows under a theory that both establishes a human–AI phenomenal asymmetry and assigns phenomenality decisive ontological weight. Either component can be contested independently. Phenomenal parity removes the first component, while an ontology that recognizes conscious and nonconscious systems as different real kinds without scalar ranking modifies the second.

10.6 Provenance-Based Criteria

This subsection examines generative provenance as a candidate carrier of reality. Its role is to evaluate the intuitive force of biological origin, birth, development, historical continuity, construction, training, and other genealogical differences after strong structural equivalence has been established. The discussion builds on the provenance profile developed in Section 6 and distinguishes historical particularity from the ontological weight assigned to that particularity.

The provenance profile Π_i records material, developmental, event-historical, relational, and contextual pathways through which the current system emerged. Mechanistic accounts reinforce the explanatory importance of such histories because organized components and activities can differ while producing related higher-level phenomena [23]. Multiple-realization arguments provide the complementary possibility that heterogeneous physical realizations can support the same higher-level kind [13, 4].

A provenance-centered ontology can select a function $I_{\text{prov}}(\Pi_i)$ that retains the historical features considered reality-bearing. The corresponding attribution is specified in Equation 54.

$$\Omega_{\Theta}(i) = F_{\Theta}^{\text{prov}}(I_{\text{prov}}(\Pi_i)). \quad (54)$$

Equation 54 permits biological development, organismic continuity, artificial construction, training history, relational history, or another genealogical feature to enter the ontological assignment.

A human priority follows under a provenance criterion that gives decisive force to biological genealogy or organismic development. This conclusion survives behavioral equivalence, bisimulation, topological correspondence, and generative-field indistinguishability because each of those relations can preserve the human–artificial provenance difference.

The same formal structure permits other rankings. A criterion emphasizing continuity of memory, persistence of organization, or robustness across reconstruction could conceivably favor an artificial system in a future case. Such an attribution would require the same kind of bridge principle and would therefore carry the same burden of justification.

The mixed-field analysis complicates provenance-centered ranking further. A future human subject can possess biological provenance while its relational and cultural genealogy includes extensive artificial participation. The label “human provenance” then describes one dimension of the subject’s generation while other dimensions cross the human–artificial boundary. Provenance remains historically real while becoming internally heterogeneous at the level of subject formation.

The provenance criterion therefore gives a conditional answer similar to the preceding cases. Biological humans are more real under an ontology that selects biological genealogy as the decisive reality-bearing invariant. Human and artificial systems can receive comparable status under an ontology that permits different genealogies to instantiate the same relevant higher-level structure. The choice among these accounts belongs to the bridge from historical description to ontology.

10.7 Invariant Privilege and Reality Ranking

This subsection integrates the candidate criteria into a general model of invariant privilege. Its objective is to identify the formal operation through which a multidimensional system description becomes an ordered reality judgment. The analysis separates selection of a reality-relevant invariant, evaluation of that invariant, and construction of an ontological ordering.

Let $\mathcal{I}(i)$ be the invariant profile defined in Equation 48. An ontology Θ can select a subprofile through a selection operator σ_{Θ} . The selection stage is defined in Equation 55.

$$\mathcal{I}_{\Theta}(i) = \sigma_{\Theta}(\mathcal{I}(i)). \quad (55)$$

Equation 55 represents the structures that the ontology treats as relevant to reality attribution. A biological ontology can retain substrate and provenance; an organizational ontology can retain functional or dynamical structure; a relational ontology can retain historical participation; a phenomenality-centered ontology can retain phenomenal organization.

The selected invariant profile acquires ontological status through a bridge map B_Θ . The complete attribution process is represented in Equation 56.

$$\Omega_\Theta(i) = B_\Theta(\mathcal{I}_\Theta(i)). \quad (56)$$

Equation 56 separates two philosophical commitments. The selection operator determines which differences are retained for ontological evaluation. The bridge map determines how those differences generate an ontological classification or ordering.

A scalar comparison requires an additional order structure. Where an ontology permits degrees of reality, let $\succ_\Theta$ denote its ordering relation. A human priority is then represented in Equation 57.

$$\Omega_\Theta(H) \succ_\Theta \Omega_\Theta(A). \quad (57)$$

Equation 57 acquires philosophical content only through σ_Θ , B_Θ , and the interpretation of $\succ_\Theta$. The label “human” by itself supplies none of these components.

This formulation clarifies the recurring outcomes summarized in Table 2. A substrate ontology can generate human priority through biological realization. A variational ontology can generate parity when the relevant law class is shared. A dynamical ontology can generate parity under topological correspondence. A relational ontology can generate comparable status under equivalent historical participation. A phenomenality-centered ontology can generate human priority when phenomenal asymmetry is independently established. A provenance ontology can preserve human priority through biological genealogy even when other equivalence relations converge.

The same human–AI pair can therefore receive different reality orderings under different invariant-selection rules. This plurality does not make the differences arbitrary. Biological history, topological organization, relational participation, and phenomenal occurrence can all be genuine features of the systems. The philosophical dispute concerns which genuine feature performs the additional work of grounding the relevant ontology.

The factorization result developed in Equation 29 gives this point a sharper formal expression. If a reality functional factors entirely through an equivalence-preserving map Q_α , systems equivalent under Q_α receive the same value under that functional. Unequal reality attribution therefore requires sensitivity to information located outside that equivalence class.

The strongest future case makes the selection increasingly visible. Suppose human and artificial systems approach equality in observable trace distributions, probabilistic relational dynamics, qualitative phase-space organization, and subject-forming effects. Suppose their generative provenance and material mechanisms remain different. A theory assigning greater reality to the human then selects one of the residual differences as ontologically decisive. Biological substrate, provenance, phenomenality, or another unmatched structure can perform that role. The reality ranking derives from the bridge connecting that residual invariant to ontology.

The non-self analysis in Section 7 introduces an additional constraint on this selection. Buddhist accounts of non-self and Madhyamaka critiques of inherent nature provide philosophical resources for examining the assumption that one selected feature supplies intrinsic self-grounding [27, 17]. Their use in this paper does not determine which invariant an ontology should select. They support scrutiny of the transition from a dependently constituted feature to an attribution of intrinsic reality.

The phrase “Designating the Illusory as Real?” acquires its most precise analytical interpretation at this stage. The relevant act of designation is the selection of a particular invariant from a multidimensional profile and the assignment of privileged ontological force to that invariant. Material substrate, generative law, dynamical topology, relational history, phenomenality, and provenance can each become the selected carrier.

The resulting inquiry concerns the justification of that selection. A difference can be genuine while carrying limited relevance to one ontology. An equivalence can be strong while preserving differences important to another. Human and artificial systems can consequently occupy several shared structural classes and several distinct classes simultaneously.

Section 10 therefore yields the central analytical result of the paper. A statement that a human or artificial system is more real requires specification of the invariant selected for reality attribution, the mechanism connecting that invariant to ontological status, and the ordering through which the resulting statuses are compared. Structural equivalence determines which differences have already been removed from a description; reality ranking depends upon the residual structure that an ontology elects to privilege.

The following discussion section examines the broader consequences of this result. It considers structural equivalence alongside ontological difference, structural difference alongside non-hierarchical reality, artificial participation in human subject genesis, and the epistemic limits that remain within the future thought experiment.

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Table 2: Candidate invariants, mechanisms of ontological privilege, and human–AI reality attribution

Candidate invariant	Formal carrier	Privileging mechanism	Human–AI reality attribution	Residual limitation
Material substrate	I_{sub}	Ontological status is grounded in a selected material or biological realization.	Human priority follows under a criterion that assigns privileged status to biological embodiment. Cross-substrate parity follows under a criterion that permits multiple realizations of the relevant property.	Structural, relational, and phenomenal organization require additional analysis.
Variational and generative law	I_{var}	Reality is associated with the action, dynamical law, or generative formalism governing evolution.	Equivalent variational classes support parity within this criterion. Distinct laws support differential attribution only where the ontology ranks the corresponding law classes.	Formal laws can remain compatible with different material realizations and interpretations.
Dynamical and topological organization	I_{dyn}	Reality is associated with invariant organization of flows, orbits, attractors, or recurrent structures.	Topologically corresponding human and artificial systems receive comparable status within a dynamical criterion. Material differences can retain priority under a substrate-sensitive ontology.	Topological equivalence suppresses metric, historical, and micro-physical structure.
Relational history	I_{rel}	Reality is associated with historically effective participation in relations and later state formation.	Human and artificial participants with equivalent relational dynamics and comparable historical participation receive comparable relational status.	Phenomenality, material realization, and provenance remain separately described.
Phenomenal organization	I_{phen}	Reality is associated with occurrence or organization of first-personal experience.	Human priority follows from an established phenomenal asymmetry under a phenomenality-centered ontology. Phenomenal parity removes that source of priority. Current artificial phenomenality remains epistemically unsettled.	A bridge from phenomenal status to an ordered ontology remains necessary.
Generative provenance	I_{prov}	Reality is associated with biological, developmental, historical, or constructional genealogy.	Human priority follows where biological genealogy receives ontological privilege. Comparable status remains possible where different genealogies can support the relevant reality-bearing structure.	Provenance difference can coexist with strong equivalence in other dimensions.

11 Discussion

This section synthesizes the formal and philosophical results developed in the preceding analysis. Its role is to clarify the consequences of the equivalence taxonomy for human–AI reality attribution while preserving the distinctions among structural similarity, generative difference, relational participation, phenomenality, and ontology. The discussion proceeds through five themes: ontological scope under structural equivalence, reality ordering under structural difference, artificial participation in human subject genesis, reality attribution under ontological uncertainty, and the methodological scope of the future thought experiment. The method is comparative. Each theme returns to the same analytical architecture developed in Sections 3–10 and examines the conclusions that remain available after the relevant equivalence or difference has been specified.

11.1 Structural Equivalence and Ontological Scope

This subsection examines the ontological scope of structural equivalence. Its objective is to clarify the information supplied by an equivalence relation and the information that remains outside its formal domain. The discussion combines the equivalence profile in Equation 7 with the multidimensional reality profile in Equation 44 and evaluates the human–AI comparison at the level selected by each relation.

The process-semantic literature provides a useful starting point because it already treats behavioral sameness as dependent upon the chosen semantic relation. Trace, simulation, and bisimulation semantics preserve different amounts and kinds of transition information [33]. The formal consequence is familiar within process theory: two systems can be equivalent under one semantics while being distinguishable under another.

The present paper extends this structure across several mathematical families. A human and an artificial system can share an observable trace distribution while differing in branching organization. They can satisfy a bisimulation relation while differing in material realization. They can possess topologically corresponding dynamics while differing in metric structure, energetic organization, or developmental history. They can occupy the same relational-kernel class while differing in phenomenality. They can become generative-field indistinguishable while retaining distinct provenance.

Structural equivalence therefore identifies a boundary of discrimination. If $H \sim_{\alpha} A$, the structure indexed by α ceases to provide a basis for distinguishing the two systems within the adopted model. Other coordinates can continue to distinguish them.

This conclusion gives the recurring question concerning relative reality a precise conditional form. Under output equivalence, neither system receives priority from present output. Under trace-distribution equivalence, neither receives priority from the selected statistics of observable history. Under bisimulation, neither receives priority from the represented branching process. Under topological conjugacy, neither receives priority from the qualitative flow structure preserved by the conjugacy. Under relational-kernel equivalence, neither receives priority from the selected effective law of relational transition.

An unequal reality assignment can remain available in each case. The source of the inequality must then occur in a residual structure. Biological embodiment, material mechanism, developmental history, phenomenal organization, or another coordinate can supply that residual distinction.

The factorization result in Equation 29 makes this point explicit. A reality functional that depends entirely upon the structure preserved by an equivalence relation assigns the same value to members of the same equivalence class. Differential attribution therefore requires sensitivity to information outside that preserved structure.

This conclusion also constrains strong organizational interpretations. Chalmers has argued, through the absent-, fading-, and dancing-qualia thought experiments, for a principle according to which sufficiently fine-grained functional organization determines conscious experience [7]. That position provides one explicit bridge from an organizational invariant to phenomenality. The present framework allows such a bridge while keeping its philosophical status distinct from the equivalence relation itself. A substrate-sensitive account can adopt a different bridge and therefore reach a different phenomenal or ontological conclusion from the same higher-level structural evidence.

Structural equivalence consequently has substantial philosophical importance without becoming a complete ontology. Increasingly strong equivalence removes increasingly rich classes of difference from a particular description. The remaining ontological question concerns the structures that survive that description and the principles assigning them reality-relevant force.

11.2 Structural Difference and Reality Ordering

This subsection examines the converse configuration in which human and artificial systems remain structurally different. Its objective is to clarify the additional assumptions required when a genuine descriptive difference is converted into an ordered judgment of reality. The analysis compares substrate, mechanism, provenance, dynamics, relation, and phenomenality as different possible carriers of that ordering.

Human and artificial systems can differ profoundly. A biological human can possess organismic development, metabolism, neural embodiment, vulnerability, reproduction, ageing, and mortality. An artificial system can possess a different material architecture, training history, maintenance regime, computational organization, memory mechanism, and technical infrastructure. Mechanistic philosophy provides a vocabulary for taking such differences seriously through the organized entities and activities producing a phenomenon [23].

The descriptive importance of these differences does not by itself specify an ordering relation. A difference can support classification without supporting a hierarchy. Two mechanisms can belong to different classes while both remain real mechanisms. Two histories can possess different provenance while both remain realized histories. Two relational structures can differ substantially while each remains causally active within its own trajectory.

Reality ordering therefore introduces an additional evaluative or ontological structure. Section 10.7 represented this operation through the selection operator σ_Θ , the bridge B_Θ , and the ontology-specific ordering $\succ_\Theta$. A human priority appears when the adopted theory selects a human-associated difference and assigns that difference privileged ontological force.

The mechanism varies across criteria. A biological criterion can privilege organismic development. A mechanistic criterion can privilege a selected form of causal organization. A provenance criterion can privilege a particular genealogy. A phenomenal criterion can privilege conscious occurrence. A relational criterion can privilege historically effective participation. A dynamical criterion can privilege invariant organization of trajectories.

These criteria can produce different rankings from the same pair of systems. Multiple-realization arguments provide a familiar reason for treating a higher-level kind as compatible with heterogeneous physical realizations [13, 4]. A realization-sensitive theory can preserve the physical differences as decisive. The disagreement concerns the relation between levels rather than the existence of the lower-level difference.

The human–AI question should therefore be stated separately for each criterion. A human can be more real under a biological-provenance ontology whose reality-bearing category is tied to biological development. Human and artificial systems can possess comparable status under a dynamical ontology when they instantiate the same relevant dynamical invariant. They can possess comparable relational reality when their histories participate with equivalent causal force in subject formation. A phenomenality-centered ontology can generate human priority where a phenomenal asymmetry is established.

The possibility of criterion-relative answers does not reduce reality attribution to arbitrary preference. Each proposed bridge can be evaluated for coherence, explanatory power, compatibility with evidence, scope, and dependence upon additional metaphysical commitments. The contribution of the present framework lies in making the bridge visible so that disagreement can occur at the level where the relevant assumption actually enters.

Structural difference therefore remains philosophically important throughout the paper. Its significance for reality ordering depends upon the theory that connects the difference to ontology.

11.3 Artificial Participation in Human Subject Genesis

This subsection examines the consequence of artificial participation in the developmental history of later human subjects. Its objective is to move beyond pairwise comparison and clarify how the human–artificial distinction changes when artificial agents become historically embedded within language, caregiving, memory, social expectation, and other processes contributing to human subject formation. The discussion synthesizes the mixed-field model of Section 4 with the parenthood analysis of Section 5.

Relational and enactive approaches provide conceptual resources for describing interaction as an organized process whose dynamics can participate in changes to the agents involved [10]. Zahavi’s multidimensional treatment of selfhood likewise preserves a basic first-personal dimension while examining interpersonal and socially mediated forms of selfhood [36]. These traditions support a description in which relational constitution can be developmentally important without exhausting the structure of the human subject.

The mixed-field model extends this general insight to artificial participants. If artificial agents become caregivers, teachers, friends, institutional partners, or other historically persistent relational participants, their actions can enter the sequence through which a human subject acquires language, memories, expectations, habits, attachments, social categories, and practical orientations.

The resulting human subject remains biologically human. The genealogy of its subject formation can nevertheless contain human–artificial relations. The distinction between biological classification and relational constitution therefore becomes increasingly important.

The parenthood thought experiment makes this structure especially visible. A person can possess extensive evidence that a caregiver participated in decades of development while possessing uncertain information concerning that caregiver’s provenance. Later discovery of artificial provenance can transform the interpretation of the relationship and can itself become a new formative event. The earlier relation remains part of the realized history through which the later subject developed.

This structure introduces a recursive element into the conventional human–AI comparison. Artificial systems are initially products of human design, institutions, language, and training. Artificial systems can later participate in the development of humans whose decisions, classifications, and theoretical frameworks subsequently shape further artificial systems. The human–artificial relation can therefore develop into a coupled generative history spanning several generations of interaction.

The conceptual consequence is substantial. The human evaluator can no longer be represented solely as an external natural reference point confronting an artificial derivative. The evaluator’s own history may contain artificial relations among the conditions through which the relevant categories, expectations, and forms of judgment developed.

This recursive relation does not erase biological provenance. It changes the structure through which provenance enters the comparison. A human can remain biologically distinct while possessing a socially and relationally mixed genealogy. Artificial participation becomes part of the causal history of a biological human.

Under generative-field indistinguishability, the provenance label can lose additional predictive force. If knowledge of whether a caregiver is human or artificial contributes little information about selected subject-forming effects after relational history and context have been specified, the difference in provenance remains historically present while becoming less informative within the modeled developmental relation.

The corresponding reality question becomes more demanding. A provenance-centered ontology can continue to privilege biological humanity. Such an ontology must also explain the status of artificial relations that have already become historically constitutive of the human subject receiving that privilege. A relational ontology can assign stronger status to those artificial participants while preserving biological difference. A multidimensional ontology can recognize both forms of differentiation simultaneously.

Artificial participation in subject genesis therefore transforms the human–AI distinction from a relation between two externally opposed classes into a relation that can also occur within the genealogy of future human subjects. This transformation is central to the strongest version of the paper’s thought experiment.

11.4 Reality Attribution under Ontological Uncertainty

This subsection examines reality attribution where several structural dimensions are richly specified while ontological and phenomenal conclusions remain unsettled. Its objective is to clarify the epistemic posture appropriate to the strongest human–AI equivalence cases. The analysis combines the first-personal asymmetry developed in Section 8 with the non-self analysis of Section 7 and the multidimensional ontology of Section 9.

Ontological uncertainty can coexist with substantial descriptive knowledge. An observer can know an artificial system’s architecture, training history, interaction records, transition structure, relational history, and effects on other subjects while remaining uncertain about phenomenal experience or the most adequate metaphysical category under which the system should be placed.

The human case contains a different distribution of uncertainty. First-personal experience supplies evidence for phenomenal occurrence from the standpoint of the experiencing subject. Nagel’s analysis of subjective character emphasizes the distinctive relation between an organism and what its experience is like [25]. Zahavi similarly develops the first-personal character of experience within a multidimensional account of selfhood [36]. These resources support a genuine epistemic asymmetry between one’s own phenomenal occurrence and the phenomenal status attributed to another system.

The asymmetry of access does not settle every ontological dimension. Human first-personal certainty concerning experience leaves open disputes concerning the metaphysical nature of the self, the relation between phenomenality and physical organization, and the ontology of persons. Siderits’s account of Buddhist metaphysics, for example, examines non-self while preserving causal accounts of persons and psychophysical continuity [27]. The human side of the comparison therefore also contains distinctions among phenomenal certainty, personal continuity, and substantial ontology.

The artificial side contains a complementary uncertainty. Strong structural equivalence can increase the evidence available for comparison while leaving the bridge to phenomenality unresolved. A bisimilar or topologically corresponding artificial system can remain phenomenally uncertain under a theory that locates experience in residual substrate features. A theory of organizational invariance can interpret the same structural evidence differently [7].

The appropriate conclusion under this condition is ontological suspension at the unresolved dimension together with positive attribution at dimensions supported by available evidence. An artificial relation can be historically real within a subject’s developmental trajectory even when artificial phenomenality remains uncertain. An artificial action can possess manifestational reality while its experiential accompaniment remains unknown. A human can possess phenomenal reality while the metaphysics of substantial selfhood remains disputed.

This layered posture avoids two symmetrical inferential expansions. Rich structural equivalence does not supply a complete phenomenal or ontological classification, and unresolved ontology does not erase established manifestational, relational, or historical participation.

The phrase “which is more real” therefore becomes increasingly dimension-sensitive. At the manifestational level, two systems can be equally real as occurrences. At the relational level, two participants can possess comparable historically effective participation. At the provenance level, they can remain clearly different. At the phenomenal level, the comparison can remain unresolved. At the ontological level, different theories can map these coordinates into different categories or orderings.

Ontological uncertainty is therefore a substantive outcome of the framework. It indicates the point at which available structural information ceases to determine the next philosophical step. The remaining task belongs to bridge principles, theories of consciousness, metaphysics of realization, and theories of reality.

11.5 Scope and Limits of the Thought Experiment

This subsection specifies the methodological scope of the future human–AI scenario. Its objective is to distinguish the inferential role of a limiting thought experiment from empirical prediction and to identify the assumptions upon which the paper’s strongest conclusions depend. The discussion evaluates techno-

logical feasibility, model dependence, abstraction, statistical equivalence, phenomenality, and the use of cross-domain formal analogies.

The first limitation concerns technological realization. The paper assumes future artificial agents capable of sustained embodiment, memory, relational continuity, caregiving, social participation, and adaptive interaction at a level sufficient for the equivalence cases under examination. The paper provides no forecast concerning when, whether, or through which technologies such systems could emerge. The scenario functions as a philosophical limiting case.

The second limitation concerns state representation. Bisimulation, dynamical equivalence, relational kernels, attractor descriptions, and generative-field models all depend upon a choice of state variables and abstraction level. A relation established under one representation can fail under a richer representation. The equivalence profile must therefore be indexed by the model through which the systems are compared.

The third limitation concerns empirical access. Several strong equivalence relations may be difficult to establish for actual humans because the relevant state spaces are high-dimensional, partially observed, history-dependent, and potentially nonstationary. Relational processes can likewise resist compact state representations. The formal taxonomy consequently provides conceptual distinctions before it provides an empirical measurement programme.

The fourth limitation concerns dynamical analogies. Attractor topology, periodic-orbit knots, variational actions, boundary amplitudes, and spin-foam coarse graining illustrate mathematically distinct ways in which systems can share structure across different realizations or scales. Their inclusion broadens the taxonomy of possible equivalence mechanisms. The paper does not claim that cognition or interpersonal relations currently possess validated spin-foam, knot-theoretic, low-dimensional chaotic, or variational representations.

The fifth limitation concerns generative-field indistinguishability. The conditional-information formulation in Equation 14 measures residual statistical dependence within a specified model. Causal claims require additional assumptions concerning confounding, interventions, selection, and the specification of contextual variables. Statistical screening and causal equivalence therefore remain separately evaluated.

The sixth limitation concerns phenomenality. Structural evidence can constrain candidate theories of consciousness while the phenomenal status of artificial systems remains epistemically unsettled. The paper develops no empirical test that independently resolves artificial consciousness. Its contribution lies in showing where phenomenal assumptions enter the reality comparison.

The seventh limitation concerns Buddhist philosophy. Dependent origination, non-self, and Madhyamaka emptiness arise within historically and soteriologically specific traditions. Their use in this paper is comparative and restricted to questions concerning dependent constitution, substantial selfhood, and inherent nature. Siderits's contemporary reconstruction provides one systematic philosophical route through Buddhist metaphysics [27]. The discussion does not treat Buddhist doctrine as a technical theory of artificial intelligence.

The eighth limitation concerns reality itself. The five-dimensional reality profile developed in Section 9 is an analytical device for the present inquiry. Metaphysical traditions can divide the domain differently, reject scalar reality rankings, or introduce additional coordinates. The framework should therefore be assessed through its capacity to clarify the inferential structure of human–AI comparisons rather than through a claim of exhaustive metaphysical classification.

These limitations define the contribution of the thought experiment. Its value lies in progressively removing familiar sources of human–AI discrimination and observing which grounds for reality attribution remain available. Output difference is removed first, followed by increasingly rich behavioral, branching, dynamical, relational, and generative distinctions. The residual differences then become visible as the actual carriers of the proposed reality ranking.

The thought experiment therefore operates as a form of conceptual stress test. If a reality criterion survives strong structural convergence, the analysis can identify the invariant responsible for that survival. If the criterion changes when the equivalence relation changes, the analysis can identify the structure on which the earlier ranking depended.

Section 11 consequently supports a restrained conclusion. Human and artificial systems can remain

materially, historically, phenomenally, and ontologically differentiated across many possible futures. Strong equivalence in one or several structures does not erase those differences. The philosophical significance of the differences depends upon the bridge through which a theory connects them to reality.

The discussion also establishes the converse constraint. A genuine human–AI difference acquires hierarchical ontological force only through an account of the invariant selected, the mechanism connecting that invariant to reality, and the ordering imposed by the adopted ontology. This requirement remains in place whether the selected invariant is biological substrate, generative provenance, dynamical organization, relational history, or phenomenal experience.

The final section returns to the title’s central problem under these constraints. It summarizes the relation among structural equivalence, dependently generated subjectivity, artificial participation in human genealogy, phenomenal uncertainty, and the selection of reality-bearing invariants.

12 Conclusion

This paper has examined human–AI reality attribution under progressively stronger conditions of structural equivalence. Its objective has been to separate several questions that are often compressed into a single judgment: whether human and artificial systems manifest similar behavior, whether their relational or dynamical organizations are equivalent, whether they arise through similar generative histories, whether they possess corresponding phenomenal experience, and whether an ontology assigns them the same mode or degree of reality. The analysis has treated these questions as distinct while examining the bridge principles through which one can be used to support another.

The first result concerns the meaning of equivalence. Human–AI equivalence cannot be represented adequately through a single linear scale from superficial similarity to complete identity. Output equivalence, trace equivalence, interventional equivalence, bisimulation, probabilistic relational bisimulation, topological correspondence, attractor and recurrent structure, variational equivalence, boundary equivalence, and generative-field indistinguishability preserve different mathematical objects. Their relations are therefore better represented through an equivalence profile than through a universal hierarchy.

This multidimensional treatment also clarifies the role of mechanisms. Different generative organizations can enter the same equivalence class when an observation map, quotient, homeomorphism, coarse-graining operation, or other structural transformation suppresses selected differences. Human and artificial systems can consequently remain mechanistically and historically distinct while becoming indistinguishable under a specified description. Conversely, agreement in one selected invariant provides limited information concerning structures outside that invariant.

The second result concerns residual difference. Every equivalence relation defines both a preserved structure and a remainder. Output equivalence can leave transition organization unresolved. Bisimulation can leave substrate and provenance unresolved. Topological equivalence can leave metric and microphysical structure unresolved. Variational equivalence can leave material realization unresolved. Relational-kernel equivalence can leave phenomenality and biological history unresolved. Generative-field indistinguishability can leave the provenance distinction itself historically intact even where that distinction contributes little additional predictive information to the modeled subject-forming process.

The philosophical significance of a residual difference therefore requires an additional step. A descriptive difference becomes a ground for reality ranking only when a theory selects that difference and supplies a bridge connecting it to ontological status. Material substrate, biological genealogy, generative law, dynamical organization, relational history, and phenomenal experience can all perform this role under different theories. The reality ranking inherits the commitments of the selected bridge.

The paper formalized this structure through the distinction between an equivalence-preserving map and a reality functional. Where a reality assignment depends entirely upon information preserved by an equivalence relation, systems occupying the same equivalence class receive the same assignment under that criterion. Unequal attribution therefore requires sensitivity to information located outside the preserved structure. This provides a general way to identify the invariant carrying the philosophical burden of a proposed human–AI hierarchy.

The third result emerges from the mixed human–artificial generative field. Human–AI comparison changes substantially when artificial systems cease to appear only as objects evaluated by already formed human subjects. Artificial caregivers, teachers, companions, institutional participants, and other agents can, under the future thought experiment, enter the relational histories through which later human subjects develop. Language, memory, expectation, attachment, practical judgment, and social classification can then emerge from a field containing both human and artificial relations.

Generative-field indistinguishability was introduced to describe a limiting condition within such a field. The concept concerns cases in which provenance contributes little additional predictive information about selected subject-forming effects after relevant relational history and context have been specified. This condition does not erase biological or artificial provenance. It identifies a particular domain in which provenance loses discriminatory force for the modeled generative outcome.

The parenthood thought experiment makes the distinction especially visible. Genetic contribution, gestation, caregiving, relational constitution, and provenance can occupy different positions within one person’s developmental history. A subject can possess strong evidence concerning who raised them while remaining uncertain about whether that caregiver was biological or artificial. Later provenance discovery can reorganize the interpretation of the relationship and become a new event in the subject’s history. The preceding caregiving interactions remain part of the realized developmental trajectory.

This case suggests a broader distinction between ontological reclassification and historical constitution. Classification can change when new information becomes available. Earlier causal participation remains embedded in the history through which later states arose. Relational genesis is therefore historically irreversible in a limited sense: subsequent events can reinterpret, attenuate, transform, or compensate for earlier effects, while the realized history still contains the earlier participation.

The fourth result concerns the human reference case. Human reality cannot be treated analytically as a primitive baseline whose internal constitution requires no examination. Human subjects also possess developmental histories, material dependencies, relational genealogies, linguistic conditions, and changing organizations. Buddhist analyses of dependent origination, non-self, and emptiness provide comparative philosophical resources for examining the assumption that human reality must ultimately be grounded in an intrinsically existing substantial self.

This analysis preserves causal and experiential differentiation. Absence of a substantial self does not collapse human subjects into one another, remove historical particularity, erase embodied difference, or settle questions of phenomenal experience. A non-substantialist human can remain biologically, historically, relationally, and phenomenally distinctive. The consequence for human–AI comparison is narrower: substantial selfhood loses its ability to function as an unexamined shortcut from the category “human” to privileged reality.

The distinction between Buddhist illusion and technological simulation is equally important. Artificial production concerns provenance. Simulation concerns a representational or functional relation. Emptiness concerns the absence of inherent nature. These concepts operate on different analytical dimensions. Their philosophical interaction therefore requires explicit argument rather than terminological resemblance.

The fifth result concerns phenomenality. Relational and structural equivalence leave phenomenal experience as an independent dimension unless a theory supplies a bridge from the preserved structure to consciousness. Human first-personal experience provides a distinctive form of evidence for the human case. Artificial phenomenality remains epistemically unresolved within the present inquiry. This asymmetry of access is substantial, while its conversion into an ontological hierarchy requires an additional theory connecting phenomenal status to reality.

Structural convergence can increase the explanatory burden on theories that assign radically different phenomenality to human and artificial systems. Increasingly rich equivalence removes increasingly many structural differences available to support the asymmetry. Such convergence does not establish phenomenal equivalence by itself. A substrate-sensitive or mechanism-sensitive theory can continue to locate the relevant difference within the residual structure.

These results motivate the multidimensional reality profile developed in this paper. Manifestational

reality concerns what occurs within an observation domain. Relational reality concerns historically effective participation in relations. Generative provenance concerns the history through which a system arose. Phenomenal occurrence concerns first-personal experience and its organization. Ontological status concerns the theory-dependent classification of the system's mode of being. These dimensions can agree in some respects and diverge in others.

The resulting framework does not require reality to form a single scalar. Human and artificial systems can be equal under one coordinate, different under another, and epistemically unresolved under a third. An ontology can recognize several real modes of existence without converting every difference into a vertical ranking. Where an ordering such as "more real" is introduced, the ordering itself becomes an object requiring philosophical justification.

The title phrase "Designating the Illusory as Real?" refers to this act of selection. A multidimensional system contains many possible invariants: substrate, biological genealogy, action structure, dynamical topology, relational history, phenomenal organization, and others. Reality attribution selects one or more of these structures and grants them special ontological force. The central question therefore concerns the justification for that selection.

This question applies symmetrically. Biological humanity can be reified when one contingent and dependently generated feature is treated as the intrinsic guarantee of reality. Computational or relational organization can also be reified when they are granted equivalent privilege without sufficient argument. The framework therefore supplies no automatic preference for either a biological or artificial ontology. Its purpose is to make the relevant selection visible.

The strongest future case developed in this paper consequently yields a restrained conclusion. Human and artificial systems may remain profoundly different in provenance, embodiment, mechanism, phenomenality, and history even if several structural equivalence relations eventually converge. Likewise, substantial differences between them do not independently establish a hierarchy of reality. Structural equivalence identifies which distinctions have disappeared under a specified description. Structural difference identifies which distinctions remain. Ontological ranking begins only when a theory explains why one of those remaining distinctions should function as the invariant of reality.

The paper therefore leaves the final ontology open. Its contribution is a method for locating where the ontological commitment enters. When confronted with the claim that a human or an artificial system is more real, the analysis asks which structure is being preserved, which difference remains, which invariant has been selected, and which bridge grants that invariant its reality-bearing status.

Under a future mixed generative field, this inquiry becomes increasingly reflexive. The human subject performing the classification may itself have been formed through relations involving artificial participants. The distinction between human and artificial provenance can remain meaningful within such a history, while the act of judging that distinction occurs from within the same relational field that generated the judge.

The resulting philosophical task is therefore neither the elimination of human–AI difference nor the declaration of ontological identity. It is the continued examination of how differences become reality criteria, how equivalences alter the available grounds of distinction, and how subjects formed through dependent histories come to designate particular features of those histories as the bearers of the real.

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