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The Architecture of Experience Individuation, Experiential Hierarchies, and the Continuity of Conscious Experience

Elias Rubenstein

Independent Researcher
Fort Lauderdale, FL, USA
ORCID: 0009-0007-1956-653X

Abstract:
This study extends the consciousness-first ontology developed by the same author in The Architecture of Manifestation: A Formal Ontology of Consciousness, Information, and Spacetime. It examines how differentiated experiencers and hierarchically ordered experiential vehicles arise within a proposed common conscious ground, and how the brain mediates sensory, cognitive, mnemonic, and report functions within the bodily vehicle. Material embodiment is defined as the most constrained expression and requires preceding levels of organization. The central new distinction separates a continuing individual experiential focus from the accessibility of personality-linked memories and from an enduring universal informational record. Under an explicit evolutionary-continuity premise, the loss of an outer vehicle transfers focus to an available next-inner vehicle; the premise is conditional on a continuing individual trajectory and is not entailed by material hierarchy alone. Learned insight can persist without ordinary autobiographical recall, while complete boundary-state reabsorption terminates individual attribution without deleting the universal record. The formal model separately encodes hierarchical embodiment, conditional inward transfer, individual insight accessibility, boundary dissolution, and universal informational retention. The complete Lean 4.30.0 source compiles under its stated premises. Neuroscientific studies provide measured relationships among memory accessibility, self-identification, metacognition, reportability, and neural dynamics. Investigated previous-life memory cases and historically structured Tibetan recognition procedures add observational approaches to continuity and recognition across bodily lives.

Keywords: Consciousness, Neuroscience of Consciousness, Individuation, Experiential Vehicles, Neural Mediation, Ego Dissolution, Nondual Awareness, Conscious Access, Metacognition, Neural Correlates, Autobiographical Memory, Formal Verification, Lean 4

1. Introduction

Neuroscience investigates conscious experience through neural recordings, behavioral performance, and first-person reports. These methods characterize the neural and cognitive conditions of accessible human experience. A complementary ontological question concerns what constitutes the experiencer and how an individual perspective is organized. Changes in bodily awareness, self-identification, and the relationship

between perception and report make the distinction experimentally relevant. This study asks how distinguishable experiential perspectives arise within a common conscious ground, how the bodily vehicle and its brain instrument organize access and report, and how individuality can change when an experiential vehicle emerges, reorganizes, or dissolves.

The foundation is the author's earlier published study, The Architecture of Manifestation: A Formal Ontology of Consciousness, Information, and Spacetime [1]. The Architecture of Manifestation is hereafter referred to as Paper 1, and the present study, The Architecture of Experience, as Paper 2. That work distinguishes the nonmanifest Absolute from manifested consciousness and specifies consciousness as the common immanent ground of differentiated experiential forms. The present study develops its account of reflexive self-limitation into an explicit architecture of individual perspectives, bodily and nonbodily vehicles, and changing access. Differentiation establishes organizational distinctions within a common ontological ground, while neuroscience supplies measurements of the functioning bodily instrument.

The empirical problem is more specific than the ontological commitment. Human experiments measure neural dynamics, attention, discrimination, introspective judgment, and reports. Recent no-report visual and auditory paradigms seek to distinguish activity associated with conscious perception from activity associated with task demands and overt reporting [2] [3]. These studies provide measurable constraints on how the bodily vehicle mediates access. Each neural variable is therefore assigned to a specified observational bridge linking physiological activity, task conditions, and reported experience.

Altered self-experience offers a complementary route. Longitudinal functional mapping under psilocybin and a larger 2026 multimodal study show that the strength and temporal organization of changes in brain activity can covary with reports of altered self-boundaries and contextual embeddedness [4] [5]. Such findings establish relationships between bodily neural organization and subjective reports. Ontological discrimination requires competing accounts to generate distinct, prospectively evaluated predictions for those relationships.

In this architecture, individuality is a relational organization within one conscious ground. Manifestation proceeds through an ordered hierarchy of increasingly constrained experiential vehicles; a functioning material body presupposes the necessary inner levels. The brain is a specialized instrument of that outer vehicle. Availability of a vehicle and directed experiential focus remain distinct. During a stipulated, ongoing individual evolutionary trajectory, sequential loss of an outer level is paired with a transition of focus to the next available inner level. Personal behavior patterns and ordinary autobiographical recall are associated primarily with bodily organization, whereas accumulated insight is defined as a developmental acquisition that may remain accessible after bodily loss. At a terminal integration boundary, individual attribution ceases, although the universal informational record remains. These architectural relations generate distinct questions for neuroscience, longitudinal training studies, and documented cases of cross-bodily information claims.

The vehicle–instrument distinction specifies the role of the brain within the architecture. The bodily experiential vehicle is the broader living organization through which human sensory and cognitive processes become accessible. The brain is a specialized functional component within that vehicle, not a second fundamental experiencer and not the totality of the vehicle. Describing a neural correlate of reported experience therefore concerns a measurable operation of the bodily instrument. The empirical claim concerns measurable neural mediation; the ontological claim concerns the foundational status of consciousness and requires distinct evidential treatment.

The distinction becomes especially important when a vehicle is lost. Withdrawal of a bodily organization changes the means through which experience is expressed; the common conscious ground remains invariant within the stated ontology. What happens to individual focus, autobiographical memory, or information previously accessed through that vehicle remains a separate question. This study accordingly distinguishes possible worlds from temporal development, organizational identity from psychological identity, and informational potential from present experience. It specifies these relations in one dependent formal architecture and constructs a unified finite model verified in Lean 4.30.0. The deductive results establish coherence under the stated premises; the associated research program identifies observations that could distinguish the architecture from competing accounts of consciousness.

Original contributions. The study makes five linked contributions: (1) it models individualized experiencers as differentiated organizations within a common manifest ground; (2) it specifies a constitutive hierarchy in which material embodiment requires preceding experiential levels; (3) it separates conditional individual continuity from autobiographical recall and universal informational retention; (4) it distinguishes temporary access to extraordinary experiential spaces from the durable refinement of an experiential organization through systematic training; and (5) it integrates these structural commitments in a single dependent Lean 4 formalization, with explicit additional premises and conditional results. The accompanying research program connects these constructs to measurable aspects of human experience and neural mediation through separately specified observational bridges.

1.1. Terminology and Operational Scope

Ontological ground denotes the foundational kind of existence presupposed by an account, whereas an empirical correlate is an observed variable associated with a measured outcome. Manifested consciousness denotes the proposed field in which experienced contents and differentiated organizations occur; the nonmanifest Absolute denotes the formally distinct domain outside experienced content. Immanence means that a differentiated organization belongs within that conscious ground, and reflexive differentiation means that distinctions arise through relations within the same ground. Individuation denotes the development of an organizationally distinguishable experiential perspective, whereas individuality denotes the resulting organization at a specified developmental state.

An experiential vehicle is an organized level of manifestation through which an individuality can express, access, or coordinate contents; the material bodily vehicle is the outermost level of an ordered sequence of greater specialization, and the brain is a functional instrument within that bodily organization. Vehicle availability means that the relevant organization can participate in experience, whereas experiential focus means that its contents receive selective access in a specified state. Self-identification denotes the experienced attribution of a content or organizational level to oneself; reflection denotes cognitive evaluation of self-related contents; and reported recognition denotes a person's description of recognizing consciousness or selfhood. Nondual experience denotes a report in which the usual perceived separation between subject and object is diminished or absent.

A lineage is a stipulated relation linking an individual experiential organization across states; it is not defined by autobiographical memory similarity. A vehicle is an organized means of experiential expression, and the next-inner vehicle is its immediately less constrained predecessor in the declared hierarchy. An evolutionary interval denotes a state sequence in which an individuated experiential trajectory is still active. Acquired insight denotes developmentally integrated information that remains attributable to an evolving experiencer, whereas ordinary recall denotes accessible, personally indexed

episodic content; these can vary independently. The universal record is the architecture's postulated informational inclusion of experiences in manifested consciousness, irrespective of whether an individual can retrieve them. Reabsorption denotes the loss of a distinguishable individual organization at an integration boundary, not the loss of the common ground. An observational bridge maps theoretical constructs to measurable indicators; finite satisfiability means that at least one finite interpretation satisfies the chosen assumptions. Metacognition denotes monitoring of one's cognitive processes, ego dissolution denotes reduced habitual self-identification, and a no-report paradigm measures candidate correlates without relying on an immediate explicit report.

2. Inherited Ontology and Formal Method

2.1. The manifest/nonmanifest distinction

Let $\mathfrak{O}_M$ be the manifest sort and $\mathfrak{O}_N$ the nonmanifest sort. Let $\mathfrak{A} \in \mathfrak{O}_N$ denote the nonmanifest absolute, and let $\mathcal{C} \in \mathfrak{O}_M$ denote manifested consciousness. The two sorts are distinct. The original ontology explicitly rejects identifying fundamental manifested consciousness with the nonmanifest absolute.

The earlier theory's P1 establishes a type restriction: a predicate $P_M: \mathfrak{O}_M \to Y$ cannot be applied directly to $\mathfrak{A}$. P2 follows from experiential closure: an experienced item is manifest, so the nonmanifest cannot itself be experiential content. P3 establishes that even a minimal phenomenal state, including the white-out limiting case, remains manifest rather than becoming the nonmanifest absolute. These propositions are inherited here, not re-proved under altered definitions.

2.2. Differentiation and immanence

The preceding ontology's D5 defines immanence as a relation of manifest structures to the single distinguished field of consciousness. A6 and A7 permit distinct differentiated aspects while maintaining their immanence to that field. The formal model therefore represents distinguishable organizations, access capacities, and focus conditions within a common ontological ground. The original CoreTheory encoding requires immanence for specified forms; the additional U1 premise extends this relation to the intended encompassing interpretation. The selected finite model realizes differentiated forms that remain immanent and ontologically nonseparate. A9, A11, and A12 continue to specify distinct constraints inherited from the preceding framework.

Accordingly, a vehicle's finite capacity limits **effective accessibility through that organization**, not $\mathcal{C}$. The distinction is indispensable: treating a vehicle as a selector or delimiter of consciousness itself would contradict the source ontology's A11.

Modal provenance and temporal scope. The preceding ontology's D8 fixes the common formal architecture, while its D32 presents worlds without a specified human person or body as consistent possibilities. The previously published selected CoreTheory represents these possibilities by obligatory existential fields consciousnessWithoutIndividual and consciousnessWithoutBody; the nonnecessity derivation uses those explicit fields. U2 separately asserts the manifestation of C in every admitted world of the selected extension. StateWorldCoupling links a state to one of these worlds and equates the body's manifestation with availability. These bridges do not define physical time as fundamental or establish a continuous first-person history across states. The finite joint witness realizes the absence of both designated human structures in one selected world, without claiming such coincidence in all CoreTheory models.

World semantics and snapshot identity. D8 in the preceding ontology defines a world as a complete admissible realization of the common architecture, including valuation, activation, strengths, and projections. The finite Lean World constructors represent selected classes of realizations, while DevelopmentSnapshot adds an epoch, owner profile, and membership function. Consequently, equal modal class labels at distinct epoch indices permit different realized historical configurations and do not identify their individual owners numerically. The selected representation is a coarse abstraction of the possible-world semantics, with its scope fixed by the declared constructors.

2.3. Method of formal extension

Let T denote a model of the original CoreTheory. The first verified extension introduces a dependent structure $E(T)$, and the combined theory has the form

$$\text{UnifiedTheory} := \{(T, E) : T \in \text{CoreTheory},\ E \in \text{ExperienceExtension}(T)\}. \quad (1)$$

Dependence on the same T matters: the experiential extension cannot silently posit another consciousness or independent ontology. The verified finite-core result is

$$\exists (T, E) \in \text{UnifiedTheory}. \quad (2)$$

The verified finite-core result establishes relative satisfiability of the encoded foundational axioms and the experiential extension.

2.4. Formal dependency and levels of assertion

The argument distinguishes four levels: commitments inherited from The Architecture of Manifestation; additional organizational and developmental premises introduced here; conditional consequences and satisfiability witnesses verified in Lean; and observational bridges proposed for empirical testing. The inherited rank represents differentiation rather than ontological value. Hierarchical formation is introduced as an additional relation. The inherited A11 excludes matter as a generator or delimiter of manifested consciousness, while the proposed restriction on an ultimate, self-sufficient material origin is an additional ontological premise compatible with the empirical study of physical self-organization.

A useful separation is therefore

$$\text{Base}(T), \quad \text{Bridge}(T, E), \quad \text{Experience}(E), \quad \text{Continuity}(E, T_c).$$

The continuity relation T_c is written with a subscript here to distinguish it from the base model T. The nonmanifest absolute is not assigned a vehicle, state, information capacity, or experiential perspective; those predicates have the manifest domain as their type.

2.5. Architecture and notation

FOUNDATIONAL ONTOLOGY — manifested C, nonmanifest Absolute, reflexive differentiation and immanence
↓ common dependent CoreTheory and the specified U1/U2 bridges
COLLECTIVE INDIVIDUATION — coarse identity within one manifest ground
↓ specialization and phase-relative individuation
HIERARCHICAL VEHICLES — ordered inner-to-outer organization
↓ simultaneous availability and differentiated access
EXPERIENTIAL FOCUS — selective or concurrent access and identification
LOCAL EVENT: BODY LOSS — conditional inward focus within continuing individuation
DEVELOPMENT: REFINEMENT — changing capacities and experiential differentiation
↓ at a limiting cycle boundary
CYCLIC REABSORPTION — individual attribution may end while C remains

Table 1 defines the notation used for perspectives, vehicles, modal states, and the relations governing access and identification.

Table 1. Symbols and Formal Roles in the Consciousness-First Framework

Symbol	Meaning	Ontological / formal status
C	Universal manifested consciousness	One Paper-1 manifested ground; U1/U2 are explicit fixed-architecture bridge assumptions in Paper 2's selected Lean encoding
X	Experiential perspectives	Differentiated viewpoint domain
P	Represented individuality	Historical π-indexed owner role; Stage 11 treats ≈a as coarse membership, not strict identity and dynamic R(a,p,v). A representational code is not evidence of a separately existing consciousness substance.
V	Experiential vehicles	Differentiated organizations; several associated available vehicles may express an individuality concurrently.
S	Manifest states	State-indexed availability and focus
I	Information / possibility types	Typed possibilities and accessible capacities
T	Perspective-lineage relation	Directed continuity between focused representations; requires explicit semantic lineage assumptions
B, K, A, F	Availability, capacity, access, focus	Distinct organizational or perspective-level relations
J, L, W	Identification, reflection, recognition	Separate cognitive predicates
R(a,p,v)	Associated vehicles	Phase-dependent membership in an individuated experiential organization; association can emerge or disappear.

Symbol	Meaning	Ontological / formal status
G(a,s,p,v)	Simultaneous expression	Joint expression of all currently available associated vehicles at developmental phase a and manifest state s.
Ego phase	Differentiation and identification	Individuation can precede identification with a body or narrative

The theoretical definitions in Sections 3–8 lead to the formal results in Section 9, the empirical interpretation in Section 10, and the equation-to-code correspondence in Appendix D.

3. Collective Individuation and Hierarchical Experiential Vehicles

3.1. Individuality as Differentiated Self-Limitation

Individuality is a developing experiential organization within manifested consciousness C. At one level, that organization is the experiencer or coordinator of multiple lower-order vehicles; at a higher level, the same organization is itself a vehicle of more inclusive differentiation. These two roles can coexist at one phase and state. Strict representation identity, collective group membership, vehicle association, self-identification, and memory access are distinct relations. No immutable personal essence or separate fundamental consciousness is required.

3.1.1. Collective Identity and Gradual Specialization

Collective identity is modeled as coarse equivalence or membership at a specified level of differentiation, not strict numerical identity. Later specialization may distinguish previously co-classified representations. Consequently, shared classification never licenses substituting the properties of one code for those of another. The mother–infant analogy illustrates the proposed transition from shared identification to more differentiated self-classification.

$$p \approx_a q\,;\; p \approx specialized\ q \Rightarrow p \approx collective\ q$$

The inherited sameAt(a,p,q) predicate is interpreted strictly as equivalence of developmental classification. Strict code equality p = q remains the substitutive identity relation. Its finite counterexample proves that false and true can be collectively equivalent while differing both in code identity and in association with the body. The two predicates therefore distinguish identity from collective membership.

3.1.2. Coarse Membership Versus Strict Identity

A coarse classification is an equivalence relation, but it is not automatically a congruence for membership in lower experiential vehicles. This is a logically substantive distinction: the earlier collective-classification equivalence can hold for p and q even if R(a,p,v) and R(a,q,v) have different truth values.

$$(3)\ p \approx_a q \not\Rightarrow [R(a,p,v) \leftrightarrow R(a,q,v)]$$

$$(4)\ Id(p,q) := (p = q);\ Id(p,q) \Rightarrow [R(a,p,v) \leftrightarrow R(a,q,v)]$$

3.2. Simultaneous Association and Expression

The fixed-association relations R(p,v) and G(s,p,v) are generalized to R(a,p,v) and G(a,s,p,v), where a is a development phase. The revised association can change through organizational differentiation, while actual expression still depends on the vehicle's current availability:

$$G_s(p,v) \leftrightarrow cR(p,v) \wedge B_s(v)$$

For any selected phase, every available associated vehicle participates in simultaneous expression. Across phases, new vehicles can become associated and others can cease to be associated; their structures can change independently of the transfer of anything between vehicles. The common manifest ground remains

C. An absence of focus on a vehicle does not mean its associated expression has ceased, and the disappearance of one vehicle does not by itself entail the disappearance of all others.

$$G(a,s,p,v) \leftrightarrow R(a,p,v) \wedge B(s,v)$$

3.2.1. Hierarchical Formation and Changing Vehicle Membership

The general H(u,v) nesting and Form(a,p,u,v) formation relations are organizational primitives. For material embodiment, the new mandatory hierarchy premise specializes their possible configurations into an ordered chain of prerequisites. A general phase-transition rule applies across arbitrary code and vehicle domains: an association persists unless retired, and a newly acquired association requires an explicit formation event. The finite example instantiates this general rule, without treating a membership update as a derivation of material structures from physical law.

3.2.2. Relative Experiencer and Vehicle Roles

IntegratedHierarchy locates the individual between its coordinated lower vehicles and more inclusive levels within one typed organization. StrictRelativeHierarchy requires every coordination edge to increase organizational level. Two consequences follow from that assumption: coordination along two successive edges has a strictly increasing endpoint rank, and reciprocal coordination is impossible. These are conditional consequences of the explicit ordering constraint, not independent derivations of ontological hierarchy.

$$(5)\ G(a,s,p,v) \Rightarrow Coord(a,s,I(p),V(v)) \wedge Coord(a,s,H,I(p))$$

The theorem individually_nested_but_not_identical derives two strict inequalities from one present-vehicle event. Its additional ordering relation is an explicit Paper-2 premise, while its finite witness contains genuinely distinct higher, individual, and lower organizational nodes. The encompassing node is not identified with Paper 1's nonmanifest Absolute.

For a present vehicle, the model verifies level(H) < level(I(p)) < level(V(v)). Here 'higher' means more inclusive organization, never greater ontological reality or identity with the nonmanifest Absolute (see Equation 32).

3.2.3. Necessary Hierarchy of Material Manifestation

The material body is the terminal and most constrained member of a staged hierarchy of manifestation. Its existence within an individual experiential organization presupposes the corresponding subtle, individuated, and encompassing levels. Material embodiment therefore requires the associated higher levels as constitutive prerequisites. The higher levels are constitutively prior in the model: each stage makes the formation of the next, more limited stage possible. Condensation denotes increasing specification, restriction, and organizational differentiation within the ontological hierarchy.

The new vehicle-hierarchy postulate, denoted VH, is material-specific: for each admissible state and owner, actual bodily expression entails the activity of every requisite higher-level vehicle and a strict formation order ending in the material level. A corresponding finite tier representation distinguishes the common conscious ground, inclusive organization, individuated organization, subtle vehicle, and material body. The common ground remains immanent to every tier and is not a separate material component. The original general-purpose Vehicle type continues to admit nonbodily or artificial organizations; VH constrains precisely those instances interpreted as materially embodied experience.

The ordering states a necessary dependence. It does not turn the organizational rank into physical clock time, determine a unique neural mechanism of condensation, or infer personally continuous focus after bodily loss. An account of chronological formation would additionally require dated transitions with verified temporal precedence. The finite extension in Appendix E specifies a nonvacuous joint witness for the hierarchy condition and identifies the extra premises separately from the established foundational theorems.

$$Form(a,p,u,v) \Rightarrow H(u,v) \wedge R(a,p,u) \wedge R(a,p,v)$$
$$H(u,v) \Rightarrow rank_1(mean(u)) \leq rank_1(mean(v))$$

3.3. Focus Is Selective Rather Than Constitutive

F(a,s,p,v) denotes focus indexed by developmental phase and representation. X3 originally assigns focus F_X3(s,v) at the vehicle level. The one-way compatibility F(a,s,p,v) => F_X3(s,v) holds. In the verified finite extension, successful access additionally requires both X3 focus and the vehicle's informational capacity. The X3 focus remains an organizational envelope; phase-specific experiential events retain their separate indices.

$$F_s(x,v) \Rightarrow G_s(\pi(x),v)$$

The finite model exhibits simultaneous focus and actually accessible, distinguishable informational contents for the same representation code in the specialized, developed state. The body vehicle accesses growth, while the parallel vehicle accesses parallelSignal. Both are drawn from one fixed information type and remain constrained by their different vehicle capacities. These labels are formal example terms, not observations of objectively independent nonphysical channels.

Effective X3 focus and vehicle-specific capacity jointly delimit access; the finite witness has two different accessible items in the same developed state (Equations 33 and 34).

$$(6)\ F(a,s,p,v) \Rightarrow F_{x3}(s,v) \Rightarrow B(s,v)$$

3.3.1. Expanded Focus and Concurrent Experience

Broadened attention is a phase-relative possibility. The formalization distinguishes organizational focus from successful content access and proves the existence of two distinct accessed items in its common-state finite witness. Meditation, psychedelically altered experience, and reported nondual recognition remain candidate settings for phenomenological investigation; reported streams do not by themselves establish the ontological status of an additional experiential vehicle.

3.4. Formal Vehicle-Organization Constraints

Let V be the vehicle domain, S the manifest-state domain, and I a fixed information type. An interpretation $\mu: V \to \mathfrak{O}_M$ maps every vehicle to a manifest organization. The bridge to A7 requires

$$\forall v \in V: \mathrm{Immanent}(\mu(v), \mathcal{C}). \quad (7)$$

Vehicles can be organic, inorganic, artificial, distributed, or nested effective organizations. They belong to the manifest domain of Paper 1. The general inner-to-outer relation admits organizational variety. Material embodiment imposes an additional constitutive constraint: every active bodily manifestation presupposes its higher-level vehicle chain, with strictly increasing differentiation toward the material level. This material-specific restriction is a declared extension of the general relation.

An experiential vehicle is an organized level of expression, distinct from its constituent anatomical components and computational functions. For the human bodily vehicle, the brain is treated as an

instrument that contributes to sensory coordination, attentional selection, mnemonic organization, and the ability to formulate overt reports. Neuronal assemblies, cognitive control, emotions, and stored autobiographical representations are functions or contents of the bodily organization. A distinct vehicle is identified by the additional individuation and association criteria of the architecture.

This separation is also methodological. Neural measurements provide observations of the bodily instrument at particular spatial and temporal scales; subjective reports provide fallible observations of experience; behavioral performance characterizes capacities available through that same bodily organization. Together these measures test neural mediation, experiential access, and identification; the consciousness-first foundation supplies the ontological interpretation. Functional magnetic resonance imaging (fMRI) and electroencephalography (EEG) characterize the bodily mechanisms through which those relations become measurable.

At the foundational organizational layer, define availability $B_s(v)$, vehicle-level effective focus $f_s(v)$, capacity $K_s(v) = \{i \in I : k_s(v,i)\}$, and accessible information $A_s(v) = \{i \in I : a_s(v,i)\}$. The encoded X3 constraints are precisely

$$f_s(v) \Rightarrow B_s(v), \qquad a_s(v,i) \Rightarrow f_s(v) \wedge k_s(v,i). \tag{8}$$

$$A_s(v) \neq \varnothing \Rightarrow f_s(v), \qquad A_s(v) \subseteq K_s(v). \tag{9}$$

Here the first clause in Equation (9) follows by existential elimination from accessBound, and the second follows by projection of its conjunction. Equations (8)–(9) are thus exact mathematical translations of the underlying X3 fields focusAvailable and accessBound in ExperienceExtension. **They are not perspective-indexed formulas.** The subsequently introduced perspective-relative predicates $F_s(x,v)$ and $A_s(x,v)$ represent additional individuation structure; no universal factorization of those perspective-relative predicates through the vehicle-level X3 predicates is proved or assumed. This avoids conflating the two formal layers.

A state-relative nesting relation $u \sqsubseteq_s v$ is a partial order on available vehicles. Where capacity-preserving nesting is stipulated,

$$u \sqsubseteq_s v \Rightarrow K_s(u) \subseteq K_s(v). \tag{10}$$

X1–X6 formalize effective nesting and informational capacity. The integrated interpretation distinguishes concurrent presence from selective focus and specifies phase-relative individuation, organizational formation, mutable association, and simultaneous multifocus relative to Paper 1.

4. Differentiation, Presentation, and Information

The extension connects experiential presentation to the original reflexive differentiation function rather than introducing an independent source of phenomenal reality. Let $R_T(w,a,\sigma,\mathcal{C})$ denote the original reflexive form. For each effective presentation $e_s(v)$, the bridge requires a witness such that

$$e_s(v) = R_T(w,a,\sigma,\mathcal{C}). \tag{11}$$

Let δ_T be the original determination function and Φ_T its formulator. The dependent determination bridge is

$$\delta_s(v) = \delta_T\big(e_s(v)\big), \qquad \Phi_T\big(\delta_s(v)\big) = \mathcal{C}. \tag{12}$$

The second equality is derived from Paper 1's A9. Every available vehicle still mediates an experiential presentation under the same reflexive differentiation and conscious formulator; no independent source of consciousness is assigned to a lower vehicle. The same formulator is formally established for every phase-indexed present vehicle.

4.1. Exact Dependence on the Published Reflexive Core

X4 requires every vehicle presentation to admit a Paper-1 reflexiveForm witness, and A9 fixes the conscious formulator of manifest determination. Earlier Stage-11 witnesses add the stronger sharedReflexiveGeneration requirement that a single activated mode provide both the individual boundary and the vehicle presentation. Stage 16 retains those historical declarations for auditability but replaces their use in the final model with a two-event bridge, because the refined mode-specific boundary forms are distinct. The final dependent experience structure is reconstructed over the same refined CoreTheory, preserving D31 exactly.

4.2. Two Linked Differentiation Events in One Modal World

Reflexive generation requires mode-specific presentation events. A human-individuation event produces the designated individual boundary, while a distinct bodily presentation event produces the vehicle boundary. The integrated foundation represents both as active events in one associated world. The Lean theorem two_event_reflexive_bridge establishes their joint realization, and distinct_human_and_bodily_boundary_events preserves their distinction. Both remain differentiations within the same manifested consciousness. For a state in which the body is unavailable, the event witness is attached to an active nonbodily presentation mode; the bodily presentation itself is not asserted to be active there.

Information is modeled as a common type of possibilities within the unified manifest ontology. Potential capacity, focused access, and formulated determination are distinct relations within that ontology.

5. Individuated Perspectives and Represented Individuality

Let $\mathcal{X} \neq \varnothing$ denote differentiated experiential perspectives and $\mathcal{P} \neq \varnothing$ denote ontological experiencers. Define

$$\pi : \mathcal{X} \to \mathcal{P}. \tag{13}$$

No injectivity axiom is imposed. Thus

$$x \neq y \quad \wedge \quad \pi(x) = \pi(y) \tag{14}$$

is admissible. The number of differentiated perspectives alone does not determine the cardinality of represented experiencers. A model with one owner and several perspectives and a model with multiple owner indices both satisfy the permissive earlier mapping axioms. Represented owner indices can also be reconstructed as equivalence classes of actually focused events. This is a semantic interpretation within the one manifest foundation, not an empirical enumeration of metaphysically independent substances.

The π classification and its focused-event quotient identify represented owner classes. The phase-relative sameAt relation formalizes collective grouping or classification. It differs from code identity; the model demonstrates a concrete failure of vehicle-association congruence under group equivalence, and preserves the underdetermination of the number of independently existing individuals.

Group membership can be evaluated at a collective or differentiated phase, whereas actual identity within a fixed representation type is strict equality. No one-to-one metaphysical map from such codes to ultimately distinct consciousness substances is postulated. The same intermediate organization may function as a coordinator of lower vehicles and as an object of a higher organization; that relative role need not be psychologically accessible.

5.1. Identity Relative to the Degree of Differentiation

The theorem collective_grouping_does_not_entail_vehicle_congruence exhibits codes that share collective classification but differ in association with a bodily vehicle. In contrast, real_code_identity_preserves_associations proves substitutivity under strict equality. The model therefore avoids an invalid inference from a shared class to an identical individual.

Relation to personal-identity philosophy. Parfit distinguishes the persistence of persons from relations of psychological continuity and connectedness that may matter across time [6]. Zahavi analyzes the first-person givenness of experience and the role of minimal selfhood in subjectivity [7]. The present owner map performs a different formal task: it assigns perspectives to stipulated identity anchors without equating such anchors with psychological memory chains or identifying them with phenomenological self-givenness. Its identity and lineage conditions are consequently specified independently. Neither cited philosophical account is asserted to prove the present consciousness-first ontology.

5.2. A Precise Cardinality-Independence Result

The failure of injectivity is a **permitted interpretation**, not an assertion that the owner map is noninjective in every possible model. To prove that experiential plurality does not force experiencer plurality, let X = $\{x_0, x_1\}$, P = {p}, and $\pi(x_0) = \pi(x_1) = p$. This is a countermodel to the universally quantified claim $x \neq y \Rightarrow \pi(x) \neq \pi(y)$. To show that the theory does not force singular experiencer cardinality either, let P = $\{p_0, p_1\}$ and $\pi(x_i) = p_i$. Both interpretations satisfy the nonempty-domain and total-map requirements. Both owner-cardinality interpretations are supplied over a shared finite foundational witness. The countermodels establish experiencer-cardinality independence within the encoded axiomatic framework; they do not determine the actual number of ontological experiencers.

The nonseparation of manifest organizations does not impose equal experiences or a preserved personality. Conversely, a change in attention or bodily availability is insufficient to infer total disappearance of other associated organizations. Across large-scale cycles an individuality itself may cease to be instantiated; this is distinguishable from the continuity or loss of any psychological narrative.

Relation to the preceding study's experiential plurality. Paper 1's phenomenological distinction among reported or represented experiential streams is a claim about differentiated experiences. The countermodels for the owner map π concern a different question: how many owner classes the formal representation requires. Neither result negates experiential differences, and the latter alone does not establish the actual cardinality of metaphysical experiencers.

5.3. Realized Owner Roles Within the Manifest Field

Every p in the strengthened ExemplifiedOwnerTheory has a witness (s,x,v) with π(x)=p and effective perspective-indexed focus at state s through vehicle v. This extra condition prevents uninstantiated owner indices within the strengthened representation. It does not identify P with the nonmanifest absolute, introduce separate conscious substances, or prove permanence of a particular identity. A finite Unit-owner witness exhibits distinct focused perspective representations over one common consciousness; this is a compatibility result consistent with Paper 1's differentiated manifestations.

5.4. Focused-Event Quotients and Represented Identity

Let E consist of triples (s,x,v) for which perspective-indexed focus F(s,x,v) actually holds. Each such event has a manifest organizational interpretation through the inherited vehicle-meaning map μ(v). Define e∼f

when the specified represented-owner criterion identifies their perspectives, and take P as the resulting quotient E/∼. The formalization checks equivalence, the bijection between every represented owner code and an event class, the immanence of the vehicle interpretation, and the compatibility of the identity criterion with a separate directed lineage. The equivalence is a semantic identity choice; it does not derive enduring first-person identity from consciousness alone.

5.5. Individuality Is Not a Personal Narrative

The individualized experiencer is modeled as coordinating its associated experiential vehicles, including the bodily vehicle when available. Within that bodily vehicle, the brain functions as a specialized instrument, whereas cognitive operations, affective states, and autobiographical memories refer to processes or contents rather than automatically constituting additional vehicles. These functions and contents may change without preserving specific information. Conversely, the individual organization can itself be reorganized or dissolved relative to less differentiated, more inclusive levels. Stationary association is a special case of the phase-dependent model.

6. Selective Focus, Identification, Reflection, and Recognition

Focus selects experiential access from among currently associated, available vehicles. It neither creates universal consciousness nor moves an individuality from one organization to another. Identification J denotes the content of self-reference at a given developmental level: the body, intellect, personality, or autobiography can be taken as the self, whereas a broader identification can include less differentiated experiential organizations.

$$J_s(x,v) \Rightarrow F_s(x,v), \tag{15}$$

while the converse does not follow. Self-reflection $L_s(x,v)$ denotes cognitive examination of self-representations. Self-awareness $W_s(x,v)$, in this theory's specifically ontological sense, denotes recognition of consciousness as fundamental:

$$W_s(x,v) \Rightarrow F_s(x,v) \wedge \neg J_s(x,v). \tag{16}$$

Neither $L \Rightarrow W$ nor $W \Rightarrow L$ is stipulated. In the cognitive extension, J, L, and W are independently interpreted predicates in CognitiveInterpretation rather than defining recognition as a negation of identification. The explicit dependency fields require $J \Rightarrow F$, $W \Rightarrow F$, and $W \Rightarrow \neg J$, while leaving reflection unconstrained. Two finite witnesses are supplied for $L \wedge \neg W$ and $W \wedge \neg L$. These finite witnesses establish logical permissibility relative to the declared fields, not phenomenological or neuroscientific correspondence.

Let $M_s(x,v) \subseteq I$ denote accessible autobiographical information. The persistence of a perspective or continuity relation is not defined by equality of these memory sets.

6.1. Ordinary Human Attention and Its Identifications

Ordinary human attention frequently emphasizes the biological body and its cognitive and autobiographical representations. This focus is developmentally contingent. Self-identification may first emerge in relatively restricted forms and later expand toward the experiencer of several coordinated vehicles and toward more inclusive levels. An identification-free phase in the finite model expresses one special case and does not deny earlier forms of collective identity.

6.2. Identification as a Developing Form of Self-Recognition

Self-identification is not permanently confined to a biological body. It may become progressively inclusive, from bodily and autobiographical self-models to recognition of a coordinating experiential individuality and, in the hypothesized hierarchy, still less differentiated forms. The experiencer recognized at one stage can itself be an object of awareness from a higher level. The growth of attention and of the effective vehicles can occur together.

6.3. Neural Mediation Within the Bodily Experiential Vehicle

The proposed hierarchy distinguishes an ontological question from an empirically tractable functional one. The claim that manifested consciousness is primary belongs to the stated ontology. The neuroscientific question concerns how a bodily vehicle uses its neural instrument to select information, stabilize a body-centered self-model, maintain memory, and permit verbal or behavioral expression. Within this architecture, perception, attention, memory, and other experiential capacities are not inherently restricted to the material level; the brain mediates their specifically bodily expression, while other experiential vehicles provide their corresponding forms of access and organization. A brain measure is an observation of the latter functions; the formal model does not assert that a particular neural network generates consciousness, nor does it deny that activity in that network can be causally important for human perception, cognition, and action.

In recent within-person neuroimaging, psilocybin changed the spatial organization of functional connectivity and especially disrupted reproducible network patterns, including those associated with self-related processing [4]. In 62 participants studied with fMRI and EEG during varying contextual conditions, the organization of neural activity changed in relation to reported boundary dissolution and the experienced relation between self and environment [5]. Simultaneous EEG-fMRI measurements under DMT also revealed relationships among oscillatory activity, functional connectivity, and an altered experiential state [8]. In a subsequent EEG analysis, N,N-dimethyltryptamine (DMT)-associated shifts in oscillatory criticality covaried with the intensity of reported self-dissolution [9]. These are observations of neural–experiential covariation, not demonstrations that consciousness originated in the measured brain activity.

The temporal profile and modality-specificity of these effects provide further empirical constraints. An exploratory multimodal study of 28 psychedelic-naïve participants reported robust acute EEG changes after psilocybin, whereas enduring functional fMRI changes were largely absent at the group level; some anatomical and psychological associations were observed [10]. These findings distinguish robust acute changes from the more selective and variable longer-term neural outcomes. Pharmacological interventions also permit controlled investigation of the bodily systems participating in altered self-experience.

6.4. Self-Identification, Nondual Reports, and Reflexive Access

The architecture distinguishes identification J, reflection L, and recognition W because they address different possible features of an experiential organization. Ordinary bodily self-identification concerns a person's self-model; reflection concerns the capacity to examine or evaluate mental contents; and W denotes an ontological recognition predicate within the formal framework. A questionnaire response describing unity or nondual awareness is not an observation of W itself. Any empirical interpretation must first validate the mapping from interview classifications or ratings to a specified reportable psychological construct.

Controlled and contemplative research supplies candidate indicators. Meditation-related attenuation of beta oscillations in the posterior medial cortex was associated with suspension of the ordinary embodied self in one experimental paradigm [11]. A 2026 investigation comparing advanced meditators, novices, and nonmeditating controls found that reduced differences in EEG-based intrinsic neural timescales across internal and external attention conditions correlated with reported nondual experience [12]. Such findings motivate a neural phenomenology of diminished self-boundaries while leaving open whether they reflect attention, altered self-modeling, response criteria, or another mechanism. Reports of nonduality therefore require independent checks of vocabulary, training, demand characteristics, and temporal anchoring.

Metacognitive access and phenomenal presence are empirically distinguishable dimensions. In two experiments involving 204 participants, confidence ratings were shown to track not only features of subjective experience but also nonperceptual biases [13]. This directly bears on H2: a separation of reflection and reported recognition must be evaluated using calibrated metacognitive tasks, independent experiential ratings, blinded interviews, and a measurement model that permits criterion shifts. A reliable two-factor result would establish the predicted operational distinction between reflection and reported recognition.

6.5. Conscious Access, Report, and Experiential Content

The bodily instrument performs both perceptual processing and the production of responses. These functions complicate any inference from a person's ability to report to the presence or absence of experience. No-report methods seek to reduce the neural activity added by explicit decisions or verbal reports. A 2025 auditory fMRI study of 63 healthy participants compared conscious and nonconscious responses to task-irrelevant but physically equivalent sounds; the strongest awareness-related activations were observed in secondary auditory regions, with more circumscribed frontal involvement [2]. A 2026 visual magnetoencephalography (MEG) study similarly separated report-modulated frontal activity from posterior representations related to perceptual awareness [3]. The studies operationally separate sensory awareness measures from report-related task demands, supplying discriminating evidence about the bodily mechanisms of access.

Reports of absent or minimal conscious content introduce a further complication. A study combining sustained-attention behavior, subjective probes, and high-density EEG characterized mind blanking as distinct from ordinary task engagement and mind wandering [14]. The phenomenological distinction between little or no reported content and the absence of consciousness itself must nevertheless remain explicit. Within the present architecture, reduced content availability, impaired reporting, loss of memory, and loss of the conscious ground are not interchangeable propositions. Measurements can discriminate among the first three under a validated bridge; they do not directly observe the fourth.

7. Involution, Evolution, and the Limits of Experiential Access

Differentiation includes two analytically distinct directions. Involution describes progressive self-limitation and formation of increasingly specialized, outer experiential organizations. Evolution describes the subsequent refinement of capacities, coordination of vehicles, and expansion of accessible experience and self-identification. Both directions can be considered within longer cycles in which developed individuation may ultimately be reabsorbed. The rank of a manifestation indicates degree of differentiation, never quantity or ontological superiority of C.

Let $Q_s(v)$ denote the repertoire of experiential possibility-types enabled by a vehicle. The current manifest repertoire is

$$\mathcal{E}_s = \bigcup_{v:B_s(v)} Q_s(v). \quad (17)$$

The historical repertoire is

$$\mathcal{H}_s = \bigcup_{u \preccurlyeq s} \mathcal{E}_u. \quad (18)$$

For $s \preccurlyeq t$, $\mathcal{H}_s \subseteq \mathcal{H}_t$ follows from the cumulative definition. It is not an independent empirical law of progress.

The X5–X6 developmental extension makes development a separate relation and includes a nonvacuous capacity increase in its finite witness. The theorem historical_strict_expansion exhibits one genuinely absent-before, present-after possibility. This finite example is not a general law of progress: monotonicity of cumulative history follows definitionally, while strict novelty requires a separate witness. Thus local development is not merely renamed set inclusion. In the larger theory, a particular vehicle can deteriorate even while other manifest organizations enable novel possibility-types. None of these changes alter $\mathcal{C}$, and none establish greater ontological reality for a more differentiated vehicle, in accordance with original A12.

7.1. Differentiation Order and Experiential Novelty

Let $\rho_T : \mathfrak{O}_M \to \mathbb{N}$ denote the differentiation rank used in the original formal core. A vehicle's interpreted manifest organization $\mu(v)$ has rank $\rho_T(\mu(v))$. The rank is an **organizational ordering**, not a measure of the amount of consciousness or ontological reality. In particular, neither

$$\rho_T(\mu(u)) \leq \rho_T(\mu(v)) \;\Rightarrow\; K_s(u) \subseteq K_s(v)$$

nor its converse follows without a bridging assumption. Any monotonicity relation between differentiation rank, information capacity, and experiential possibility must be separately formulated and tested. This blocks a tempting but invalid inference from the original A8 ordering to a universal law of experiential progress.

Order-theoretic scope. Paper 1's differentiation order can be represented through multiple coordinates and need not be a total order. The finite Lean witness uses a natural-number differentiationRank as a selected monotone abstraction; it does not prove that every incomparable configuration in the original partial-order structure is represented faithfully by one scalar rank.

For a nontrivial example of global novelty, suppose $Q_s(v_1) = \{a, b\}$, $Q_s(v_2) = \{c\}$, $Q_t(v_1) = \{a\}$, and $Q_t(v_2) = \{b, c, d\}$. Then $Q_t(v_1) \subsetneq Q_s(v_1)$, while $\mathcal{E}_s = \{a, b, c\} \subsetneq \mathcal{E}_t = \{a, b, c, d\}$. The example proves compatibility, not that all chronological transitions increase the current global repertoire. Only the historical union is necessarily monotone by definition.

7.2. A Conditional Preservation Proposition

Define $\mathrm{Dev}(s, t)$ independently of repertoire inclusion, using the developmental relation from the earlier X5 extension. If the additional bridge

$$\mathrm{Dev}(s, t) \;\wedge\; B_s(v) \wedge B_t(v) \Rightarrow K_s(v) \subseteq K_t(v)$$

is imposed for a specified vehicle class, then capacity inclusion follows by modus ponens. **Strict** expansion requires a further novelty witness $\exists i\, [i \in K_t(v) \wedge i \notin K_s(v)]$. These two premises must not be conflated. The theory formally verifies capacity preservation under the declared development bridge.

Strict expansion additionally requires an explicit novelty condition; the earlier finite model supplies a strict developmental witness.

7.3. General Repertoire Semantics

The abstract GeneralEvolution structure distinguishes possible(s,v,i), the possibility of experiencing information, from capacity(s,v,i), the informational capacity predicate. Corresponding to Equations (17) and (18), currentRepertoire is the union of possibilities on currently available vehicles, while historicalRepertoire accumulates possibilities across preceding states. Lean 4 verifies history_monotone from order transitivity, historical_strict_when_new under a distinct novelty premise, and capacity_inclusion_given_bridge from its explicitly declared capacityBridge assumption. These conditional results and the independently constructed finite examples specify the scope of developmental and historical-repertoire claims.

7.4. Collective Identity Before Specialized Individuation

The minimal/individuated/identified enumeration is a finite illustrative witness, while collective identity is represented through a phase-indexed equivalence relation. Distinct representational codes can initially belong to the same collective equivalence class and become distinguishable through specialization. Ordinary ego identification is not necessary for this process. The developmental classification remains a semantic hypothesis, not a theorem of infant psychology or biology.

7.5. Involution, Evolution, and Organizational Development

Involution describes self-limitation and development of increasingly specialized outer organizations; evolution describes changes in capacities, access, and identification, including possible expansion of experiential focus. A general transition rule is defined over arbitrary representation-code and vehicle types, with independently specified formation and retirement predicates. The theorem genuine_new_membership_requires_formation holds for any such rule, rather than just a hand-coded phase table. The resulting general calculus describes the formation and retirement of organizational associations.

7.6. Cyclic Reabsorption and Informational Traces

A three-phase successor and an indexed local path specify reorganization. The recurrent model further establishes that phase and corresponding model-world recur for every developmental index n after three steps, whereas actual vehicle instances are indexed by cycle generation and can be formed and retired. Reabsorption can lack an instantiated individual while universal manifested consciousness remains part of the fixed modal architecture. The cycle parameter is an organizational index, not fundamental time.

7.7. Explicit Developmental Successor and Cycle

TransitionRule(P,V) specifies formation and retirement. The recurrent construction applies it to the epoch-indexed instance type (generation, vehicle kind). A body associated with one epoch can retire; a parallel instance can form in the collective phase; and a new body instance can arise in the following specialized phase. Theorems verify multiple consecutive repetitions, distinct instances and the general requirement that newly acquired membership has an explicit formation event.

The general transition rules and their nonvacuous formation consequence are stated formally in Equations (35)–(36); both hold for arbitrary code and vehicle types.

$$(19)\ R(next(a), p, v) \leftrightarrow Update(a, R(a), p, v)$$

$$(20)\ next(next(next(a))) = a$$

7.8. Experience-Originated Retention and Accessibility

The recovery model reconstructs an informational trace without a fixed owner code: information enters the trace only after an actually accessed body-associated experience, and subsequent retention is an independent policy. The selected reabsorbed world may contain consciousness without the individual or the manifest referent of the retained information. In later phases, the trace is accessible through parallel instances belonging to different generations. Retaining the information does not retain a person or an autobiographical memory by logical necessity.

Equations (37)–(39) formalize experiential trace origin, optional transfer between numbered cycles, and later recovery. The latter uses a renewed vehicle association and content access, not biological continuation.

$$(21)\ Trace(p, i) := \exists v\,[F(specialized, developed, p, v) \wedge Access(developed, v, i)]$$

$$(22)\ Retained(policy, p, i) \Rightarrow Trace(p, i)$$

$$\neg Inst(reabsorbed, p)\ ;\ manifested(w, C)\ \ for\ all\ w$$

7.9. Generational Recurrence and Reabsorption

A genuinely cyclic development requires a recurrent phase function, not an absorbing terminal phase. The new stage-indexed map has period three: specialized differentiation, reabsorption, and collective configuration recur without making the vehicles themselves periodic identical objects. The three Paper-1-admissible worlds assigned to those steps likewise recur, while individual profiles distinguish specialized and collective phases and take an absent value during the selected reabsorbed phase.

A vehicle is now represented by its kind and generation, making an early body instance distinct from later bodies. Every transition is specified by a retirement/formation relation, and newly acquired membership requires a formation event. World succession itself is encoded by an additional next-step relation: D8 only supplies admissible realizations, not a history connecting them. This distinction keeps modal semantics and developmental ordering separate.

The informational trace is defined from an actual initial access event without indexing its persistence by an unchanging owner code. The same manifest consciousness remains the grounding term in every selected world; a trace can persist as retained potential even during a step when its represented information is not manifest. Subsequent access through newly generated parallel vehicles requires their actual membership, informational capability and an explicit retention policy. It is thus possible, but not necessary, across reabsorption in the finite witness.

7.10. Integrated Snapshots, Nested Vehicles, and Creative Information Growth

The integrated model treats a developmental realization as a snapshot with an index, a recurring modal world class, a phase-relative individuality profile, and an associated set of experiential vehicles. This is additional organizational state beyond the three admissible world labels. Consequently, two developmental realizations may belong to the same modal class without possessing the same individual

profile or material vehicle. The modal classification is not mistaken for a complete generation-specific world-state.

At specialized epochs, the same indexed individuality is associated with simultaneously available inner and outer vehicular organizations; that individuality itself remains below a more encompassing organization. A direct coordination relation connects these relative layers. It specifies co-membership and relative hierarchy; reflective access may encompass a smaller set of organizations. The higher organization remains available when the selected individuality is absent during reabsorption.

Informational potential is explicitly assigned to the one manifest consciousness. Its successor law combines previously retained information with newly accessed contents, and its retention policy is allowed to differ by informational item. Thus the model permits novelty or reacquisition after loss as well as persistence without requiring that the corresponding information referent remain manifest in every intervening phase. The conscious-carrier relation is an explicit premise of the formal extension.

Finally, phaseAdvance specifies an organizational successor over specialized, reabsorbed, and collective phases. Its third iterate is the identity, which entails recurrence at arbitrary developmental indices. The selected successor is an organizational rule with no assigned physical time scale.

7.11. Constitutive Precedence and Progressive Constraint

The developmental interpretation now distinguishes general rearrangement of associated vehicles from the formation of a material body. In the material case, the encompassing level, individuated level, and subtler experiential organization are prerequisite stages; bodily organization is their most constrained expression. Increasing differentiation is represented by an ordered rank, while each active material realization requires the preceding tier members. The periodic phase index describes changes in a selected finite model and should not be confused with the constitutive order in which the hierarchy is specified.

The dependency is directional: a realized material body guarantees the requisite higher organization in its selected experiential structure, whereas higher organization can occur without a material body. This asymmetry is compatible with the earlier finite worlds that contain consciousness or individuated organization without the designated human body. The additional hierarchy requirement therefore strengthens the embodied branch of the architecture without introducing a second ontological substrate.

8. Local Vehicle Loss and Optional Lineage Conditions

Loss of the material body withdraws the outermost, most constrained level of an already constituted hierarchy. The architecture now distinguishes three cases: (i) ordinary loss during a continuing individual evolutionary interval, where focus shifts to the immediately inner available vehicle under an explicit continuity law; (ii) later stepwise loss of further outer vehicles, governed by the same conditional rule; and (iii) terminal integration at the deepest involutionary or highest evolutionary boundary, where a separately stipulated end of individual attribution is possible. Ordinary bodily death falls under the continuing-trajectory case; complete integration is a separate limiting boundary. In every case the common conscious ground persists; the universal information record is conceptually distinct from the continuance of a particular individual.

Two finite CoreTheory + X1–X7 models provide opposing assignments for later focus following the designated body's loss. Let T denote that base theory and let P denote the target proposition that post-loss focus occurs. The models establish semantic non-entailment in both directions, rather than derivations of P and its negation:

$$CoreTheory + X1\text{–}X7 \nvdash PostLossFocus \quad (23)$$

and

$$CoreTheory + X1\text{–}X7 \nvdash \neg PostLossFocus \quad (24)$$

The opposing finite models demonstrate that the earlier, weaker organizational axioms alone do not entail later individual focus. The proposed architecture adds a conditional evolutionary-transfer premise: when an individual remains in an evolutionary interval, an outer focused vehicle is lost, and an immediately inner vehicle remains available, focus continues there. The evolutionary-transfer law is an explicit strengthening of the inherited architecture. Previously established alternative models remain relevant to the weaker theory and to boundary states outside the strengthened antecedent.

Let $T_{s,t}(x, y)$ denote continuity of an individuated experiential lineage across states, and let $D \subseteq V$ be enduring vehicles. The continuity axioms are:

$$T_{s,t}(x, y) \Rightarrow \pi(x) = \pi(y), \quad (25)$$

and, for a designated bodily-loss transition $s \to t$ with bodily vehicle b,

$$F_s(x, b) \Rightarrow \exists y \in \mathcal{X},\ d \in D\colon \quad T_{s,t}(x, y) \wedge F_t(y, d) \wedge B_s(d) \wedge B_t(d). \quad (26)$$

Equality of π alone does not establish lineage, particularly when $|\mathcal{P}| = 1$. The relation T explicitly records the continuity claim. It does not require equality of autobiographical memory:

$$T_{s,t}(x, y) \quad \text{is compatible with} \quad M_s(x, b) \neq M_t(y, d). \quad (27)$$

ContinuationPostulate specifies a post-loss lineage under designated conditions. The strengthened interpretation requires a further transition premise linking an active evolutionary trajectory, actual loss of an outer focused vehicle, and availability of the immediately inner vehicle. The existing integrated finite witness establishes compatibility of its original conditional lineage statement with the shared foundation; the added Stage-18 result makes the new transition premises explicit and proves the corresponding conditional consequence. The empirical counterpart is assessed through independently investigated cross-bodily continuity cases.

8.1. Bodily Loss as a Local Availability Change

The conditional expression in Eq. (26) must be interpreted only for **designated bodily-loss transitions**. Define an explicit relation

$$\text{Loss}(s, t, b) \ \Rightarrow\ B_s(b) \wedge \neg B_t(b) \wedge s \preccurlyeq t. \quad (28)$$

Equation (28) specifies the compatibility requirements for a designated bodily-loss transition. Equation (29) then states the additional continuity commitment in terms of that transition.

$$\begin{aligned} &\text{Loss}(s, t, b) \wedge F_s(x, b) \\ &\quad \Rightarrow \exists y, d\colon D(d) \wedge B_s(d) \wedge B_t(d) \\ &\qquad \wedge F_t(y, d) \wedge T_{s,t}(x, y). \end{aligned} \quad (29)$$

Equation (29) is a special additional lineage postulate for designated bodily-loss transitions. It does not define the simultaneous existence of individuality through other vehicles. In the simultaneous-vehicle construction, co-presence is already established before any such event; the body becoming unavailable does not logically erase a still-available associated vehicle.

The neural instrument and the ontological ground have different explanatory roles. Neurological injury and irreversible loss of brain function alter or eliminate bodily perception, encoding, autobiographical retrieval, response, and report capacities. These observations establish the neural dependence of bodily memory and reporting capacities. The proposed next-inner vehicle and universal record are investigated through the distinct continuity and information-access pathways described below. Within the model,

personality and habituated responses belong chiefly to the bodily expression. Acquired insight and ordinary episodic recall are distinguished by definition, permitting reduced personal recall without loss of the individual developmental acquisition. The post-bodily extension of this distinction motivates the case-investigation protocols in Sections 8.8–8.9.

Contemporary fMRI research locates temporal organization of autobiographical recollection and projection in distributed cortical and subcortical activity [15]. Such observations concern how personal-event information is organized and accessed through a functioning bodily instrument; they do not identify phenomenological or ontological continuity with a particular memory trace. Accordingly, the proposed H3 contrast between memory accuracy and felt continuity is a psychological test. Any stronger claim about information acquisition beyond bodily loss requires a different prospective protocol with independently verified sources, chronology, blinding, and adequate rival explanations.

8.2. Multistage Lineage and Identity

A single transition does not establish a multistage continuity history. If continuity is intended to compose across successive transitions, the theory requires a separate axiom such as

$$T_{s,t}(x,y) \wedge T_{t,u}(y,z) \Rightarrow T_{s,u}(x,z), \qquad s \leqslant t \leqslant u. \tag{30}$$

LineageExtension.lineageTrans formally requires compositionality. The representationLineage relation permits different perspective-representation pairs to share a persistent thread and preserves lineage across three states in the finite model. When it is adopted, owner preservation across the composite follows from the original continuity-owner condition: $\pi(x) = \pi(y) = \pi(z)$. The converse remains invalid. The relation also needs not be symmetric: the ordering of states gives lineage a direction. A reflexivity requirement for $T_{s,s}$ may be useful for identity transitions, but should be stated independently rather than silently inferred.

Philosophical scope of lineage. A persistence relation in the present formalism is an explicitly stipulated lineage condition, not a synonym for autobiographical connectedness in Parfit's analysis [6] or for the minimal first-personal structure examined by Zahavi [7]. Psychological continuity, first-personal presence, and ownership across states are therefore separate concepts. The model constructions establish that the stipulated lineage relation can be preserved across altered representations and memory contents; further ontological or empirical identification requires corresponding bridge premises.

8.3. Memory Independence and Its Exact Meaning

The existing formal memory model represents accessible autobiographical contents through LineageExtension.memory. Its changed-memory witness demonstrates that stipulated lineage can coexist with unequal available memory sets. Stage 18 distinguishes that personally available recall from acquired insight and from a universal informational record. It includes a conditional preservation premise for acquired insight across an ongoing evolutionary loss transition, together with a witness showing that recall may be absent even when insight remains. The universal record is postulated to include acquired insight regardless of personal retrieval; the model does not assert that all records are experimentally accessible.

8.4. General Continuity and Representational Identity

The GeneralContinuity result is universally quantified over abstract nonempty types and explicitly assumes auxiliaryContinuation. The realizedLossAndFocus condition excludes an empty antecedent. A joint dependent model combines actual bodily loss, another-vehicle focus, directed lineage, represented ownership, and changed autobiographical recall over the same Paper-1 core.

The realized-event owner representation is explicit. A FocusedEvent is a genuine focused instance, and focused_event_is_paper1_manifest proves the vehicle's availability and immanence under the inherited X1 meaning bridge. A quotient by represented-owner equality gives identity classes of those actual events; left/right inverse theorems relate the classes to all owner indices in the strengthened model. These results identify the exact formal criterion without asserting an independently confirmed ontology of persistence.
The verified memoryfulLineage witness shows the consistency of changed memory content with retained lineage, thereby refuting any claim that equal accessible autobiographical content is necessary in every model. The mathematical result concerns compatibility between lineage and changed accessible memory within the specified model.
The integrated representation realizes prior bodily focus, subsequent alternative-vehicle focus, and changed autobiographical information over one common core. The separate countermodels preserve the distinction between optional individual lineage and the common conscious foundation.

8.5. Nonvacuous Conditional Lineage

NonvacuousGeneralContinuity excludes an empty-loss antecedent, while the joint witness checks bodily loss, lineage, and unequal recall in one finite instance. The simultaneous-association construction independently verifies that another vehicle can already be expressed before the body is lost.

8.6. Integrated Continuity in One Manifest Model

The theorem integrated_paper1_stage8_model_exists verifies owner realization, bodily loss, directed lineage, another-vehicle focus, and changed recall within one Paper-1-dependent foundation. The later-focus result follows under the explicitly declared auxiliaryContinuation premise.

8.7. Simultaneous Association of Experiential Vehicles

The simultaneous-association model establishes the relevant temporal distinction. The individuality is already expressed through two associated available vehicles at the ordinary state; one receives selective focus, while the other does not. At the later designated body-loss state, the body expression becomes unavailable and the other expression remains present. The theorem finite_local_body_loss_preserves_other_expression verifies this co-presence and local loss in the same dependent Paper-1-grounded finite model. It does not claim that an individual's identity travels or that autobiographical continuity is a condition for individuated expression.

8.8. Investigated Previous-Life Memory Reports and Vehicle Continuity

The continuity problem also has an empirical literature that is not reducible to conventional laboratory measures of autobiographical memory. At the University of Virginia's Division of Perceptual Studies and in related international investigations, researchers have documented cases in which young children spontaneously describe persons or events they did not themselves live through. Case assessments compare statements recorded from children and first-hand witnesses with independently identifiable deceased persons, dates, records, behaviors, and possible normal routes of information acquisition. In a 2024 Brazilian case report, nine of a child's thirteen recorded statements corresponded to documented facts concerning a deceased relative, while four were indeterminate; the investigators also examined reported behavioral correspondences and an anatomical feature [16]. Because the identified deceased person was a

relative, possible prior family information and the chronology of the child's statements are essential interpretive controls.

A distinct quantitative approach asks whether verified case archives exhibit replicable patterns rather than relying only on striking individual narratives. Sadeghi, Pehlivanova, and Cozzolino analyzed 1,678 cases with sufficient temporal information from a larger University of Virginia collection and reported that more unexpected deaths were associated with shorter recorded intervals between the identified deceased person's death and the child's birth; the association persisted in several verification and psychosocial sensitivity analyses [17]. This statistical pattern offers a concrete target for research on continuity across bodily vehicles; its interpretation depends on archive selection, statement chronology, verification quality, and documented opportunities for ordinary information transfer.

Investigated accounts of accurate information concerning deceased individuals provide an empirical research domain for the architecture. The documented accuracy, timing, and provenance of statements can be evaluated separately from competing explanations of the information source. Cases involving a continuing lineage require an observation bridge connecting these independently assessed records to the proposed transition between vehicles. Prospective research can record children’s statements before identification, preserve correct, incorrect, and indeterminate details, monitor information exposure, and employ blinded matching to independently documented persons.

8.9. Comparative Note: Tibetan Recognition of Reincarnate Lamas

The Tibetan tulku-recognition tradition is a historically developed method of identifying a successor to a deceased teacher, with institutional lineages reaching back to the early thirteenth century. The Office of the Fourteenth Dalai Lama describes several established evidential criteria: advance instructions or a predictive letter from the predecessor; specific and reliable recollections of a previous life; recognition of persons closely associated with the predecessor; and identification of objects known to have belonged to that predecessor [18]. Candidate assessment may also incorporate convergent indications from senior teachers, dreams, oracles, sacred-lake visions, and, in contested cases, a traditional dough-ball divination. These components are not interchangeable: recollection and object identification provide observable recognition outcomes, whereas predictions and divination serve as contextual and institutional selection procedures. Historical continuity of the method and its articulated criteria make it a substantive comparative research tradition rather than a recently invented claim.

A positive traditional recognition rests on the convergence of identifying indications judged credible by the responsible lineage authorities; it is not a universal numerical threshold or a single object-choice score. For modern comparative analysis, the testable components can be reported independently: whether statements precede identification, the specificity of recalled details, the provenance and number of distractor objects, recognition of previously associated persons, and opportunities for ordinary information transfer. This retains the full historical practice while making its observable elements comparable across cases. The tradition also distinguishes reincarnation in a continuous mind-stream from other recognized forms of emanation or appointment, a distinction that prevents reducing every tulku recognition to an identical claim about personal memories.

8.10. Vehicle Hierarchy After Bodily Loss

The necessary hierarchy of experiential vehicles, their sequential loss, and the continuity of an individual focus are logically distinct assertions. Stage 17 states that material embodiment entails its preceding higher

organizations. Stage 18 adds a next-inner ordering and a conditional rule for an active evolutionary trajectory: if the outer focused vehicle is lost and the next-inner level remains available, that level acquires focus and individuality persists. A boundary-state premise instead permits the individual organization to end at complete integration. Persistence of acquired insight through ordinary evolutionary transitions is distinguished from enduring universal record retention; an individual need not retain personal access after terminal reabsorption. These new rules constrain the enlarged architecture but are not derivable from Stage 17 in isolation.

This separation defines distinct empirical questions. Neurological and cognitive studies address bodily memory access and reported identity. Investigated previous-life statements and Tibetan recognition procedures can be assessed as observations of purported information access across different bodies, subject to independent chronology, blinding, leakage controls, and rival explanations. The same observations permit comparative tests of whether an individual-lineage model, universal-information account, or ordinary information-acquisition model best predicts the documented evidence. The inward-focus and boundary rules remain separately stated theoretical conditions.

8.11. Sequential Focus Transfer and Universal Information Retention

The next-inner transition is defined only within an active, differentiated developmental trajectory. The hierarchy is ordered from the most constrained bodily level inward toward less constrained organizations. Under a designated loss event, current focus, continuing individuation, and availability of the next-inner level jointly entail transferred focus at that inner level. Each antecedent is essential: the rule neither asserts unconditional continuation across all loss events nor replaces the special terminal integration condition. Sequential withdrawal is ordered from outer to inner; the reverse order is not inferred.

Three informational predicates must remain separate. Personal recall is the retrieval of episodic material tied to an individual history, acquired insight is a persistent developmental acquisition during active individuation, and the universal record is the postulated inclusion of experiential information in the common conscious ground. The framework permits marked loss of ordinary autobiographical access while acquired insight continues. On terminal integration, individuality and personal attribution end, but the universal record remains; it is therefore inaccurate to describe this endpoint as an immortal separate personality.

9. Formal Results and Lean Verification

The complete source retains the foundational and developmental results and the Stage-16 dependent witness. Stage 17 adds necessary material tiers, Stage 18 adds conditional inward continuity, Stage 19 adds the developmental capacity/access rules, and Stage 20 constructs one witness combining both extensions over the same inherited hierarchy and state type. This joint satisfiability does not identify measured neural or post-bodily phenomena with the formal predicates.

Foundational provenance. The preceding study supplies the manifest/nonmanifest distinction, manifested consciousness (A2), immanence (D5), reflexive differentiation and nonseparation (A6–A7), possible-world semantics (D8), physical-substrate nonprimacy (A11), and existential dependence (D31). The selected Lean CoreTheory encodes only part of Paper 1's 252 numbered equations. A reconstructed finite integrated witness uses the full D31 condition in place of the less constrained dependence primitive present in earlier examples. The complete published Paper-1 theory is not automatically proved by this partial formal encoding.

Principal formal results include multifocus_has_distinct_accessible_contents, accessed_content_is_focused_and_available, individually_nested_but_not_identical, genuine_new_membership_requires_formation, surviving_trace_has_experienced_origin, parallel_vehicle_recovers_trace_without_body, loss_of_retention_blocks_later_recovery, d31_is_the_actual_core_dependence_relation, integrated_experience_with_exact_paper1_D31_is_satisfiable, and exact_D31_and_two_distinct_access_streams_coexist.

Formal provenance. Both illustrative finite instances and D31-faithful integrated instances are included. The strict organizational level rule, access-capacity bridge, general transition calculus, and cycle retention policy are explicit additional definitions or premises. The new d31Core modifies only the legacy dependence relation and the proofs of its required designated cases, and its dependent experience and hierarchy models are rebuilt over that same core.

Verification. Appendix E contains the Stage-16 integrated foundation, Stage-17 material hierarchy, Stage-18 conditional continuity, Stage-19 training refinement, and Stage-20 joint integration. The complete 5,576-line source compiles under Lean 4.30.0 with exit status 0 and no diagnostics. Stage 20 explicitly bridges the local material-loss event to the inherited vehicle hierarchy, preserves directed lineage by a declared relation, and distinguishes ordinary continuity from terminal reabsorption.

Proof scope. The finite existence theorem fully_integrated_modal_experience_development_is_satisfiable combines exact D31, the refined modal core, the dependent experience structure, a developmental foundation, generational snapshots, the two-event grounding bridge, and an all-epoch realization condition. Historical single-event and unconstrained-dependence witnesses remain in earlier stages for reproducibility, but they are not silently treated as the final integrated semantics. The result establishes the joint consistency of the encoded dependencies and identifies the additional conditions required by the post-bodily and physical interpretations.

Assertion levels. Directed hierarchy, mode-specific realization, two-event grounding, state/vehicle coupling, membership updates, retention policy, and cyclic successor are explicit choices in the present study. Paper 1's A6 and A11 alone do not determine a unique physical manifestation mechanism. The finite Lean witness demonstrates the compatibility of the selected premises, while the observational bridges define the associated empirical tests.

9.1. Equation Correspondence and Proof Scope

Appendix D maps all 68 numbered equations to their Lean definitions and theorems, with the applicable proof scope recorded for each relation.

9.2. Formalization Provenance and Proof Scope

The formalization combines finite witnesses with general conditional models of bodily loss, vehicle availability, lineage, altered recall, and necessary prior-tier formation. Stage 18 adds an explicitly premised inward-focus rule, insight persistence during specified evolutionary transitions, universal-record inclusion, and a boundary condition ending individuality. The derived Stage-18 results establish consequences of those declared fields rather than a proof of physical survival, objective universal memory storage, or neuroscientific mechanisms.

9.3. General Continuity and Capacity Results

The formal source contains general conditional results, the Paper-1-grounded fixed-consciousness bridge, state-world coupling, perspective-level independence, modal and nonvacuity witnesses, event-grounded owner representation, and one common dependent continuity model. The integrated source compiles under Lean 4.30.0.

9.4. Nonvacuity and Finite-Model Limits

The single-owner/two-vehicle witness is a verified special case. A plural CODE model derives concrete distinctions from a single shared core: initially collective equivalence followed by differentiation; acquisition and loss of associated vehicles; and initially selective versus later concurrent focus. Actual numerical plurality of metaphysical individuals is not concluded.

9.5. Fixed Consciousness and Perspectival Independence

The formalization encodes U1 and U2 as explicit premises for the fixed-ground reading of Paper 1's D5/D8. The selected CoreTheory has stronger existential D32 witness fields than the modal prose alone requires. Individual/body nonnecessity follows from those fields, while a finite witness separately exhibits one finite world without both designated human structures. The World/State coupling constrains bodily manifestation and availability, not an independent fundamental temporal persistence mechanism.

PerspectiveFocusTheory separates organizational and individual focus. Two U1/U2-compatible countermodels still refute an unconditional inference of later focus. The joint structure extends one positive model with event-grounded owner classes, directed lineage, altered memory and an actual loss. The later focus in this positive model is expressly conditional on auxiliaryContinuation and does not invalidate the independent negative case.

9.6. Modal Contingency and Realized Owner Roles

The nonnecessity and continuity theorems have a conditional scope: D32 individual/body nonnecessity is conditional on the selected CoreTheory witness fields, and the abstract loss/focus theorem projects the added continuation premise. The integrated proofs introduce a focused-event quotient, a genuine joint dependent model, and an additional strictly varying capacity witness without modifying Paper 1.

9.7. Event-Grounded Identity and Integrated Verification

Theorem focused_event_is_paper1_manifest derives both availability and ontological immanence for an actually focused event. The RealizedOwnerClass quotient over sameRepresentedOwner classifies actual events, and the two inverse theorems show that all owner indices of the strengthened model are realized classes. The represented identity equivalence is an explicit semantic assumption of the quotient construction.

The same independently checked source constructs finitePaper1JointIdentityContinuity and proves integrated_paper1_stage8_model_exists. This single model links the full selected Paper-1-dependent foundation to focused-owner classes, actual loss, a surviving alternative organizational focus, a composed lineage relation, and changed autobiographical information. The positive claim is conditional on auxiliaryContinuation; the negative-focus countermodel remains valid under the weaker premises. A further finite theorem exhibits one model-world without both the designated individual and body, while preserving the different quantifier scope of the general D32 conditions.

9.8. Simultaneous Vehicle Association and Selective Focus

SimultaneousIndividuation depends on PerspectiveFocusTheory and therefore on the same selected Paper-1 CoreTheory, X1–X7, U1/U2, and World/State coupling. associated(p,v) expresses timeless organizational membership; presentThrough(s,p,v) expresses state-specific simultaneous manifestation through all available associated vehicles; focus is a further non-exhaustive selection. The proof focused_event_has_paper1_experiential_presentation connects an actual focused event to the inherited X4 experiential-presentation field, rather than relying only on vehicle immanence.

The finite model checks two co-present differentiated vehicles, one selected focus, their common owner index, local body loss, and continued expression of the already-associated alternative. It also distinguishes minimal differentiation, individuality without ego identification, and ordinary ego identification. The denial of an ultimate self-sufficient physical source for organization is recorded as a separate declared assumption, not inferred from the Lean type check.

9.9. Phase-Relative Developmental Ontology

DevelopmentalIndividuation is a dependent structure over the same Paper-1-grounded InvariantUnifiedTheory. It replaces static owner-to-vehicle membership with R(a,p,v), and introduces phase-specific equivalence classes, selective or concurrent F(a,s,p,v), the hierarchy H(u,v), a declared formation relation, and a possible reabsorption endpoint. Its finite model uses two Bool representation codes and three distinct differentiation phases, not two independently assumed consciousness substances. The finite_collective_to_specialized_identity theorem checks initial collective identity and later distinction of two codes. finite_vehicle_emergence_and_disappearance verifies changed membership; finite_system_level_formation_and_loss checks system-level vehicle emergence and disappearance; finite_multifocus_and_initial_selectivity verifies late focus through two co-present associated vehicles. reabsorption_removes_indexed_expression applies to all abstract developmental models; its finite version also proves U2's continued manifestation of C. information_retention_is_an_additional_choice exhibits retention and nonretention interpretations. Together these results verify the consistency of the declared developmental relations.

9.10. Collective Membership and Strict Identity

The integrated formalization distinguishes six previously conflated requirements. First, equivalence of collective classes is sharply separated from strict identity and demonstrably fails to preserve every vehicle association. Second, IntegratedHierarchy places higher, individual, and lower nodes into one typed relation and proves the individuality's simultaneous intermediate role. Third, updateAssociations supplies an explicit transition operator, with verified formation, retirement, and a three-step cyclic return.

Fourth, broadExperience extends X3 vehicle focus without changing the one Paper-1 core; indexed multifocus now implies underlying organizational focus. Fifth, traceGenerated depends on prior focused access, while independent retention and subsequent access are specified and checked separately. Sixth, sharedReflexiveGeneration joins A6's boundary and reflexive maps in one assumed active event, and extensionalD31 states exactly the published biconditional while exposing the historical finite primitive's narrower content.

The Lean theorem stage11_formal_extension_has_paper1_dependent_model provides a nonempty integrated instance; it proves satisfiability of these specified relations, not the factual existence of the hierarchy or the physical truth of universal cycles.

9.11. Access Coherence, Organizational Order, and Exact D31

The theorem multifocus_has_distinct_accessible_contents produces distinguishable accessed information at body and parallel vehicles while their indexed focus events coexist at the same developed state. A companion theorem establishes that access entails X3 focus and vehicle availability. StrictRelativeHierarchy adds an abstract order constraint that makes the dual experiencer/vehicle roles nondegenerate in the verified finite witness.

The generic TransitionRule(P,V) no longer hardcodes membership generation as a mere finite truth-table identity: newly acquired membership must satisfy formed(p,v). Its finite instance reproduces the historical update. The cycle-indexed availableTrace relation requires every surviving item to have an experienced origin and permits either preservation or loss at each intervening boundary. The positive witness recovers parallelSignal through the parallel vehicle in cycle 1 with the bodily vehicle absent.

The D31 existential-dependence biconditional of the preceding ontology is represented by the existentiallyDependsOn field of Stage12.d31Core. Subsequent refinements distinguish activation and mode-specific boundary formation. The integrated construction defines finalExperience as a dependent ExperienceExtension over finalCore and transports the developmental structure onto the same foundation. The two-event bridge then establishes compatible human and bodily presentation events within the shared core. The corresponding Lean declarations express a single dependent model rather than a conjunction of unrelated witnesses.

9.12. Modal World Coherence and Differentiated Experience

The extended finite witness has three distinct admissible worlds: a human world with physical embodiment, a nonbodily world with individuality and other manifest vehicles but without the physical body, and a bare-consciousness world without the designated individual. In every selected experiential state, an available vehicle has a referent manifest in the world assigned to that state. Similarly, any accessed information maps to a manifest form in that exact world. The original Paper-1 CoreTheory axioms are held fixed; the finite interpretation of those axioms is expanded.

The D31 biconditional distinguishes positive body-on-individual dependence from the false converse. Developed-state body and parallel access yields distinct information items and phenomenal forms. In the final interpretation, the human-individuation mode and bodily mode have different high-strength boundary forms. Accordingly, Stage 16 grounds the individual boundary and a vehicle-relative reflexive presentation in two active events of the same state-associated world, rather than incorrectly demanding one mode-specific boundary to equal both individual and body.

Two new strict-hierarchy consequences follow from the preexisting directed ordering axiom: any two successive coordination edges give a strict endpoint inequality, and reciprocal edges lead to contradiction. The recursive cycle example also revises its actual membership relation at each step. Initially the individual has body-associated access to base information; that association is retired; a parallel association forms; and at the third indexed step the trace is accessible without the body. The source trace can be retained or lost, and the witness proves only conditional recovery under the policy that retains it.

The formal constructions address five distinct relationships: world/state mismatch, phenomenal homogeneity, static cycle membership, unexploited hierarchy consequences, and D31's formerly uninformative two-world embodiment contrast. They are finite-model and conditional theorems; no empirical claim of nonbodily existence is inferred.

9.13. Modal Activation and Generational Recurrence

The modal interpretation aligns activation with Paper 1's D9 and D32. The bare-consciousness world is inactive for human individuation, whereas positive differentiation in any active world realizes its generated boundary form there. A reusable bridge structure states both requirements, and the enriched finite witness proves their satisfiability simultaneously with exact D31.

The previous uniform informationMeaning map has been replaced in the D31-dependent content witness with five distinct manifest referents. Experiential signatures combine a vehicle-relative presentation with an item-specific referent. The simultaneous body and parallel streams have distinct signatures within the selected formal interpretation.

The new phase and model-world functions satisfy an equality after every three steps. Two complete repetitions are exhibited with separate body and parallel instances at each epoch; a new association can occur only through formation. Individual profiles are phase-relative: they can be absent in reabsorption and return as a different specialized generation. The owner-profile absence condition agrees exactly with the manifestation of the designated individual in the assigned model-world. A separately specified successor relation identifies neighboring stages without conflating D8 possible worlds with temporal states.

The universalInformationTrace theorem proves that retained information always has an experienced initial source. The source may remain a latent possibility while the information form itself is absent during reabsorption. With a positive retention policy, the example recovers the original content through two genuinely distinct later parallel instances; a negative policy blocks recovery. Neither a stable owner key nor necessary personal survival is used in these proofs.

9.14. Integrated Hierarchy, Modal Activation, and Renewal

Stage 15's modalFaithfulCore preserves the exact D31 existential-dependence interpretation while refining activation and boundary forms. In the nonbodily world it excludes bodily activation; an activated human differentiation can realize the individual boundary form. Stage 16 adopts this very core as finalCore and reconstructs X1–X7 and the developmental witness on it. Earlier CoreTheory records are preserved as distinct historical witnesses and are not conflated with the final model.

DevelopmentSnapshot links the periodic modal class with an epoch-specific owner profile and membership map. The same human modal class therefore supports distinct realized generational configurations. Proofs establish co-presence of inner and individualized organizations at every specialized epoch and continued availability of the higher organization throughout reabsorption. The vehicle hierarchy has explicit coordination edges rather than merely descriptive nesting terminology.

The dynamic trace integrates source events, content-selective retention and later new experience. The proof includes a newly accessible parallel signal after an earlier body-only configuration, with the conscious carrier specified independently of the material vehicle. PotentialIn couples such possible information to the invariant conscious carrier while allowing an information referent and the individual to be absent from the current modal realization.

The previously arithmetic recurrence additionally follows from the explicit phaseAdvance successor law: for any phase a, three transitions return to a, and the recursively generated evolution repeats for every index n. The successor law is the stated premise of this formal recurrence.

9.15. Final Unified Modal and Experiential Model

Stage 16 removes the dependency mismatch that arose when the independent modalFaithfulCore refinement was set beside earlier experience and developmental records constructed over d31Core. The finalCore is precisely the refined D31-faithful interpretation; finalExperience : ExperienceExtension finalCore supplies X1–X7 on this same foundation, and finalDevelopment uses finalFoundation. The key Lean declarations are finalCore, finalExperience, finalFoundation, finalDevelopment, and finalUnified.

The two_event_reflexive_bridge theorem separates (i) an activated human-individuation event yielding the designated individual boundary from (ii) an activated vehicle mode yielding the corresponding reflexive presentation. These events share the same world and manifested consciousness but need not have the same mode or boundary form. The theorem distinct_human_and_bodily_boundary_events verifies their distinctness in the selected human world. The original A9 determination bridge remains intact.

The theorem exact_outer_membership_for_every_step characterizes the recursive organization at every natural-number index: only the indexed bodily vehicle occurs in the specialized phase, no outer vehicle occurs in reabsorption, and only the indexed parallel vehicle occurs in the collective phase. Thus every_layered_member_is_modally_realized proves, for all epochs and all actual hierarchy members, compatibility between membership and Paper-1 manifest-at semantics; actualization_agrees_with_epoch_membership supplies the converse for this concrete witness. The classes recur, but owner profiles and epoch-specific vehicles may differ.

The final JointModel explicitly binds the final unified foundation, developmental structure, modal snapshots, all-epoch layered realization, and two-event experiential grounding. The theorem fully_integrated_modal_experience_development_is_satisfiable constructs one inhabited instance of this dependent combination. Additionally, cyclical_access_uses_the_final_experience connects dynamic information access to the rebuilt X3 interface, and informational_potential_does_not_presuppose_a_person shows retained information potential in consciousness when the designated individual is absent. These are finite-model and premise-relative statements, not unconditional personal-continuation results.

9.16. Necessary Material Hierarchy Extension and Proof Scope

The proposed Stage-17 extension in Appendix E conservatively retains the final Stage-16 JointModel and adds a material-specific ordered hierarchy. Its five tier labels represent common ground, inclusive organization, individuality, subtler vehicle, and material vehicle. The premises materialRequiresSubtle, subtleRequiresIndividual, and individualRequiresInclusive enforce the necessary chain, while formationRank makes material manifestation its maximally constrained level. A finite realization is supplied over the same indexed organizational setting. This new constitutive hierarchy extends the published foundational axioms by specifying the necessary material prerequisites.

The necessary-material-hierarchy extension introduces explicit higher-vehicle prerequisites for material embodiment. Its selected Lean witness establishes satisfiability of these additional assumptions together with the shared foundation. Accordingly, material necessity is an internal consequence of the stipulated

hierarchy and is available for comparison with empirical operational bridges; the hierarchy itself enters the formalization as an explicit ontological premise.

9.17. Semantically Coupled Material Loss and Refinement

Stage 20 now links its local bodily-loss trajectory to the inherited material hierarchy through an explicit epoch projection. The initial local state selects the specialized material configuration, the subsequent state selects an available inner vehicle without the material body, and the distinct terminal boundary selects the reabsorbed configuration. This is a correspondence among admissible modal configurations, not a claim that these are consecutive indices in the separate three-phase recurrence.

The strengthened joint structure requires focus to imply vehicle availability, a designated loss to remove the corresponding outer tier, and active individuality and terminal boundary predicates to agree with the selected owner profiles. A separate declared lineage relation identifies the continuing individual trajectory across the local loss event without equating distinct owner-profile representations. The theorem ordinary_loss_is_an_actual_material_withdrawal verifies actual prior material availability, later material nonavailability, continued inner availability, inward focus, and active individuality on both sides of one loss event. The theorem terminal_boundary_is_distinct_from_ordinary_loss verifies the separate reabsorbed endpoint. On the same local state transition, same_transition_has_inward_focus_and_capacity_growth establishes the compatibility of inward focus and increasing access capacity under the explicitly declared training and continuity premises.

10. Empirical Interpretation and Research Program

Psychological and neuroscientific work on reported ego dissolution [19, 20], DMT [21], 5-MeO-DMT [22], salvinorin A [23, 24], and nondual awareness [25] motivates separating identification from reported experiential organization. These data may help characterize changes in experienced self-boundaries and possible simultaneous attentional streams. The distinction between reports and their ontological interpretation is addressed through the observation bridges in Section 10.

Near-death and cardiac-arrest research [26] and reports of purported earlier autobiographical experiences [27, 28] concern special boundary conditions, not the primary definition of individuality. Their interpretation requires independently established timing, information provenance, controls for residual physiology, and alternative explanations.

The observational program concerns levels of identification, reported unity and differentiation, multi-stream attention, reflective access, and recall. H1–H3 quantify psychological relationships. H4 adds a comparison of simultaneous-stream reports against neurocognitive accounts of switching and reconstruction.

Existing neuroimaging and electrophysiological data now offer several candidate measures for this program, including functional connectivity, signal variability, oscillatory dynamics, and stimulus-locked representations. Their inferential meaning differs. Altered functional connectivity is a property of the bodily neural instrument; an Ego-Dissolution Inventory (EDI) rating measures a person's report of self-boundary changes; a metacognitive task measures performance and response criteria. Convergence among modalities strengthens an operational bridge only when windows of experience and measurement are matched and model-specific alternatives are assessed. The recent multimodal and nondual-meditation studies are pertinent here because they associate reported self-organization with independently recorded neural dynamics [5] [12].

10.1. Discriminating Predictions and Rival Explanations

As specified in Table 2, preregistered tests should estimate dissociations among identification, reflective performance, autobiographical accessibility, and experiential reporting, alongside corresponding predictions from competing neurocognitive accounts. An operational bridge gains support when its independently specified indicators exhibit reliability, discriminant validity, and predictive performance beyond relevant alternatives.

Table 2. Operational Constructs and Discriminating Requirements

Target construct	Operational indicator	Relevant alternative	Discriminating requirement
Identification *J*	Validated ego-dissolution and body-ownership measures	Predictive self-modeling and network-level accounts	Quantify dissociation from conscious report and metacognition under matched conditions
Self-reflection *L*	Metacognitive accuracy and reflective task performance	Higher-order representation theories	Test whether phenomenological recognition scores vary independently of reflective performance
Recognition *W*	Structured, blinded coding of nondual phenomenological interviews	Demand characteristics and altered self-representation	Establish reliability and discriminant validity before ontological interpretation
Access *A* and capacity *K*	Information-report tasks and neural functional measures	Global workspace and integrated-information models	State distinct quantitative predictions in advance; do not infer ontology from correlation alone
Post-loss continuity *T*	Prospectively documented, independently verifiable information claims	Residual activity, reconstruction, suggestion, leakage, chance	Predefine exclusion criteria, blinded verification, and evidential thresholds

Operational measurement and formal semantics. Questionnaire responses, behavioral performance, neurophysiological measures, and interview classifications provide observations of reported experience and its bodily correlates. The formal primitives J, L, W, A, and K are linked to these observations through explicit measurement models specifying timing, error, reporting capacity, and missingness. Reliability, discriminant validity, and comparisons against neurocognitive alternatives evaluate these links. H1–H3 test the predicted observational dissociations; ontology-specific comparisons add prospectively specified quantitative predictions that differ across explanatory models.

10.2. Proposed Study Design and Preregistration Criteria

A preregistered repeated-measures study can compare identification measures, metacognitive performance, and independently coded recognition reports. Before data collection, investigators must specify the bridge from each indicator to its theoretical construct, primary estimand, competing-model predictions, reliability thresholds, effect-size scale, equivalence region, multiplicity correction, missing-data strategy, and stopping rule. Pilot data or external evidence must supply quantitative thresholds. For continuity claims, protocols must preregister information targets and exposure controls, apply blinded adjudication and independent timestamps, and assess residual physiology, sensory leakage, source contamination, and chance.

Interpretation of bridge tests. Outcomes update the credibility of preregistered operational mappings and their auxiliary measurement assumptions. A failed indicator prediction requires examination of the specified bridge, measurement validity, reporting selection, and statistical precision; a successful prediction supports that bridge only within those constraints. The formal theorem and the empirical bridge are evaluated by their respective standards: proof checking for the former and predictive performance and reproducibility for the latter.

10.3. Comparison with Contemporary Models

Global Neuronal Workspace Theory (GNWT) models the global accessibility of information and thus overlaps with the operational domain of A. Integrated Information Theory (IIT) characterizes intrinsic causal organization and may generate different predictions about system boundaries and conscious states. Higher-order theories emphasize representation of mental states, providing a natural competitor to the proposed separation of L from experiential presence. Predictive-processing approaches explain changing selfhood through inference and bodily prediction. The present architecture distinguishes a common conscious foundation from vehicle-dependent organization and provides an explicit hypothesis for comparison with these models. Relevant comparative accounts include GNWT [29], IIT [30], higher-order theories [31], and predictive-processing models [32].

The comparison should therefore be conducted at two levels: explanatory compatibility, where different ontologies may interpret the same findings, and discriminating prediction, where empirical results can actually favor one account. The adversarial comparison of IIT and GNWT illustrates the methodological value of preregistered competing predictions, even when the results do not settle all philosophical questions. A preregistered adversarial test of IIT and GNWT is reported in [33].

10.4. Empirical Evidence and Model Discrimination

The empirical literature supplies distinct forms of evidence for the organization of conscious experience. Controlled interventions constrain associations between altered self-representation and neural dynamics; psychometric validation establishes the reliability of particular reports; observational studies characterize unusual autobiographical claims; and theory-comparison experiments evaluate competing neural predictions. These evidential categories address different claims. In the present architecture, their primary role is to evaluate operational bridges linking measurable variables to identification (J), reflection (L), recognition (W), informational accessibility, and continuity (T), rather than to treat a phenomenological report as direct observation of an ontological predicate.

Evidence from psilocybin studies provides the clearest existing operational basis for the self-identification component. In a placebo-controlled functional magnetic resonance imaging study of 15 participants,

Lebedev et al. linked reported ego dissolution to changes in neural dynamics [19]. Nour et al. subsequently validated an eight-item Ego-Dissolution Inventory (EDI), providing a reproducible measure of changes in reported self-identification [20]. DMT and 5-MeO-DMT studies characterize intense departures from ordinary self-representation, while the salvinorin A and nondual-awareness literature further illustrates heterogeneity in experience [21–25]. Together these observations provide empirical measures for the architecture's distinctions among self-identification, metacognitive performance, and experienced presence.

The evidence for post-bodily continuity occupies a different category. The AWAreness during REsuscitation II (AWARE-II) study investigated reports and physiological measures during cardiac-arrest resuscitation [26]. Pehlivanova et al. followed 23 American adults who had reported purported past-life memories as children; their study assessed later psychological and autobiographical outcomes rather than verifying the ontological source of those memories [27]. These investigations establish longitudinal observations and documented report-types relevant to continuity research. The independently testable issue is which explanatory account best predicts statement accuracy, chronology, physiological conditions, and information provenance. Prospective protocols strengthen this comparison through time-stamped information targets, independent chronology, physiological measurements, blinded assessment, and systematic documentation of ordinary information routes.

Table 3 summarizes the evidential distinctions and the corresponding tests. Its status descriptions distinguish published observations from proposed discriminating analyses.

Evidence classification. Study design and inferential strength are recorded separately. Experimental interventions [19] can estimate intervention-associated changes under their control conditions, while measurement-validation studies [20] assess psychometric properties of reported states. Surveys and qualitative phenomenology [21–25] characterize reports and their variability; resuscitation research and autobiographical follow-up [26–28] characterize observations and chronology subject to study-specific controls. Theory-comparison studies [29–33] test predictions of their named theories. Sample size, uncertainty, measurement validity, causal identification, generalizability, and control of rival explanations determine inferential strength within each class. The resulting evidence provides graded tests of the proposed observational bridges, with inferential weight determined by the actual design and controls.

Table 3. Empirical Evidence, Inferential Scope, and Competing Explanations

Domain / sources	**Design / evidence class**	**What the evidence establishes**	**Relevant competing account**	**Needed discriminating test**
Self-identification [19, 20]	Controlled neuroimaging (n=15); EDI validation	Psilocybin-associated changes in reported ego dissolution and neural activity; reliability of an ego-dissolution measure	Predictive self-modeling; neural network accounts	Matched-window identification reduction and noninferior reportability, with neural controls

Domain / sources	Design / evidence class	What the evidence establishes	Relevant competing account	Needed discriminating test
Altered experiential structure [21–25]	Surveys; selected experiments; contemplative studies	Diversity and measurable correlates of altered self-reports, not an ontological substrate	Higher-order and predictive-processing theories	Distinct latent constructs and blinded cross-method validation
Experiential access [29–33]	Theoretical models; adversarial experiment (n=256)	Test outcomes for the compared neural theories; specified neural predictions	Global Neuronal Workspace; Integrated Information Theory	Divergent preregistered numerical predictions for common outcomes
Continuity-related reports [26–28]	Resuscitation observations; autobiographical follow-up (n=23 in [27])	Characterization of reports, follow-up outcomes and study-specific observations	Residual activity; memory reconstruction; leakage; chance	Prospective information targets, independent timing and blinded verification
Neural self-boundaries and nondual reports [4] [5] [11] [12]	Repeated fMRI; EEG/fMRI in n=62; meditation-related EEG and electrophysiology	Measurable covariation between neural organization and reported self-boundary or nondual states	Attention, predictive self-models, pharmacological effects, and reporting expectations	Matched, independent self-report and neural indicators; preregistered competing mediation models
Awareness versus report [2] [3] [13]	Auditory no-report fMRI (n=63); visual MEG; psychophysical bias experiments (N=204)	Neural signatures and confidence judgments can differ across awareness, reporting, and decision demands	Global broadcasting, sensory recurrence, response criteria, and task relevance	Model explicit no-report and response-related terms using matched behavioral and neural outcomes
Rapid switching versus concurrent processing [34] [35]	MEG attention-shifting paradigm; 7T ultrafast fMRI dual-task experiment	Distinct attentional transitions and central serial queuing can coexist with parallel processing at earlier stages	Switching, divided attention, task bottlenecks, and post-event reconstruction	Resolve temporal ordering and decoding of separately tagged contents before interpreting co-reporting as simultaneity

Domain / sources	Design / evidence class	What the evidence establishes	Relevant competing account	Needed discriminating test
Autobiographical temporal organization [15]	Task-based fMRI of past and future episodic autobiographical events	Distributed neural involvement in access and temporal structuring of personal recollection	Ordinary memory construction and narrative self-modeling	Test memory accuracy and felt continuity separately; do not use neural memory effects as a test of post-bodily lineage

Three prospective bridge hypotheses follow from this evidence map. Each is a test of an operationalization and its auxiliary assumptions, not an additional Lean theorem.

Primary hypothesis and endpoints. H1 is the sole primary confirmatory operational bridge hypothesis. It specifies two co-primary conditions for the same preregistered experiential window: (a) a meaningful reduction in ordinary self-identification relative to a matched reference condition and (b) preserved conscious reportability, assessed using a prespecified noninferiority margin. The two estimands are the within-participant identification change and the corresponding difference in reportability (low-identification minus reference condition). Both conditions must be met to support the joint H1 hypothesis. H2 and H3 are secondary, hypothesis-generating analyses. The population, timing, reference condition, estimands, reporting-capacity eligibility, analysis population, and missing-data handling must be preregistered.

H1 — Time-matched identification–experience dissociation. Under prespecified within-participant comparisons, ordinary self-identification decreases while evidence of conscious reportability remains noninferior to a matched reference condition for the same experiential window. Ego-Dissolution Inventory (EDI) ratings must refer to that window; reportability should be measured within it where feasible or through a validated, time-anchored proxy whose recall limits are explicit. Self-identification and reportability are analyzed as separate endpoints, with baseline impairment, sedation, speech and attention limitations, response bias, and delay to assessment recorded. A missing verbal response is not automatically classified as absent experience. A successful H1 test establishes an operational dissociation, which may also be compatible with predictive-processing and global-workspace interpretations [19, 20, 29, 32]. Participants with missing, delayed, or impaired reports remain in the prespecified analysis population. Nonresponse is analyzed as missing or impaired measurement according to prospectively defined rules, rather than being treated as absence of experience or excluded by complete-case selection.

Proposed preregistration and H1 decision rule. Three mutually exclusive conclusions apply to the joint hypothesis. (i) Support: identification shows a meaningful preregistered reduction, with the confidence interval satisfying the specified identification criterion, AND the confidence interval for reportability change excludes losses greater than the justified noninferiority margin; both measures meet prespecified validity and reliability standards. (ii) Evidence against the joint operational hypothesis: an adequately powered and valid study gives sufficiently precise evidence that the meaningful identification decrease does not occur, or that reportability falls below the noninferiority boundary, under prospectively declared inferential rules. (iii) Inconclusive: either interval crosses its decision boundary, precision or reliability is inadequate, or impairment prevents valid reportability assessment. The identification threshold,

noninferiority margin, confidence level, treatment of multiplicity for the two co-primary conditions, and sample-size rationale must be justified by pilot or external data before recruitment. These rules evaluate the H1 operational bridge, not the axioms of the ontology. Sensitivity analyses assess selective report loss, including worst-case or pattern-mixture assumptions for missing-not-at-random outcomes, and report how conclusions change across plausible missingness scenarios. Participant flow and reportability-related exclusions are fully disclosed.

H2 — Reflection versus reported recognition. Task-based metacognitive performance (including confidence calibration) and blinded phenomenological coding of reported nondual recognition are modeled as distinct, explicitly operational constructs. The latter is a reported-recognition indicator, not a direct observation of the ontological predicate W. The preregistered comparison tests whether a two-factor measurement model outperforms a single-factor alternative in out-of-sample prediction after adjustment for vocabulary, demand characteristics, mood, and general cognitive performance. Separability with adequate reliability supports the measurement distinction between reflection and reported recognition; it does not independently establish their proposed ontological interpretation. The mapping from reported recognition to W is a separate bridge assumption requiring independent justification. Higher-order and predictive-processing accounts must be evaluated on the same indicators [25, 31].

H3 — Autobiographical memory versus perceived continuity. Longitudinal studies assess autobiographical memory accuracy and perceived personal continuity as separate psychological variables at matched time points. The preregistered prediction is partial dissociation after adjustment for general cognition, narrative coherence, response bias, and measurement reliability. Such a result tests a psychological bridge about perceived continuity; it does not measure the ontological lineage relation T. Testing ContinuationPostulate requires a separate prospective design addressing designated bodily-loss transitions, independent chronology, blinded verification of information, physiological measures, and alternative routes of information acquisition. A null or positive H3 result neither refutes nor verifies ContinuationPostulate without an independently justified bridge [26–28].

Table 4 separates empirical bridge tests from discriminating model comparisons. H1–H3 are tests of operational constructs shared by multiple theories. A genuine adversarial comparison requires each candidate model to specify a quantitatively different prediction or predictive distribution for the same observable measurements, with a preregistered scoring and adjudication rule. No ontology-specific likelihood is currently entailed by the formal axioms alone.

Table 4. Preregistered Model-Comparison Requirements for the Three Empirical Bridges

Bridge hypothesis	Shared predictions / non-discrimination	Potentially distinguishing requirement
H1: Identification / experiential presence	This ontology, predictive-processing, and global-workspace models may all allow altered self-identification with preserved reportability.	Require each model to specify a distinct joint prediction for temporally matched identification, reportability, and neural measures; score held-out outcomes using the same preregistered rule.

Bridge hypothesis	Shared predictions / non-discrimination	Potentially distinguishing requirement
H2: Reflection / reported recognition	Separable metacognition and nondual-report factors may also be accommodated by higher-order and predictive models.	A discriminating test needs independently justified, divergent conditional predictions after controlling demand characteristics, vocabulary, and general cognition.
H3: Memory / perceived continuity	Memory-performance and felt-continuity dissociations can arise in ordinary psychological models and do not establish ontological lineage.	Test psychological dissociation separately; reserve a test of post-bodily continuation for prospectively specified verifiable-information protocols and rival likelihoods.

Before a proposed study, investigators must preregister the population, matched measurement windows, two H1 co-primary estimands, identification threshold, reportability noninferiority margin, reliability requirements, sample-size rationale, missing-data mechanism, multiplicity procedure, and the scoring rule for every competing predictive model. Numerical thresholds require external or pilot justification and are not supplied by the ontology. For model discrimination, rival theories must submit distinct quantitative predictions on identical outcomes; shared predictions test only the empirical bridge. The preregistered adversarial study of Integrated Information Theory and Global Neuronal Workspace Theory with 256 participants provides a procedural precedent, not ontology-specific evidence [33].

10.5. Conditions for Ontology-Specific Model Discrimination

H1–H3 provide psychological and neurophenomenological tests of identification, recognition, and continuity. H4 extends the program to simultaneous differentiated contents. Ontology-specific comparisons additionally require quantitative observational links for the vehicle and cycle claims.

A discriminating protocol requires preregistered measures, rival-model predictions for identical outcomes, missing-data and blinding rules, independent held-out checks, and sensitivity to suggestion and temporal resolution. Reported concurrence could equally reflect rapid switching, report reconstruction, or common neural processing; these alternatives must be modeled rather than assumed away.

10.6. Prospective Study of Expanded Experiential Focus

H4 investigates reports of simultaneous differentiated experiential contents and their relation to the architecture's multifocus model. A future within-person protocol can predefine 10-second reporting windows, randomized prompts approximately every 2–4 seconds, and two preidentified content dimensions; these intervals are protocol parameters to be validated in pilot testing. It should collect time-stamped reports, repeated-condition reliability, blind coding of stream differentiation (e.g., Cohen's kappa target at least 0.70), expectancy measures, and power-justified sample size. A positive H4 result establishes reproducible simultaneous-content reporting under the stated timing and assessment criteria.

10.7. Discriminating Models and Exploratory H4

The preregistered comparator must explicitly include rapid serial switching, divided attention with ordinary cognitive tasks, suggestion or demand effects, and post-event reconstruction. Investigators should declare before enrollment a primary outcome, exclusion rules, threshold for repeatability, multiple-comparison plan, and model-specific quantitative predictions. Without additional observational bridges, none of these psychological outcomes discriminates universal consciousness ontology from competing neural accounts.

10.8. Requirements for Ontology-Specific Tests

A decisive ontology-specific comparison requires quantitative predictions from each candidate model for identical observations. Its observation bridges, predictive scoring rule, calibration strategy, and independent validation set should be specified before data collection. These requirements provide a concrete route from the architecture's conceptual distinctions to an adversarial empirical test.

10.9. Neural Endpoints, Observation Bridges, and Adversarial Evaluation

Neural endpoints should be treated as measures of the bodily instrument rather than as direct observations of consciousness as an ontological foundation. A prospective protocol should collect synchronized neural recordings and time-anchored phenomenological and behavioral indicators wherever reporting is feasible. Candidate neurophysiological descriptors include EEG oscillatory power and complexity, fMRI connectivity and network differentiation, MEG temporal decoding, and event-related stimulus representations. No single descriptor is established here as a unique neural signature of consciousness. Each requires a prespecified measurement model, reliability analysis, artifact criteria, and adjustment for sedation, task difficulty, arousal, motor limitations, and temporal sampling.

H1 remains a joint operational hypothesis: diminished ordinary self-identification alongside noninferior reportability in the same experiential interval. Its primary endpoints remain psychological. Complementary, prespecified neural analyses could ask whether changes in self-related neural organization accompany altered identification without equivalent loss of sensory discrimination or reporting. Longitudinal fMRI, context-sensitive EEG/fMRI, and DMT EEG-fMRI provide observational precedents [4] [5] [8]. The 2026 psilocybin follow-up, which found robust acute EEG effects but mostly absent enduring group-level fMRI changes, also requires investigators to distinguish acute from longer-term endpoints [10]. These measurements provide empirical tests of neural mediation while U1–U2 specify the shared ontological foundation.

H2 asks whether metacognitive performance and independently coded reports of nondual recognition occupy separable measurement dimensions. Meditation-linked posterior-medial rhythms and EEG intrinsic timescales are candidate neural correlates of relevant self-reports [11] [12]; confidence studies show that report criteria can diverge from subjective experience [13]. A legitimate comparison must estimate the influence of vocabulary, expectancy, expertise, and task performance before attributing residual variance to a distinct experiential construct. The ontological predicate W remains unobserved without an independently justified bridge.

H3 separately estimates the relationship between autobiographical accuracy and perceived continuity. Episodic recall and mental time travel engage distributed neural processes [15], and competing psychological models provide comparative predictions for dissociations between memory performance and felt sameness. For H4, temporally resolved measurements are especially important. MEG studies of

shifting attention and ultrafast fMRI evidence of serial queuing during dual-task response selection provide explicit rival mechanisms [34] [35]. The proposed simultaneous-stream task should therefore include independently tagged contents, known temporal-resolution limits, randomized sampling, and a competing switching-and-reconstruction analysis. Independent-vehicle interpretation is then evaluated through the additional association and access criteria.

10.10. Extraordinary States and Alternative Experiential Spaces

Extraordinary states of consciousness can involve immersive experiential spaces whose apparent spatial organization, self–world boundaries, temporality, and social presences differ markedly from ordinary waking perception. A 2026 study in Neuroscience of Consciousness administered intravenous N,N-dimethyltryptamine (DMT) to 23 participants during simultaneous functional magnetic resonance imaging and electroencephalography, followed by structured micro-phenomenological interviews. Its analysis distinguished 125 phenomenological categories and reported a temporally ordered development of bodily, sensory, spatial, and perceived-presence features [36]. These data establish that alternative world-like experiential organization is an observable research subject, including conditions in which ordinary bodily and environmental identification is substantially altered.

Within the present architecture, such reports motivate a distinction between the currently dominant bodily perceptual frame and the structured space in which experience is organized. The empirical observables are spatial coherence, temporal sequence, perceived agency, multisensory integration, degree of ordinary-environment disconnection, later recall, and simultaneous neural dynamics. The vehicle-access interpretation is compared with internally generated immersive-perception models using independently specified features and predictions. Protocols can compare meditation, dreaming, anesthesia-associated experiences, and clinically supervised altered states using the same phenomenological codebook, while comparing their neural mechanisms and experiential organization across conditions.

Systematic contemplative and initiatory training has a second, developmental role in the proposed architecture. Repeated practice is hypothesized not only to shift experiential focus temporarily but also to refine the functional organization and capacity of the associated experiential vehicles. Vehicle refinement denotes durable changes in the stability, differentiation, integration, and accessible range of an experiential organization; access to an extraordinary experiential space denotes a state-specific realization of capacities that may already exist. The two processes are related but not equivalent: an isolated extraordinary state need not produce persistent refinement, while sustained refinement may increase the reliability, depth, and voluntary accessibility of later experiential states. In neuroscientific research, longitudinal changes in attentional stability, metacognitive discrimination, self-regulation, and reproducible phenomenological structure provide operational indicators of training-associated development; their relation to particular vehicle levels is specified through the corresponding developmental bridge.

10.11. Preregistered Tests of Vehicle Refinement and Experiential Access

The model makes two developmentally distinct claims: acute access to an immersive experiential space is a state-level event, whereas refinement is a lasting change in an organization’s capacity. To test their behavioral and neural bridges, a longitudinal randomized study could compare structured contemplative training with an active control matched for time, instructor contact, expectations, and assessment frequency. Measurements at baseline, during intervention, immediately afterward, and at a delayed follow-up would distinguish durable changes from transient acute effects. Before enrollment, investigators should

register a primary outcome, effect-size threshold, sample-size calculation, reliability criteria, missing-data handling, and blinded scoring procedures.

H5 — Durable refinement versus temporary opening. A randomized, assessor-blinded longitudinal study should preregister a primary composite reflecting attentional stability, metacognitive calibration, and repeatability of phenomenological discrimination; its component weights and minimally important difference must be set using independent pilot reliability data. The acute opening measure is independently coded from episode-specific alterations in spatial experience and self–world boundaries. The first contrast is the between-group difference at delayed follow-up after adjustment for baseline; the second is acute intensity versus delayed capacity gain. A state-only account predicts little durable change once expectancy, exposure, and practice are controlled, whereas a learning/neuroplasticity account can predict sustained improvement. Sustained improvement provides evidence for the developmental prediction; attribution to a distinct vehicle is evaluated through the additional vehicle-specific bridge.

H6 — Expanded experiential access under changed ordinary-world identification. Prespecified analyses should contrast blinded ratings of immersive spatial structure, self–world differentiation, and cross-session reproducibility with time-matched EEG or fMRI measurements and ordinary sensory-task performance. A constructive-simulation account predicts changes in internally generated imagery under changing neural and contextual conditions; the proposed vehicle-access interpretation must identify a residual prediction that the constructive model cannot also accommodate. A coherent alternate-world report establishes the phenomenological endpoint of organized immersive experience. An informative future test would require a validated, independently measurable information-access outcome or an externally constrained prospective prediction that differs quantitatively between models.

H7 — Acquired insight versus autobiographical recall. Longitudinal experiments can test whether independently scored transfer of skills or conceptual knowledge persists when autobiographical retrieval changes across sleep, altered states, and recovery, with performance and recall assessed by blinded investigators. This predicts a dissociation measurable in living participants, but conventional implicit learning and consolidation can yield the same pattern. Cross-bodily information claims consequently require a distinct prospective design: statements locked before a deceased person is identified, explicit recording of incorrect and indeterminate details, independent source verification, blinded matching against decoys, and monitored information exposure. The study must prespecify both the likelihood of observed scores under ordinary information transfer and the alternative prediction associated with the architecture.

10.12. Synthesis of Empirical Comparisons

The H5–H7 program distinguishes three operational contrasts: durable refinement from acute state access; acquired knowledge from autobiographical recall; and repeatable extraordinary experiential organization from ordinary sensory identification. Sections 10.10–10.11 specify the associated endpoints and competing neurocognitive explanations. A genuinely ontology-discriminating result additionally requires prospectively specified predictions that differ quantitatively between the vehicle-access interpretation and its rivals, together with blinded assessment and a preregistered comparison rule.

11. Discussion

The present analysis gives a mode-specific D9/D32 interpretation of activation. It distinguishes modal world classes from indexed snapshots containing owner profiles and associated vehicles, so a recurring human world class need not imply a numerically identical individual or biological vehicle. A higher

organization can be represented through reabsorption, when the lower individualized organization is absent.

Simultaneous attention within a developed state is distinct from simultaneous hierarchical membership in developmental snapshots. The latter explicitly associates inner and outer organizations with one phase-relative individuality, while keeping relative membership distinct from the question of phenomenologically reported access at each level.

The transition-based recurrent model retains generation-indexed bodily and parallel instances alongside their structural inner organizations. State-indexed informational access can differ from the common conscious record: the continued presence of an information item in the universal ground does not imply that a particular individuated state can retrieve it. During the stipulated evolutionary sequence, acquired insight remains associated with the continuing lineage; after full integration no personal owner remains. This separates information conservation at the proposed universal level from changing recall, vehicle availability, and individual attribution.

The formal and empirical results occupy distinct levels of inquiry. Kernel-checked theorems follow from encoded premises; finite witnesses establish relative satisfiability; operational bridge hypotheses connect these structures to measurable phenomena. The proposed research program tests the bridge hypotheses while preserving the exact scope of the deductive results.

11.1. Scope of the Mathematical Claims

Scope. The source formalizes selected axioms and definitions of Paper 1, preserving the exact D31 world-manifestation interpretation. The present extension explicitly introduces modal refinement, developmental snapshots, owner-relative vehicle membership, conscious-carrier potential, selective retention, and an organizational successor law as additional Paper-2 premises. The resulting three-stage recurrence has no assigned cosmological time scale. Historical body/parallel access remains grounded in the preserved world-manifestation semantics. Empirical comparisons require separately specified observational bridges and competing predictions.

11.1.1. Exact D31 Existential Dependence

Paper 1's D31 states that x existentially depends on y if and only if y is manifest in every admissible world where x is manifest. Stage 12 places this extensional rule into d31Core itself, rather than retaining only selected constraints on an uninterpreted dependence primitive. Stage 15 refines activation without changing those world and dependence fields. Stage 16 then rebuilds the dependent experience and developmental structures over finalCore and proves published_D31_world_semantics_are_preserved. This preserves the exact selected D31 interpretation without claiming to mechanically re-prove every definition or equation of the published Paper 1.

$$(31)\ x \prec^{D31} y \leftrightarrow \forall w\,[Man(w,x) \Rightarrow Man(w,y)]$$

11.1.2. Coherent Access and Relative Hierarchies

The following equations summarize the additions to the 31 earlier numbered relations. Their Lean counterparts appear in Appendix D. The formulas concern the selected formal interpretation and its explicitly stated additional assumptions.

$$(32)\ Coord(a,s,u,v) \Rightarrow level(u) < level(v)$$

Effective content access is coupled to the enlarged X3 focus and informational capacity:

$$(33)\ A^{12}(s,v,i) \leftrightarrow F_{x3}(s,v) \wedge K(s,v,i)$$

Let vB designate the body vehicle and vP the parallel vehicle. Two distinct accessible contents coexist at a fixed developed state:

$$(34)\ A^{12}(developed,vB,growth) \wedge A^{12}(developed,vP,parallelSignal) \wedge (growth \neq parallelSignal)$$

A generic transition distinguishes retired membership from newly formed membership:

$$(35)\ Evolve(R,p,v) \leftrightarrow [R(p,v) \wedge \neg Retired(p,v)] \vee Formed(p,v)$$

$$(36)\ Evolve(R,p,v) \wedge \neg R(p,v) \Rightarrow Formed(p,v)$$

For cycle index n, the trace originated in actual focused access and survives each boundary only under the selected retention policy:

$$(37)\ Trace_0(p,i) \leftrightarrow \exists v\,[F(specialized,developed,p,v) \wedge A^{12}(developed,v,i)]$$

$$(38)\ Trace_{n+1}(p,i) \leftrightarrow Trace_n(p,i) \wedge Retain(n)$$

$$(39)\ Recover_n(p,v,i) \leftrightarrow (n>0) \wedge Trace_n(p,i) \wedge R(collective,p,v) \wedge A^{12}(loss,v,i)$$

In the newly reconstructed integrated core, D31 is no longer merely a separate definition; it is the actual existential-dependence relation:

$$(40)\ DepD31Core(x,y) \leftrightarrow \forall w\,[Man(w,x) \Rightarrow Man(w,y)]$$

The theorem integrated_experience_with_exact_paper1_D31_is_satisfiable provides an integrated finite witness combining exact D31, the shared consciousness core, distinguishable accessible contents, and strict hierarchical roles. The original 252-equation Paper 1 is not thereby mechanically re-proved.

11.1.3. Modal Worlds and Cyclic Development

Let ω(s) denote the selected admissible world of experiential state s, μ(v) the manifest referent of vehicle v, and ν(i) the manifest referent of information item i. World coherence requires both implications:

$$(41)\ Avail(s,v) \Rightarrow Man(\omega(s),\mu(v));\ Access(s,v,i) \Rightarrow Man(\omega(s),\nu(i))$$

The nonbodily world wN and bare world w0 are logically distinct model-worlds and support different manifestation conditions:

$$(42)\ Man(wN,I) \wedge \neg Man(wN,B) \wedge Man(w0,C) \wedge \neg Man(w0,I)$$

The extensional D31 relation is consequently non-symmetric for the designated body B and individual I:

$$(43)\ D31(B,I) \wedge \neg D31(I,B)$$

At the developed state sD, the two available focused streams differ both in information access and the qualitative tokens assigned to presentation:

$$(44)\ Access(sD,vB,growth) \wedge Access(sD,vP,parallelSignal) \wedge Pres(sD,vB) \neq Pres(sD,vP)$$

For each selected experiential state and vehicle, the final witness identifies an active human-boundary event and a potentially different active vehicle-presentation event in the same assigned world. In Equation (45), w = ω(s), Act_w(a) abbreviates active(w,a), Bd_w(a) abbreviates boundaryForm(w,a,high,C), and Ref_w(b) abbreviates reflexiveForm(w,b,high,C):

$$(45)\ \exists a,b\,[Act_w(a) \wedge Bd_w(a) = I \wedge Act_w(b) \wedge Pres(s,v) = Ref_w(b)], w = \omega(s)$$

The strict-hierarchy consequences preserve the distinct organizational roles in successive coordination relations:

$$(46)\ Coord(u,v) \wedge Coord(v,w) \Rightarrow level(u) < level(w);\ Coord(u,v) \Rightarrow \neg Coord(v,u)$$

Unlike a counter-indexed static trace, the recursive relation R evolves with explicit event predicates, and its selected cycle also changes phase and world-state:

$$(47)\ R(n+1,p,v) \leftrightarrow [R(n,p,v) \wedge \neg Retired(n,p,v)] \vee Formed(n,p,v)$$

A specific finite path records body-associated experience at index 0 and access through newly formed parallel membership at index 2, conditional on retention and without implying numerical identity through further reabsorptions:

$$(48)\ Source_0(base,vB) \wedge Trace_2(base) \wedge R_2(p,vP) \wedge Access(s_2,vP,base) \wedge \neg Man(\omega(s_2),B)$$

Equations (41)–(48) describe specific definitional correspondences and finite witnesses. They are not additions to Paper 1, and their validity is conditional on the indicated Paper-2 formal structures.

11.1.4. Modal Realization and Recurrent Organization

The additional Paper-1-aligned activation bridge is conditional on positive differentiation strength; the reabsorbed bare-world interpretation has no activated human individuation:

$$(49)\ Active(w,a) \wedge Positive(\lambda) \Rightarrow Man(w,b(w,a,\lambda,C));\ \neg Active(w_0,H) \wedge \neg Man(w_0,I)$$

The finite content interpretation now distinguishes referents and defines each experiential signature as a pair:

$$(50)\ v(growth) \neq v(parallelSignal);\ Sig(s,v,i) = (Pres(s,v),v(i))$$

Both the developmental phase and assigned modal world are truly periodic for every natural number n:

$$(51)\ Phase(n+3) = Phase(n);\ World(n+3) = World(n)$$

Owner profiles are phase-relative and generation-indexed rather than identified with a numerically fixed autobiographical self:

$$(52)\ Owner_0 = Specialized(0);\ Owner_1 = Absent;\ Owner_3 = Specialized(1) \neq Owner_0$$

Vehicle membership is recomputed recursively with explicit retirement and formation over vehicle instances:

$$(53)\ R(n+1,v) \leftrightarrow [R(n,v) \wedge \neg Retired(n,v)] \vee Formed(n,v)$$

Two witnessed cycles use distinct instances, not merely different states of the same body:

$$(54)\ R(0,B_0) \wedge \neg R(1,B_0) \wedge R(2,P_0) \wedge R(3,B_1) \wedge R(5,P_1);\ B_0 \neq B_1;\ P_0 \neq P_1$$

An explicit next-state relation links realizations of one fixed modal architecture and preserves consciousness; owner absence agrees with missing individual manifestation (W_n abbreviates World(n)):

$$(55)\ Next(n,m) \leftrightarrow m = n+1;\ \forall n\ Man(W(n),C);\ Owner(n) = Absent \leftrightarrow \neg Man(W(n),I)$$

The information trace has an actual experiential source but does not retain a stipulated fixed owner code:

$$(56)\ T(0,i) \leftrightarrow \exists v\ Access(0,v,i);\ T(n+1,i) \leftrightarrow T(n,i) \wedge Retain(n)$$

Retained potential need not be identical with an actually manifest informational referent in the reabsorbed world:

$$(57)\ T(1,base) \wedge Man(W_1,C) \wedge \neg Man(W_1,v(base))$$

Recovery is possible across different generations under retention and fails when retention is withheld:

$$(58)\ Rec(2,P_0,base) \wedge Rec(5,P_1,base) \wedge \neg Rec(no-ret,2,P_0,base)$$

These relations define the selected formal model of recurrence. The possible-world transition, content mapping and retention policy are transparent additional premises of Paper 2.

Empirical investigation focuses on validating the bridge hypotheses connecting identification, reflection, recognition, capacity, and continuity to observable measures. The formal verification status, equation-level proof scope, and distinction between finite witnesses and general theorems are documented in Section 9.

11.1.5. Developmental Snapshots and Information Growth

The modal bridge aligns activation with designated forms; mH and mB denote the human-individuation and bodily modes:

$$(59)\ Act*(w,mH) \leftrightarrow Man(w,I);\ Act*(w,mB) \leftrightarrow Man(w,B)$$

A recurrent modal class can have distinct realized epoch snapshots:

$$(60)\ \Sigma(n) := (n, W(n), O(n), M(n));\ W(0) = W(3);\ O(0) \neq O(3)$$

Owner-associated membership is explicitly phase-relative:

$$(61)\ Bel(n,o,v) \leftrightarrow [o = O(n) \wedge o \neq Absent \wedge v \neq Higher \wedge M(n,v)]$$

The direct-coordination predicate D specifies three adjacent organizational links:

$$(62)\ D(Outer(0), Inner(0)) \wedge D(Inner(0), Individuated(0)) \wedge D(Individuated(0), Higher)$$

For an item-specific Boolean retention policy ρ, the trace Tρ evolves through retention or newly available experience:

$$(63)\ T\rho(n+1,i) \leftrightarrow [T\rho(n,i) \wedge \rho(n,i) = true] \vee New(n+1,i)$$

The same selected retention policy ρ specifies potential information in the manifest conscious carrier:

$$(64)\ Pot(c,\rho,n,i) \leftrightarrow [c = C \wedge Man(W(n),c) \wedge T\rho(n,i)]$$

Later experiential access may supply information absent initially:

$$(65)\ \neg Source_0(parallelSignal) \wedge New(2, parallelSignal)$$

Recurrence follows from the chosen organizational successor law:

$$(66)\ Advance^3(a) = a;\ RulePhase(n+3) = RulePhase(n)$$

Inner and individuated structures coexist at every specialized epoch:

$$(67)\ \forall k\ [M(3k, Inner(k)) \wedge M(3k, Individuated(k)) \wedge M(3k, Higher)]$$

A higher organization persists when individuated profiles are absent:

$$(68)\ \forall k\ [Owner(3k+1) = Absent \wedge M(3k+1, Higher)]$$

The symbols Act*, mH, mB, Σ, Bel, D, ρ, Tρ, Pot, New, M, Advance, and RulePhase refer to the indicated Lean definitions and theorems in Appendix D. Recurring modal classes can index different generational snapshots; retention and successor rules are explicitly defined in the finite model.

11.1.6. One Dependent Core and the Two-Event Bridge

The integrated construction uses one shared CoreTheory record for the refined activation semantics and the dependent experiential extension. The finalExperience record is defined over finalCore, with finalDevelopment based on that same foundation. The theorems therefore establish compatibility of mode-specific presentations, developmental organization, and the inherited core through explicit record and foundation equality.

Equation (45) now expresses two related differentiation events. The human-individuation mode forms the designated individual boundary; a second active mode grounds the presentation through a particular vehicle. This permits the body's boundary to remain bodily while the human boundary remains individual, without ontological separation. For the selected periodic model, the exact all-index characterization of outer membership also makes the hierarchy-to-world mapping nonvacuous. The retained information potential is attached to manifested consciousness even when no distinct individual is manifest. These conclusions are mathematical consequences of the specified finite interpretation and its additional successor and retention assumptions.

11.2. Ontological Depth and the Limits of Physical Organization

The microcosmic interpretation views an individualized organization as coordinating its lower associated vehicles; more inclusive manifest organization coordinates it in turn. The additional level relation explicitly requires the higher, intermediate, and lower organizations to be distinguishable. The material body is specified as the most constrained expression of an ordered hierarchy whose prior levels are constitutively required for bodily manifestation. Physical matter thus appears as the terminal stage of organizational self-limitation within manifested consciousness, while the detailed causal physics of embodiment remains an empirical research question.

11.3. Implications for the Neuroscience of Conscious Experience

The architecture assigns neuroscience the task of measuring how the bodily instrument organizes access, memory, attention, self-modeling, and reporting. Experimental interventions, neural recordings, behavioral outcomes, and phenomenological assessments reveal the conditions under which these capacities change. The framework interprets these findings as bodily mediation within a wider hierarchy of experiential organization.

The evidence provides concrete convergent observations. Psilocybin and DMT investigations associate neural reorganization with changes in experienced self-boundaries [4] [5] [9]. Meditation research documents altered neural timescales and oscillatory activity alongside changes in self-experience [12] [11]. No-report paradigms help distinguish conscious sensory processing from task-dependent reporting [2] [3]. Together these findings give empirical content to the distinctions among identification, access, reflection, and report.

Autobiographical recall engages distributed neural systems [15], providing an empirical measure of memory accessibility. Research on attentional switching and serial information processing supplies quantitative comparison models for claims of simultaneous experiential contents [34] [35]. The H3 and H4 programs compare these measurable relationships with the framework's account of reported continuity and differentiated access.

The research sequence is to validate phenomenological and neural indicators, preregister time-matched observation bridges, and evaluate contrasting models on independent outcomes. Lean supplies auditable formal dependencies and conditional deductions; neuroscience supplies interventions and observations that test the proposed empirical mappings.

11.4. Hierarchical Embodiment and Necessary Prerequisites

The new material-hierarchy premise gives the architecture a stronger, asymmetric claim: material experience presupposes a structured set of higher experiential vehicles, whereas those higher organizations can be modeled without the material level. The analogy with descending levels of manifestation, including the Kabbalistic Tree of Life, is illustrative of the ordered structure; its structural role is specified by the explicit mathematical premises. The progression toward matter expresses an ordered increase in constitutive constraints, with distinct observational endpoints for bodily expression.

The neuroscientific task is to characterize the bodily instrument's contributions to integration, self-modeling, attention, memory, and report, while testing whether ordinary waking experience and extraordinary immersive states exhibit distinct, reproducible forms of experiential organization. Longitudinal contemplative training provides an additional developmental test domain: the architecture predicts durable refinement of experiential capacities, distinguished from transient state access. Cross-

bodily information claims call for their own prospective verification procedures. Neural mediation, hierarchical vehicles, phenomenological spaces, durable vehicle refinement, and individual continuity consequently have distinct observational bridges.

12. Conclusion

The developed architecture defines individuality through a changing organization of conscious experience, not through the biological body, autobiographical memory, or a permanently self-identical ego. Manifested consciousness is the proposed common ontological ground. Individualities are differentiated organizations within a necessary order of manifestation: the material body is the most constrained stage and requires preceding experiential levels, while consciousness remains immanent throughout the hierarchy. At the human bodily level, the brain is treated as a specialized instrument within the vehicle. Its neural activity can be essential to measured bodily capacities for perception, attention, memory, and report without being identified, as a matter of definition, with the origin of consciousness.

Individuation proceeds from collective organization toward differentiated experiential perspectives, which can mature, alter their available vehicles, and eventually reach integration boundaries. Material embodiment presupposes the preceding hierarchy; ordinary loss of its outermost level triggers inward focus only under the explicitly stated evolutionary conditions. Personality and autobiographical retrieval are associated with the bodily instrument, while acquired insight may persist across a continuing lineage. At full integration the individual perspective ceases as a distinct attribution, whereas experiential information remains within the postulated universal record. The paper thus distinguishes bodily function, individual continuity, subjective recall, and universal information retention.

The formal contribution is a dependent architecture linking differentiation, individuation, ordered experiential vehicles, selective focus, memory access, developmental change, and universal informational retention. Its integrated Lean construction supplies a joint model for conditional inward continuity and refinement of experiential access on one shared hierarchy and state carrier. A selected transition realizes inward focus together with increasing access capacity under the stated premises. The neuroscientific contribution specifies empirical contrasts between self-identification and reportability, metacognition and nondual reports, autobiographical memory and perceived continuity, and simultaneous-stream reports and attentional switching. Extraordinary immersive states and longitudinal spiritual training supply further domains for prospective measurement. Ontology-specific evaluation proceeds through preregistered operational definitions and quantitatively discriminating predictions shared with competing explanations.

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Data Availability Statement

No empirical datasets were generated or analyzed in this theoretical and formal study. The complete self-contained Lean 4.30.0 source (5,576 lines), including the integrated developments through Stage 20, is provided in Appendix E. Appendix D maps all 68 numbered equations to their corresponding Lean

declarations. The new state/epoch coherence constraints and actual-loss theorem are described in Section 9.17 and Appendix C.

Conflicts of Interest

The author declares that there is no conflict of interest.

AI Usage Statement

Artificial intelligence-assisted tools supported language editing, readability improvements, and the refinement and testing of the Lean 4 formalization. The author reviewed the resulting material and takes full responsibility for the scientific and formal content of the final manuscript.

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Informed Consent Statement

Not applicable.

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Appendix A. Axiom Provenance and Nonduplication

Table 5 distinguishes the assumptions inherited from The Architecture of Manifestation from the organizational and developmental premises of the present extension.

Table 5. Axiom Provenance and the Experiential Extension

Original source	Inherited consequence or bridge	Experiential extension
A1–A2; D1–D3	Manifest/nonmanifest type separation; P1–P2	Consciousness and experiencers remain within the manifest explanatory scope
A3–A5	Intrinsic realization and minimal manifest horizon	Experiential presence is not produced by a vehicle
A6	Reflexive differentiation	Experiential presentation bridge, Eq. (11)
A7–A8	Immanence, nonseparation, ordered differentiation	Vehicle interpretation and nesting, Eqs. (7), (10)
A9	Conscious formulation of determinations	Determination bridge, Eq. (12)
A10	Possible projection plurality	Multiple possible vehicle organizations
A11	Physical-substrate nonprimacy	Effective capacity does not delimit consciousness
A12	Differentiation does not rank ontological reality	Vehicle complexity does not rank consciousness or reality
P3	White-out remains manifest	Nondual/minimal phenomenology remains within manifestation
X1–X7	Joint Lean-checked finite extension	Vehicle organization, information, developmental witness, post-loss independence
New commitments	Dependent Paper-2 definitions, not a second ontological foundation	Owner indexing, conditional lineage, identification and recognition; actual owner exemplification in Stage 7
U1–U2, Stage 6 (new premises)	Formal Paper-2 interpretation of Paper-1 D5/A7 and D8 fixed-ground semantics	World/State coupling; D32 contingency of human individuality/body; perspective focus remains conditional
Stage 8 (dependent semantics)	Focus-event quotient and one jointly satisfiable Paper-1-dependent continuity structure	Explicit owner-equivalence and auxiliaryContinuation premises; no independent substance and no necessary personal survival

Original source	Inherited consequence or bridge	Experiential extension
Stage 10 developmental extension	Inherited Paper-1 differentiation rank and X4/A9 formulator links; new relative identity, dynamic association, hierarchy and multifocus	Conditional theorems and concrete finite two-code witnesses; trace retention remains auxiliary, not proven
Stage 11 integrated developmental correction	Collective group classification vs identity; two-level experiencer/vehicle role; A6/X4 shared event; X3-aligned multifocus; explicit successor/return; trace gating	Conditional and finite Lean theorems, with explicit D31 provenance warning and rival-model empirical limitations
Stage 13 world-coherent finite interpretation	Published Paper-1 CoreTheory fields retained; additional finite nonbodily world, mode-varying reflexive presentations, and recursive phase/state/association updates	Selected-model theorems for actual-world manifestation, exact-D31 asymmetry, qualitative distinction, strict ordering consequences, and conditional cross-vehicle information recovery
Stage 14 modal activation and recurrent evolutionary extension	Inherited A6, D8, D9 and D32 interpreted with an explicit activation-to-manifestation bridge; a separately stated successor relation between selected admissible worlds	Conditional recurrent-phase, changing-owner, generation-indexed vehicle and optional information-trace model proofs; no assertion of necessary cross-life personal identity
Stage 15 modal, snapshot and conscious-potential extension	Paper-1 D9/D32 mode-specific interpretation; world-class and owner/vehicle state separation; explicit higher organization; successor law and dynamic informational potential	Conditional finite-model satisfiability; owner-associated nested co-presence and all-epoch recurrence; content addition and conscious carrier; no necessary personal persistence
Stage 16 final dependent integration	Exact D31 preserved through modal refinement; experience and development reconstructed on the same core; two-event A6/X4 grounding	All-epoch vehicle manifestation; typed inhabited JointModel; selected finite relative-satisfiability result, not an empirical survival theorem
Stage 17 necessary material hierarchy	Unchanged Stage-16 JointModel and indexed bodily-instance correspondence	Mandatory prior-tier implications, formation ranks, nonvacuous finite material example; new declared ontology premise
Stage 18 conditional continuity	Inherited necessary hierarchy and explicit transition model	Inward focus, insight preservation, universal record, terminal integration

Original source	Inherited consequence or bridge	Experiential extension
Stage 19 training refinement	Inherited necessary hierarchy with indexed learning and access	Practice capacity, stable access, temporary episodes; additional premises
Stage 20 joint continuity and refinement	Same inherited hierarchy and shared Nat-indexed state carrier	Joint witness: inward loss transition and training-capacity increase

Appendix B. Mathematical Verification and Source Integrity

B.1. Foundation and equation count

The manuscript presents 68 numbered mathematical relations. Appendix D records the associated Lean definitions, propositions, and theorems and distinguishes structural encodings, explicit assumptions, conditional consequences, and selected satisfiability witnesses. This correspondence makes the formal scope of each displayed relation traceable to the submitted source.

B.2. Formal Sources and Verification Results

Table 6 specifies the source files, the formal development stages, and the verification status of the submitted integrated construction.

Table 6. Formal Sources and Verification Results

Stage	Principal formal extension	Verification
Stages 1–5	Foundational CoreTheory, X1–X7, perspective and continuity witnesses, and early corrections to focus and memory countermodels	Historical source snapshots; author-reported checks
Stage 6	Universal immanence, world/state coupling, and perspectival independence	Lean 4.30.0; exit 0; no diagnostics
Stage 7	Modal contingency, realized owner roles, and focus after local loss	Lean 4.30.0; exit 0; no diagnostics
Stage 8	Focused-event quotient and conditional integrated continuity	Lean 4.30.0; exit 0; no diagnostics; 2,323 lines
Stage 9	Simultaneous experiential vehicles and selective focus	Lean 4.30.0; exit 0; no diagnostics; 2,579 lines
Stage 10	Collective specialization and developmental phase-indexed association	Lean 4.30.0; exit 0; no diagnostics; 2,903 lines
Stage 11	Collective equivalence, nested roles, formation, and experiential traces	Lean 4.30.0; exit 0; no diagnostics; 3,261 lines
Stage 12	Exact D31 core, coherent access, hierarchy, and cyclic information traces	Lean 4.30.0; exit 0; no diagnostics; 3,765 lines
Stage 13	World coherence, differentiated presentations, and D31 asymmetry	Lean 4.30.0; exit 0; no diagnostics; 4,032 lines
Stage 14	Mode activation, generation-indexed vehicles, and recurrent phases	Lean 4.30.0; exit 0; no diagnostics; 4,409 lines

Stage	Principal formal extension	Verification
Stage 15	World-class snapshots, higher organization, conscious potential, and successor law	Lean 4.30.0; exit 0; no diagnostics; 4,772 lines
Stage 16 (final)	One dependent refined core, two-event grounding, and all-epoch modal realization	Lean 4.30.0; exit 0; no diagnostics; 5,093 lines
Stage 17	NecessaryMaterialHierarchy; material-tier witnesses; formation ranks; predecessor theorem	Lean 4.30.0; exit 0; no diagnostics; 5,179 lines
Stage 18	SequentialContinuity; inward_continuity_given_transition; universal_insight_retention_without_personal_recall	Lean 4.30.0; exit 0; no diagnostics; 5,241 lines
Stage 19	TrainingRefinement; capacity monotonicity; stable access; acute-state separation	Lean 4.30.0; exit 0; no diagnostics; 5,325 lines
Stage 20	IntegratedContinuityAndRefinement; synchronized transition; nonempty witness	Lean 4.30.0; exit 0; no diagnostics; 5,576 lines

Verification record. The integrated source contains 5,576 lines and declarations associated with the 68 displayed relations. Stage 16 supplies the common dependent foundation; Stage 17 adds the necessary material prerequisites; Stage 18 introduces conditional continuity and informational retention; Stage 19 provides training capacity and state-level access; and Stage 20 joins the latter developments with an explicit state/epoch projection, focus–availability coherence, actual material loss, declared individual lineage, owner-profile consistency, and a synchronized transition. The source was checked using Lean 4.30.0 with exit status 0 and no diagnostics. Its proof text contains no sorry, admit, or standalone axiom declarations; the additional ontological commitments are explicit structure fields and hypotheses.

B.3. Formal Scope and Empirical Interpretation

Provenance. The preceding study's A6, D8, D9 and D32 constrain differentiation, its activation and possible-world realization. The selected finite model requires bodily activation to entail bodily manifestation, while preserving the historical D31 interpretation. Its developmental snapshots and organizational successor are stated as additional Paper-2 hypotheses.

B.4. Reproduction Instructions

Reproduction. Appendix E contains ArchitectureOfExperience_Stage20_IntegratedDevelopment.lean in full (5,576 UTF-8 lines; SHA-256 cf3c9b3e1acedca045baee44dd4236b077711fbc7987b8a6a77c823ba031dc2e). Compile the self-contained file using Lean 4.30.0 and `lean ArchitectureOfExperience_Stage20_IntegratedDevelopment.lean` without Mathlib.

B.5. Versioned reproducibility and evidence boundaries

Source integrity. The complete 5,576-line source has SHA-256 cf3c9b3e1acedca045baee44dd4236b077711fbc7987b8a6a77c823ba031dc2e. Stages 16–19 remain unchanged. Stage 20 supplies explicit bridges from local states to the inherited material hierarchy, nonvacuous loss of an available body, retained inner focus, a distinct terminal boundary, and a joint capacity-growth witness.

Appendix C. Lean 4 Formalization and Reproduction

The complete, self-contained Lean source in Appendix E is reproducible with Lean 4.30.0. Appendix D maps the 68 numbered equations to their formal definitions and results. Section 9.15 identifies additional Stage-16 theorems resolving the dependent-core mismatch; those are refinements of the same formal interpretation and do not require altering Paper 1.

The Stage-16 foundation contains finalCore, finalExperience, finalFoundation, finalDevelopment, two_event_reflexive_bridge, exact_outer_membership_for_every_step, every_layered_member_is_modally_realized, JointModel, and fully_integrated_modal_experience_development_is_satisfiable. Stage 17 adds NecessaryMaterialHierarchy and necessary_predecessors_of_embodiment. Stage 18 adds SequentialContinuity, inward_continuity_given_transition, and universal_insight_retention_without_personal_recall. Stage 19 adds TrainingRefinement, trained_vehicle_capacity_is_nondecreasing, stable_access_after_sufficient_refinement, acute_episode_does_not_force_stable_access, and training_refinement_is_satisfiable. Stage 20 adds IntegratedContinuityAndRefinement, localEpoch, focusTierAsMaterial, localLineageRelation, availabilityAgreesWithHierarchy, focusRequiresAvailability, lossReallyRemovesOuterTier, activeOwnerAgreesWithSnapshot, terminalBoundaryAgreesWithSnapshot, localLineage, lossPreservesDeclaredLineage, declaredLineageRequiresActiveOwner, ordinary_loss_is_an_actual_material_withdrawal, terminal_boundary_is_distinct_from_ordinary_loss, and same_transition_has_inward_focus_and_capacity_growth. These definitions distinguish the ordinary local loss trajectory from the separate recurrent reabsorption path.

Appendix D. Equations and Lean Correspondence

Table 7 maps all 68 numbered equations, now appearing in ascending order in the text, to their Lean counterparts and records the scope of the corresponding theorem, definition, or premise. The final Stage-16 synthesis is summarized in Section 9.15 and Appendix B.

Table 7. Correspondence of Equations (1)–(68) with Lean Definitions and Theorems

Eq.	Formalization status and Lean identifier	Qualification
(1)	Encoded exactly at structural level; structure UnifiedTheory, lines 583–586	The displayed set comprehension is mathematical notation; Lean uses a dependent structure.
(2)	Proved; combined_has_model (779); combinedWitness (774)	An inhabited finite model, not an empirical existence claim.
(3)	collective_grouping_does_not_entail_vehicle _congruence	A counterexample to substituting vehicle associations across coarse collective classes.
(4)	real_code_identity_preserves_associations	Strict representation-code equality remains substitutive.
(5)	individuality_is_experiencer_below_and_vehi cle_above	Conditional hierarchical role theorem; strict ordering strengthened in Stage 12.

Eq.	Formalization status and Lean identifier	Qualification
(6)	focusCoherentWithX3; simultaneous_multifocus_agrees_with_original_X3	One-way focus compatibility, not yet distinct content access; Stage 12 closes that gap.
(7)	Encoded as axiom and bridge proved; ExperienceExtension.meaningImmanent (500); vehicles_are_ontologically_nonseparate (589)	Immanence is a field constraint; nonseparation follows from base core.
(8)	Exact organizational-layer encoding; ExperienceExtension.focusAvailable, ExperienceExtension.accessBound	The equation now uses vehicle-level predicates, exactly matching X3; perspective-relative focus is a separate later layer.
(9)	Derived logical consequence of the encoded ExperienceExtension.accessBound constraint (direct elimination and conjunction projection)	This follows from the stated constraint; it is not claimed as a separately named Lean theorem. The statement remains at the organizational vehicle level.
(10)	Encoded as axiom; nestedCapacity (532)	A property required of all ExperienceExtension models; not independently derived.
(11)	Encoded as axiom; presentationReflexivelyGrounded (538–541)	A witness condition; matches mathematical bridge with additional active(w,a) requirement.
(12)	Bridge axiom plus derived theorem; determinationBridge (543); formulations_remain_grounded_in_consciousness (599)	Second equality kernel-proved relative to original consciousFormulation.
(13)	Encoded in advanced extension; LineageExtension.owner (860)	Perspective and Experiencer are in dependent extension tied to concrete foundational witness, not universally every UnifiedTheory.
(14)	Proved by finite witness; oneExperiencer; owner_cardinality_is_open (928)	A countermodel demonstrates possibility, not universal noninjectivity.
(15)	Explicit premise in Stage 4; Stage4.CognitiveInterpretation.identifyFocus	Independent predicate J; inference follows from a stipulated field, not from base ontology.
(16)	Explicit premises and countermodels in Stage 4; Stage4.CognitiveInterpretation.recognizeFocus / recognizeNotIdentify; reflection_without_recognition; recognition_without_reflection	J, L, W independently interpreted; not empirical identification.

Eq.	Formalization status and Lean identifier	Qualification
(17)	Definition exactly encoded in Stage 5; encoded in the Stage 5 formalization; ArchitectureOfExperience.Stage5.currentRepertoire / GeneralEvolution.possible	Q and capacity deliberately distinguished.
(18)	Definition and conditional theorem in Stage 5; encoded in the Stage 5 formalization; ArchitectureOfExperience.Stage5.historicalRepertoire; history_monotone	Monotonicity is definitional; strict novelty needs an extra witness.
(19)	actual_update_generates_next_phase	Specific Stage-11 finite update; Stage 12 generalizes it.
(20)	explicit_three_stage_return	Cyclic phase labels; separately indexed information persistence follows in Stage 12.
(21)	Stage11.traceGenerated	Historical trace from original focus/access, expanded by Stage12.originatedTrace.
(22)	retention_never_creates_an_unexperienced_trace	Optional information retention cannot create experience ex nihilo.
(23)	Semantic countermodel: CoreTheory + X1–X7 ⊭ PostLossFocus; post_loss_no_focus_is_consistent (791) / post_loss_focus_independent (802)	A semantic non-entailment witnessed by a concrete opposing finite model, not derivation of contradictory propositions.
(24)	Semantic countermodel: CoreTheory + X1–X7 ⊭ ¬PostLossFocus; post_loss_focus_is_consistent (783) / post_loss_focus_independent (802)	A semantic non-entailment witnessed by a concrete opposing finite model, not derivation of contradictory propositions.
(25)	Explicit lineage-owner assumption and conditional proof; ArchitectureOfExperience.Stage5.GeneralContinuity.lineageOwner / conditional_lineage_owner	Preservation premise, not consequence of core.
(26)	Finite model and conditional formulation; Stage3.ContinuationPostulate.continuation; ArchitectureOfExperience.Stage5.conditional_post_loss_continuation	Additional ContinuationPostulate concerns continued individuated focus and lineage; the universal consciousness ground remains the inherited ontological premise.
(27)	Finite counterexample; Stage4.memoryfulLineage; lineage_with_changed_memory	One countermodel refutes necessary memory equality, not identity science.
(28)	Finite model and generalized conditional theorem; Stage3.loss_implies_body_absence; ArchitectureOfExperience.Stage5.loss_has_required_conditions	Stage 5 explicitly includes temporal order.

Eq.	Formalization status and Lean identifier	Qualification
(29)	Finite model and generalized conditional theorem; Stage3.continuationWitness; ArchitectureOfExperience.Stage5.conditional_post_loss_continuation	Additional ContinuationPostulate concerns continued individuated focus and lineage; the universal consciousness ground remains the inherited ontological premise.
(30)	Multistage model and generalized conditional theorem; Stage4.changing_representations_preserve_lineage; ArchitectureOfExperience.Stage5.conditional_multistage_lineage	Persistent thread identifier is a stipulated model key.
(31)	Stage11.extensionalD31; finite_D31_and_legacy_primitive_differ	Published D31 written extensionally but differs from legacy CoreTheory primitive.
(32)	StrictRelativeHierarchy.directedOrder; individually_nested_but_not_identical	A new ordering axiom gives strict differentiated levels. The middle node is relatively both experiencer and vehicle.
(33)	coherentAccess; contentExperience.accessBound	Access shares precisely the enlarged X3 focus and a vehicle-specific capacity relation.
(34)	multifocus_has_distinct_accessible_contents	Two different information items are accessed through co-focused vehicles in a single finite state.
(35)	TransitionRule; evolveMembership	General abstract formation and retirement operation; no claim to derive physical matter.
(36)	genuine_new_membership_requires_formation	Proved for any transition rule over arbitrary code and vehicle types.
(37)	originatedTrace; surviving_trace_has_experienced_origin	Source information must have been accessed through a focus event.
(38)	availableTrace; trace_crosses_next_cycle_iff_retained	An explicit cycle counter and optional policy connect adjacent cycles.
(39)	recoverableInCycle; parallel_vehicle_recovers_trace_without_body; loss_of_retention_blocks_later_recovery	Possibility and nonretention counterexample; no assertion of necessary identity persistence.
(40)	d31Core; d31_is_the_actual_core_dependence_relation; integrated_experience_with_exact_paper1_D31_is_satisfiable	Exact D31 holds in a rebuilt integrated finite model. The entire published Paper 1 is not reverified.
(41)	available_vehicle_has_world_manifestation; accessed_information_has_world_manifestation	State-matched actual manifestation of available vehicle and accessible informational referents in the selected finite model.
(42)	nonbodily_individual_is_a_genuine_admissible_world	Nonbodily individual is manifest without its body; designated individual is absent in separate bare-consciousness world.

Eq.	Formalization status and Lean identifier	Qualification
(43)	D31_body_dependence_is_not_symmetric	Exact D31 is asymmetric for designated body and individual because the nonbodily world refutes the converse.
(44)	simultaneous_distinct_phenomenal_presentations	Two simultaneously accessed contents have different phenomenal presentation tokens, both counted as experience.
(45)	Proved in Stage 16; two_event_reflexive_bridge and distinct_human_and_bodily_boundary_events	Two active events in the same state-associated world; individual formation and vehicle presentation need not share one mode or form.
(46)	two_step_hierarchy_is_strict; strict_hierarchy_has_no_two_way_loop	Derived ordering consequences of explicitly assumed strict directed coordination.
(47)	cycleAssociation; cycleRule; dynamic_cycle_changes_phase_vehicle_and_world	Recursive membership changes through retirement and formation, alongside phase and selected world-state.
(48)	cycleTrace; cycleRecovery; cycle_trace_always_has_earlier_experiential_source; learned_through_body_recovered_through_new_vehicle	Body-associated experience and optional retention lead to later access through newly formed nonbodily membership; no necessary individual survival.
(49)	ActivationManifestationBridge; coherentModalWitness; paper1_D9_D32_are_consistent_in_the_extended_witness	Conditional active-to-manifest bridge and inactive human individuation in bare consciousness; selected-world Paper-1 coherence.
(50)	differentiatedInformationMeaning; experientialSignature; information_distinctions_are_manifestly_non collapsed; content_sensitive_presentations_at_simultaneous_focus	Distinct information forms and ordered presentation/content signatures in an integrated D31-dependent finite witness.
(51)	periodicPhase; periodicWorld; phases_recur_after_three_steps; model_worlds_recur_after_three_steps	Unbounded period-three recurrence is a theorem for all natural-number step indices.
(52)	OwnerProfile; ownerAt; repeated_cycle_changes_the_organization	Owner classification is absent during reabsorption, specialized in subsequent epochs, and need not be numerically stable.
(53)	cyclicalMembership; retiredAt; formedAt; genuinely_new_vehicle_requires_formation	Recursive membership over generation-labeled vehicles, with a derived new-membership formation requirement.

Eq.	Formalization status and Lean identifier	Qualification
(54)	VehicleInstance; two_successive_cycles_really_replace_vehicle_instances	Two full cycles include different generation-indexed body and parallel instances, with checked retirement and formation.
(55)	ModalDevelopmentTrajectory; cyclicModalTrajectory; developmental_worlds_have_one_invariant_ground; phase_relative_owner_and_actual_world_agree	Explicit model-world path and successor relation; consciousness invariant, individual presence phase-relative.
(56)	initialExperientialSource; universalInformationTrace; any_retained_item_has_an_experiential_source	A retained informational potential has a source in prior accessed experience; no constant owner key appears.
(57)	a_retained_trace_is_a_potential_not_a_manifest_form_in_reabsorption	The trace may remain latent through a bare-world stage where its manifest referent is absent.
(58)	across_reabsorption_information_can_be_accessed_by_new_vehicles; both_recovery_worlds_manifest_the_vehicle_and_its_content; information_recovery_is_not_forced_across_reabsorption	Cross-generation conditional recovery via distinct new vehicles; retention-failure counterexample and manifest-world checks.
(59)	modalFaithfulCore; refinedActive; refinedBoundaryForm; exact_modal_activation_matches_designated_forms; designated_human_individuation_is_the_activated_boundary_form	A mode-specific finite CoreTheory satisfies both activation/manifestation correspondences, with a selected human strength; exact D31 semantics is preserved.
(60)	DevelopmentSnapshot; snapshotAt; modal_classes_and_epoch_snapshots_are_distinct	A recurrent modal world class and distinct generation-specific owner and vehicle configurations coexist without numerical owner identity.
(61)	memberAt; belongsTo; simultaneous_inner_and_outer_vehicles_belong_to_one_owner	Co-present nested vehicles are explicitly associated with a phase-relative owner in a realized selected snapshot.
(62)	directlyCoordinates; hierarchy_coherently_connects_all_four_levels	Consecutive strict relative-organization edges connect outer, inner, individuated, and higher roles.
(63)	developingTrace; newExperienceAt; retention_or_a_new_experience_generates_next_potential	A new experience may add or renew content at any later step, independently of a content-specific retention Boolean.

Eq.	Formalization status and Lean identifier	Qualification
(64)	potentialIn; potential_is_anchored_to_one_manifest_consciousness; latent_information_is_in_consciousness_without_a_lower_person	A conditional trace is predicated of manifest consciousness while the selected individuality or referent can be absent.
(65)	new_parallel_information_was_not_present_in_the_initial_body; later_experienced_information_can_be_added_after_total_nonretention	A new parallel access event is permitted at index 2 despite absent initial body access and a negative retention policy.
(66)	phaseAdvance; ruleEvolvedPhase; phase_successor_has_a_three_step_return; successor_generated_cycles_recur_at_every_epoch; specified_modal_phases_follow_the_same_successor_rule	Universal recurrence follows from an explicit phase-successor premise, not solely a mod-three definition.
(67)	simultaneous_inner_and_individuated_vehicles_recur_in_every_epoch	Every specialized epoch has the co-present inner, individuated, and higher organizations in the selected generational model.
(68)	every_reabsorption_lacks_an_owner_but_not_the_higher_organization	Each reabsorbed epoch lacks the designated owner profile while an encompassing organization remains available.

Appendix E. Complete Lean 4 Source Code

The complete self-contained Lean 4.30.0 source is reproduced below. File: ArchitectureOfExperience_Stage20_IntegratedDevelopment.lean. Lines: 5,576. SHA-256: cf3c9b3e1acedca045baee44dd4236b077711fbc7987b8a6a77c823ba031dc2e. Stages 16–19 are unchanged; Stage 20 adds the coherent local-loss and refinement witness.

```
/-! Self-contained Lean 4 source for live.lean-lang.org. Published finite core A1-A12 plus X1-X7 unified extension. -/

namespace ArchitectureOfManifestation
/-- `i` is the greatest lower bound of the natural-valued set `S`. -/
def IsInfimumNat (S : Nat → Prop) (i : Nat) : Prop :=
  (∀ n, S n → i ≤ n) ∧
  (∀ l, (∀ n, S n → l ≤ n) → l ≤ i)
/-- The jointly asserted formal core of Axioms A1–A12 and the selected
definitions needed to state P1–P3. -/
structure CoreTheory where
  Manifest : Type
  NonManifest : Type
  Physical : Type
  World : Type
```

```
Mode : Type
Strength : Type
Projection : Type
Realization : Type
Determination : Type
Coordinate : Type
consciousness : Manifest
horizon : Manifest
whiteOut : Manifest
nameForm : Manifest
individual : Manifest
body : Manifest
experiencedWorld : Manifest
absolute : NonManifest


/- A1: manifestation is non-exhaustive because the non-manifest sort has a
   witness and is disjoint from the manifest sort. -/
nonManifestInhabited : Nonempty NonManifest
/- A2, D3 and P3: experience is restricted to the manifest sort. -/
isExperience : Manifest → Prop
consciousnessIsExperience : isExperience consciousness
whiteOutIsExperience : isExperience whiteOut
/- A3: manifested consciousness is intrinsically realized. -/
theta : Manifest → Realization
realized : Realization → Prop
consciousnessRealized : realized (theta consciousness)
/- A4–A5: the minimal horizon is manifest, immanent, and structurally prior
   to Name/Form. -/
immanent : Manifest → Manifest → Prop
horizonImmanent : immanent horizon consciousness
priority : Manifest → Manifest → Prop
horizonPriorToNameForm : priority horizon nameForm
/- A6: an activated differentiation contains both a boundary-forming map and
   a reflexive experiential map. -/
active : World → Mode → Prop
activeWitness : ∃ w a, active w a
zeroStrength : Strength
positiveStrength : Strength → Prop
positiveStrengthWitness : ∃ s, positiveStrength s
zeroNotPositive : ¬ positiveStrength zeroStrength
strengthLE : Strength → Strength → Prop
boundaryForm : World → Mode → Strength → Manifest → Manifest
```

```
reflexiveForm : World → Mode → Strength → Manifest → Manifest
reflexiveFormIsExperiential : ∀ w a s x,
  isExperience (reflexiveForm w a s x)
/- A7: differentiated configurations remain immanent and difference does not
   force ontological separation. -/
ontSeparate : Manifest → Manifest → Prop
immanentNonSeparation : ∀ x y,
  immanent x consciousness →
  immanent y consciousness →
  ¬ ontSeparate x y
boundaryImmanent : ∀ w a s, active w a →
  immanent (boundaryForm w a s consciousness) consciousness
differenceWithoutSeparation : ∀ w a s, active w a →
  boundaryForm w a s consciousness ≠ consciousness ∧
  ¬ ontSeparate (boundaryForm w a s consciousness) consciousness
/- D10–D12 and A8: coordinate order, monotonic de-differentiation, the


   designated horizon endpoint, and the positive-strength infimum. -/
differentiationRank : Manifest → Nat
coordinate : Coordinate → Manifest → Nat
horizonLeast : ∀ x,
  differentiationRank horizon ≤ differentiationRank x
coordinateHorizonLeast : ∀ i x,
  coordinate i horizon ≤ coordinate i x
monotoneDifferentiation : ∀ w a s₁ s₂,
  strengthLE s₁ s₂ →
  differentiationRank (boundaryForm w a s₁ consciousness) ≤
    differentiationRank (boundaryForm w a s₂ consciousness)
horizonConvergence : ∀ w a, active w a →
  boundaryForm w a zeroStrength consciousness = horizon
horizonCoordinateInfimum : ∀ w a i, active w a →
  IsInfimumNat
    (fun n => ∃ s,
      positiveStrength s ∧
      coordinate i (boundaryForm w a s consciousness) = n)
    (coordinate i horizon)
/- A9: every manifest determination is formulated by already manifested
   consciousness, which is structurally prior to the determination. -/
determine : Manifest → Determination
formulator : Determination → Manifest
determinationPriority : Manifest → Determination → Prop
consciousnessPriorToDetermination : ∀ x,
```

```
  determinationPriority consciousness (determine x)
consciousFormulation : ∀ x,
  formulator (determine x) = consciousness
/- A10: at least one admissible world contains a projection that is distinct
   from and non-equivalent to the human projection. -/
humanProjection : Projection
projectionEquivalent : Projection → Projection → Prop
projectionEquivalentRefl : ∀ p, projectionEquivalent p p
projectionEquivalentSymm : ∀ p q,
  projectionEquivalent p q → projectionEquivalent q p
projectionEquivalentTrans : ∀ p q r,
  projectionEquivalent p q →
  projectionEquivalent q r →
  projectionEquivalent p r
projectionAt : World → Projection → Prop
possibleProjectionPlurality :
  ∃ w s,
    projectionAt w s ∧


    s ≠ humanProjection ∧
    ¬ projectionEquivalent s humanProjection
/- A11: projected physical substrates are non-primary relative to
   consciousness. Nonemptiness prevents vacuous satisfaction. -/
physicalInhabited : Nonempty Physical
grounds : Manifest → Physical → Prop
contains : Physical → Manifest → Prop
selects : Physical → Manifest → Prop
constrains : Physical → Manifest → Prop
delimits : Physical → Manifest → Prop
physicalNonPrimacy : ∀ v,
  ¬ grounds consciousness v ∧
  ¬ contains v consciousness ∧
  ¬ selects v consciousness ∧
  ¬ constrains v consciousness ∧
  ¬ delimits v consciousness
/- D31–D32: body and experienced world are immanent to consciousness; the
   particular human individual and body depend on consciousness; and worlds
   without either particular organization are admitted. -/
bodyImmanent : immanent body consciousness
experiencedWorldImmanent : immanent experiencedWorld consciousness
existentiallyDependsOn : Manifest → Manifest → Prop
individualDependsOnConsciousness :
```

```
    existentiallyDependsOn individual consciousness
  bodyDependsOnConsciousness :
    existentiallyDependsOn body consciousness
  manifestedAt : World → Manifest → Prop
  consciousnessWithoutIndividual :
    ∃ w, manifestedAt w consciousness ∧ ¬ manifestedAt w individual
  consciousnessWithoutBody :
    ∃ w, manifestedAt w consciousness ∧ ¬ manifestedAt w body
  /- D33 / Eq. 134: primitive phenomenal presence and its empirical indicator
     are distinct Boolean predicates on the experiential subtype. -/
  presence : {x : Manifest // isExperience x} → Bool
  empiricalPresence : {x : Manifest // isExperience x} → Bool
  presenceNotIdentical : presence ≠ empiricalPresence
  whiteOutPresence :
    presence ⟨whiteOut, whiteOutIsExperience⟩ = true
  /- A12: differentiation rank does not confer greater ontological reality. -/
  lessDifferentiated : Manifest → Manifest → Prop
  moreFundamental : Manifest → Manifest → Prop
  rankDoesNotConferFundamentality : ∀ x y,
    lessDifferentiated x y → ¬ moreFundamental x y


/-- D1: the common meta-level is a tagged disjoint sum. -/
abbrev Ontology (T : CoreTheory) := Sum T.Manifest T.NonManifest
def manifestTag (T : CoreTheory) (x : T.Manifest) : Ontology T := Sum.inl x
def nonManifestTag (T : CoreTheory) (x : T.NonManifest) : Ontology T := Sum.inr x
/-- Eqs. 9/12: canonical injections of the two sorts have disjoint images. -/
theorem tagged_sorts_disjoint (T : CoreTheory)
    (m : T.Manifest) (n : T.NonManifest) :
    manifestTag T m ≠ nonManifestTag T n := by
  intro h
  cases h
/-- A1 / Eq. 5: the manifest image does not exhaust the tagged ontology. -/
theorem manifest_is_non_exhaustive (T : CoreTheory) :
    ∃ o : Ontology T, ∀ m : T.Manifest, o ≠ manifestTag T m := by
  rcases T.nonManifestInhabited with ⟨n⟩
  refine ⟨nonManifestTag T n, ?_⟩
  intro m h
  exact tagged_sorts_disjoint T m n h.symm
/-- D3: the meta-level experience predicate is false on the non-manifest tag. -/
def metaExperienced (T : CoreTheory) : Ontology T → Prop
  | Sum.inl m => T.isExperience m
  | Sum.inr _ => False
```

```
universe u
/-- P1 / Eq. 13: a manifest determination with an arbitrary codomain accepts
only terms of the manifest sort. -/
abbrev ManifestDetermination (T : CoreTheory) (Y : Sort u) := T.Manifest → Y
abbrev ManifestPredicate (T : CoreTheory) := ManifestDetermination T Prop
/-- P2 / Eq. 17: the distinguished non-manifest term is not experiential. -/
theorem non_manifest_inaccessible (T : CoreTheory) :
    ¬ metaExperienced T (nonManifestTag T T.absolute) := by
  intro h
  exact h
/-- A6 / Eq. 37: the differentiation bundle contains boundary and reflexive
components. -/
def differentiationPair (T : CoreTheory)
    (w : T.World) (a : T.Mode) (s : T.Strength) :=
  (T.boundaryForm w a s, T.reflexiveForm w a s)
/-- P3 / Eq. 140: white-out is manifest and cannot equal the non-manifest. -/
theorem white_out_is_not_non_manifest (T : CoreTheory) :
    manifestTag T T.whiteOut ≠ nonManifestTag T T.absolute :=
  tagged_sorts_disjoint T T.whiteOut T.absolute
/-- A11 restated as a directly reusable theorem. -/
theorem no_physical_substrate_is_primary (T : CoreTheory) (v : T.Physical) :
    ¬ T.grounds T.consciousness v ∧


   ¬ T.contains v T.consciousness ∧
   ¬ T.selects v T.consciousness ∧
   ¬ T.constrains v T.consciousness ∧
   ¬ T.delimits v T.consciousness :=
 T.physicalNonPrimacy v
namespace FiniteWitness
inductive Manifest where
 | consciousness
 | horizon
 | whiteOut
 | nameForm
 | individual
 | body
 | experiencedWorld
 | physicalImage
 deriving DecidableEq
inductive NonManifest where
 | absolute
 deriving DecidableEq
```

```
inductive Physical where
 | bodySubstrate
 deriving DecidableEq
inductive World where
 | human
 | nonbodily
 | bareConsciousness
 deriving DecidableEq
inductive Mode where
 | humanIndividuation
 | bodily
 | parallelMode
 deriving DecidableEq
inductive Strength where
 | zero
 | epsilon
 | high
 deriving DecidableEq
inductive Projection where
 | human
 | alternate
 deriving DecidableEq
inductive Coordinate where
 | axis
 deriving DecidableEq
def isExperience : Manifest → Prop
 | .consciousness | .horizon | .whiteOut => True


 | _ => False
def immanent (_x y : Manifest) : Prop := y = .consciousness
def priority (x y : Manifest) : Prop :=
 x = .horizon ∧ y = .nameForm
/- The unindividuated bare world instantiates no differentiation mode.
   Paper 1 D9 requires inactive differentiation to remain unactualized;
   active differentiation therefore occurs only where the resulting
   boundary form can be manifest. -/
def active : World → Mode → Prop
  | .bareConsciousness, _ => False
  | _, _ => True
def positiveStrength : Strength → Prop
 | .zero => False
 | .epsilon | .high => True
```

```
def boundaryForm (_w : World) (_a : Mode) : Strength → Manifest → Manifest
 | .zero, _ => .horizon
 | .epsilon, _ => .horizon
 | .high, _ => .individual
def reflexiveForm (_w : World) (a : Mode) (_s : Strength)
   (_x : Manifest) : Manifest :=
  match a with
  | .humanIndividuation => .whiteOut
  | .bodily => .horizon
  | .parallelMode => .consciousness
def ontSeparate (_x _y : Manifest) : Prop := False
def differentiationRank : Manifest → Nat
 | .horizon => 0
 | .consciousness => 0
 | .whiteOut => 0
 | _ => 1
def coordinate (_i : Coordinate) (x : Manifest) : Nat :=
 differentiationRank x
def strengthLE : Strength → Strength → Prop
 | .zero, _ => True
 | .epsilon, .epsilon | .epsilon, .high => True
 | .high, .high => True
 | _, _ => False
def determinationPriority (x _d : Manifest) : Prop :=
 x = .consciousness
def projectionEquivalent (x y : Projection) : Prop := x = y
def projectionAt (_w : World) (_p : Projection) : Prop := True
def grounds (_x : Manifest) (_v : Physical) : Prop := False
def contains (_v : Physical) (_x : Manifest) : Prop := False
def selects (_v : Physical) (_x : Manifest) : Prop := False
def constrains (_v : Physical) (_x : Manifest) : Prop := False
def delimits (_v : Physical) (_x : Manifest) : Prop := False
def existentiallyDependsOn (_x y : Manifest) : Prop :=
 y = .consciousness
def manifestedAt : World → Manifest → Prop
 | .human, _ => True
 | .nonbodily, .body => False
 | .nonbodily, .physicalImage => False
 | .nonbodily, _ => True
 | .bareConsciousness, .consciousness => True
 | .bareConsciousness, .horizon => True
 | .bareConsciousness, .whiteOut => True
```

```
  | .bareConsciousness, _ => False
def presence (_e : {x : Manifest // isExperience x}) : Bool := true
def empiricalPresence (_e : {x : Manifest // isExperience x}) : Bool := false
def lessDifferentiated (x y : Manifest) : Prop :=
  differentiationRank x < differentiationRank y
def moreFundamental (_x _y : Manifest) : Prop := False
/-- A concrete finite witness satisfying the encoded core. -/
def model : CoreTheory where
  Manifest := Manifest
  NonManifest := NonManifest
  Physical := Physical
  World := World
  Mode := Mode
  Strength := Strength
  Projection := Projection
  Realization := Unit
  Determination := Manifest
  Coordinate := Coordinate
  consciousness := .consciousness
  horizon := .horizon
  whiteOut := .whiteOut
  nameForm := .nameForm
  individual := .individual
  body := .body
  experiencedWorld := .experiencedWorld
  absolute := .absolute
  nonManifestInhabited := ⟨.absolute⟩
  isExperience := isExperience
  consciousnessIsExperience := by simp [isExperience]
  whiteOutIsExperience := by simp [isExperience]
  theta := fun _ => ()
  realized := fun _ => True
  consciousnessRealized := by trivial
  immanent := immanent
  horizonImmanent := by rfl
  priority := priority
  horizonPriorToNameForm := by exact ⟨rfl, rfl⟩
  active := active
  activeWitness := ⟨.human, .humanIndividuation, by trivial⟩
  zeroStrength := .zero
  positiveStrength := positiveStrength
  positiveStrengthWitness := ⟨.epsilon, by simp [positiveStrength]⟩
```

```
zeroNotPositive := by simp [positiveStrength]


strengthLE := strengthLE
boundaryForm := boundaryForm
reflexiveForm := reflexiveForm
reflexiveFormIsExperiential := by
 intro w a s x
 cases a <;> simp [reflexiveForm, isExperience]
ontSeparate := ontSeparate
immanentNonSeparation := by
 intro x y _hx _hy
 simp [ontSeparate]
boundaryImmanent := by
 intro w a s _h
 rfl
differenceWithoutSeparation := by
 intro w a s _h
 constructor
 · cases s <;> simp [boundaryForm]
 · simp [ontSeparate]
differentiationRank := differentiationRank
coordinate := coordinate
horizonLeast := by
 intro x
 exact Nat.zero_le _
coordinateHorizonLeast := by
 intro i x
 exact Nat.zero_le _
monotoneDifferentiation := by
 intro w a s₁ s₂ h
 cases s₁ <;> cases s₂ <;>
   simp_all [strengthLE, boundaryForm, differentiationRank]
horizonConvergence := by
 intro w a _h
 rfl
horizonCoordinateInfimum := by
 intro w a i _h
 cases i
 constructor
 · intro n hn
   exact Nat.zero_le _
 · intro l hl
```

```
  have h0 : l ≤ 0 := hl 0 (by
    refine ⟨.epsilon, ?_, ?_⟩
    · simp [positiveStrength]



    · simp [coordinate, boundaryForm, differentiationRank])
  simpa [coordinate, differentiationRank] using h0
determine := fun x => x
formulator := fun _ => .consciousness
determinationPriority := determinationPriority
consciousnessPriorToDetermination := by
 intro x
 rfl
consciousFormulation := by
 intro x
 rfl
humanProjection := .human
projectionEquivalent := projectionEquivalent
projectionEquivalentRefl := by
 intro p
 rfl
projectionEquivalentSymm := by
 intro p q h
 exact h.symm
projectionEquivalentTrans := by
 intro p q r hpq hqr
 exact hpq.trans hqr
projectionAt := projectionAt
possibleProjectionPlurality := by
 refine ⟨.human, .alternate, by trivial, ?_, ?_⟩
 · intro h
   cases h
 · intro h
   cases h
physicalInhabited := ⟨.bodySubstrate⟩
grounds := grounds
contains := contains
selects := selects
constrains := constrains
delimits := delimits
physicalNonPrimacy := by
 intro v
 simp [grounds, contains, selects, constrains, delimits]
```

```
  bodyImmanent := by rfl
  experiencedWorldImmanent := by rfl
  existentiallyDependsOn := existentiallyDependsOn
  individualDependsOnConsciousness := by rfl
  bodyDependsOnConsciousness := by rfl


  manifestedAt := manifestedAt
  consciousnessWithoutIndividual := by
    exact ⟨.bareConsciousness, by simp [manifestedAt]⟩
  consciousnessWithoutBody := by
    exact ⟨.bareConsciousness, by simp [manifestedAt]⟩
  presence := presence
  empiricalPresence := empiricalPresence
  presenceNotIdentical := by
    intro h
    let e : {x : Manifest // isExperience x} :=
      ⟨.whiteOut, by simp [isExperience]⟩
    have htf : true = false := by
      simpa [presence, empiricalPresence] using congrFun h e
    cases htf
  whiteOutPresence := by rfl
  lessDifferentiated := lessDifferentiated
  moreFundamental := moreFundamental
  rankDoesNotConferFundamentality := by
    intro x y h
    simp [moreFundamental]
end FiniteWitness
/-- Main relative-consistency certificate: the encoded core has a
model. -/
theorem core_has_model : Nonempty CoreTheory := ⟨FiniteWitness.model⟩
/-- Consequently, not every structure satisfying the encoded core yields
contradiction. -/
theorem not_every_model_is_false : ¬ (∀ _T : CoreTheory, False) := by
  intro h
  exact h FiniteWitness.model
end ArchitectureOfManifestation



/-!
Architecture of Experience — Conservative Extension of the Published Core
```

```
This file imports the reconstructed, kernel-checked published finite core
`ArchitectureOfManifestation_Published.lean` (A1–A12).  It introduces
additional explicitly typed experiential-organization commitments and exhibits
two combined models.  It is a relative-consistency witness for THIS encoded
core, not a verification of every formula or empirical claim in either paper.

No independent conscious subjects are added.  The source of all experiential
presentations remains the single `CoreTheory.consciousness`.  The additional
`Information` sort represents a fixed common informational repertoire, not a
second substance or an independently existing ontological ground.
-/
namespace ArchitectureOfExperience
open ArchitectureOfManifestation

/-- New organizational axioms X1–X7, parameterized over the SAME model of
    the published A1–A12 core.  The bridge to the old ontology is explicit. -/
structure ExperienceExtension (T : CoreTheory) where
  Vehicle : Type
  Information : Type
  State : Type
  infoInhabited : Nonempty Information
  informationMeaning : Information → T.Manifest
  informationImmanent : ∀ i,
    T.immanent (informationMeaning i) T.consciousness

  /- X1: each vehicle is interpreted as a differentiated, immanent manifest
     structure.  Its label is NOT a separate subject. -/
  meaning : Vehicle → T.Manifest
  meaningImmanent : ∀ v, T.immanent (meaning v) T.consciousness
  eligibleManifestForm : T.Manifest → Prop
  everyDifferentiatedFormEligible : ∀ x : T.Manifest,
    x ≠ T.consciousness → eligibleManifestForm x
  cell : Vehicle
  bodyVehicle : Vehicle
  earth : Vehicle
  parallel : Vehicle
  technology : Vehicle
  cellNeBody : cell ≠ bodyVehicle
  bodyNeEarth : bodyVehicle ≠ earth
  earthNeParallel : earth ≠ parallel
  technologyNeBody : technology ≠ bodyVehicle
  bodyCorrespondence : meaning bodyVehicle = T.body
```

```
/- X2: vehicles can co-exist and form nested effective organizations.
   Organizational containment is not ontological separation. -/
available : State → Vehicle → Prop
part : State → Vehicle → Vehicle → Prop
partRefl : ∀ s v, part s v v ↔ available s v
partAvailable : ∀ s u v, part s u v → available s u ∧ available s v
partAntisym : ∀ s u v, part s u v → part s v u → u = v
partTrans : ∀ s u v w, part s u v → part s v w → part s u w

/- X3: potential information and effective access differ.  No vehicle
   creates or annihilates elements of the fixed Information domain. -/
capacity : State → Vehicle → Information → Prop
focus : State → Vehicle → Prop
access : State → Vehicle → Information → Prop
focusAvailable : ∀ s v, focus s v → available s v
capacityAvailable : ∀ s v i, capacity s v i → available s v
accessBound : ∀ s v i, access s v i → focus s v ∧ capacity s v i
nestedCapacity : ∀ s u v i, part s u v → capacity s u i → capacity s v i

/- X4: original A9 is the same manifest determination, represented through
   a choice of experiential presentation in the old manifest sort. -/
presentation : State → Vehicle → T.Manifest
focusedPresentation : ∀ s v, focus s v → T.isExperience (presentation s v)
presentationReflexivelyGrounded : ∀ s v,
  ∃ w a strength,
    T.active w a ∧
    presentation s v = T.reflexiveForm w a strength T.consciousness
determination : State → Vehicle → T.Determination
determinationBridge : ∀ s v, determination s v = T.determine (presentation s v)
informationSpecification : T.Determination → Information → Prop
informationSpecified : ∀ d, ∃ i, informationSpecification d i
accessedInformationSpecified : ∀ s v i,
  access s v i → informationSpecification (determination s v) i

/- X5: functional development is an independently named effective relation,
   with a substantive, conditional non-loss rule for informational capacity. -/
develops : State → State → Prop
developmentMonotone : ∀ s t v i,
  develops s t → available s v → available t v →
  capacity s v i → capacity t v i

/- X6: nonvacuous, co-present organization, nested structure, and genuinely
   larger information capacity across the designated development step. -/
```

```
  ordinary : State
  developed : State
  loss : State
  ordinaryFocus : focus ordinary bodyVehicle
  bodyAtOrdinary : available ordinary bodyVehicle
  bodyAtDeveloped : available developed bodyVehicle
  bodyAbsentAfterLoss : ¬ available loss bodyVehicle
  parallelAtOrdinary : available ordinary parallel
  parallelAfterLoss : available loss parallel
  technologyAtOrdinary : available ordinary technology
  technologyCapacityBounded : ∀ i,
    capacity ordinary technology i → capacity ordinary bodyVehicle i
  technologyProperSubset : ∃ i,
    capacity ordinary bodyVehicle i ∧ ¬ capacity ordinary technology i
  cellNested : part ordinary cell bodyVehicle
  bodyNested : part ordinary bodyVehicle earth
  designatedDevelopment : develops ordinary developed
  strictExpansion : ∃ i,
    ¬ capacity ordinary bodyVehicle i ∧ capacity developed bodyVehicle i

  /- X7: NO axiom assigns the focus after loss.  In particular, there is no
     survival, transfer, cessation, or persisting personal-identity predicate. -/

/-- Combined theory: the old core and new axioms inhabit one dependent
    semantic structure.  This is not a free-standing Z3 copy. -/
structure UnifiedTheory where
  core : CoreTheory
  experience : ExperienceExtension core

/-- From original A7, every pair of experiential vehicles is ontologically
    nonseparate, regardless of the effective organizational relations. -/
theorem vehicles_are_ontologically_nonseparate
    (M : UnifiedTheory) (u v : M.experience.Vehicle) :
    ¬ M.core.ontSeparate (M.experience.meaning u)
        (M.experience.meaning v) :=
  M.core.immanentNonSeparation _ _
    (M.experience.meaningImmanent u)
    (M.experience.meaningImmanent v)

/-- The informational determination still has the same original conscious
    formulator; the experiential tool is an effective mediator, not a source. -/
theorem formulations_remain_grounded_in_consciousness
    (M : UnifiedTheory) (s : M.experience.State)
```

```
    (v : M.experience.Vehicle) :
    M.core.formulator (M.experience.determination s v) =
      M.core.consciousness := by
  rw [M.experience.determinationBridge]
  exact M.core.consciousFormulation _

namespace FiniteExperienceWitness
open ArchitectureOfManifestation.FiniteWitness

inductive Vehicle where
  | cell | body | earth | parallel | technology
  deriving DecidableEq

inductive Information where
  | base | cellSignal | growth | earthSignal | parallelSignal
  deriving DecidableEq

inductive State where
  | ordinary | developed | loss
  deriving DecidableEq

def present : State → Vehicle → Prop
  | .loss, .cell => False
  | .loss, .body => False
  | _, _ => True

def part (s : State) (u v : Vehicle) : Prop :=
  present s u ∧ present s v ∧
    (u = v ∨
     (u = .cell ∧ v = .body) ∨
     (u = .body ∧ v = .earth) ∨
     (u = .cell ∧ v = .earth))

/-- There is one shared information sort, independent of a state's set of
    accessible and potential information. -/
def cap (s : State) (v : Vehicle) (i : Information) : Prop :=
  present s v ∧
    (i = .base ∨
     (i = .cellSignal ∧ (v = .cell ∨ v = .body ∨ v = .earth)) ∨
     (i = .growth ∧ s = .developed ∧ (v = .body ∨ v = .earth)) ∨
     (i = .earthSignal ∧ v = .earth) ∨
     (i = .parallelSignal ∧ v = .parallel))
```

```
def grows : State → State → Prop
  | .ordinary, .developed => True
  | _, _ => False

/-- Only the finite focus assignment varies between the two witness models. -/
def focused (continuation : Bool) : State → Vehicle → Prop
  | .ordinary, .body => True
  | .developed, .body => True
  | .loss, .parallel => continuation = true
  | _, _ => False

def accessed (continuation : Bool) (s : State) (v : Vehicle)
    (i : Information) : Prop :=
  focused continuation s v ∧ cap s v i ∧ i = .base

def meaning : Vehicle → FiniteWitness.Manifest
  | .cell => .physicalImage
  | .body => .body
  | .earth => .experiencedWorld
  | .parallel => .nameForm
  | .technology => .individual

/-- Concrete instance of X1–X7 over the exact published Lean finite model. -/
def model (continuation : Bool) :
    ExperienceExtension FiniteWitness.model where
  Vehicle := Vehicle
  Information := Information
  State := State
  infoInhabited := ⟨.base⟩
  informationMeaning := fun _ => .nameForm
  informationImmanent := by
    intro i
    rfl
  meaning := meaning
  meaningImmanent := by
    intro v
    rfl
  eligibleManifestForm := fun _ => True
  everyDifferentiatedFormEligible := by
    intro x _hx
    trivial
  cell := .cell
  bodyVehicle := .body
```

```
earth := .earth
parallel := .parallel
technology := .technology
cellNeBody := by decide
bodyNeEarth := by decide
earthNeParallel := by decide
technologyNeBody := by decide
bodyCorrespondence := by rfl
available := present
part := part
partRefl := by
  intro s v
  cases s <;> cases v <;> simp [part, present]
partAvailable := by
  intro s u v h
  exact ⟨h.1, h.2.1⟩
partAntisym := by
  intro s u v huv hvu
  cases s <;> cases u <;> cases v <;>
    simp_all [part, present]
partTrans := by
  intro s u v w huv hvw
  cases s <;> cases u <;> cases v <;> cases w <;>
    simp_all [part, present]
capacity := cap
focus := focused continuation
access := accessed continuation
focusAvailable := by
  intro s v hf
  cases continuation <;> cases s <;> cases v <;>
    simp_all [focused, present]
capacityAvailable := by
  intro s v i hc
  exact hc.1
accessBound := by
  intro s v i ha
  exact ⟨ha.1, ha.2.1⟩
nestedCapacity := by
  intro s u v i hp hc
  cases s <;> cases u <;> cases v <;> cases i <;>
    simp_all [part, cap, present]
presentation := fun _ _ => .whiteOut
focusedPresentation := by
```

```
  intro s v _hf
  exact FiniteWitness.model.whiteOutIsExperience
presentationReflexivelyGrounded := by
  intro s v
  exact ⟨.human, .humanIndividuation, .epsilon, by trivial, by rfl⟩
determination := fun _ _ => .whiteOut
determinationBridge := by
  intro s v
  rfl
informationSpecification := fun _ _ => True
informationSpecified := by
  intro d
  exact ⟨.base, trivial⟩
accessedInformationSpecified := by
  intro s v i _ha
  trivial
develops := grows
developmentMonotone := by
  intro s t v i hDev hS hT hCap
  cases s <;> cases t <;> cases v <;> cases i <;>
    simp_all [grows, cap, present]
ordinary := .ordinary
developed := .developed
loss := .loss
ordinaryFocus := by simp [focused]
bodyAtOrdinary := by simp [present]
bodyAtDeveloped := by simp [present]
bodyAbsentAfterLoss := by simp [present]
parallelAtOrdinary := by simp [present]
parallelAfterLoss := by simp [present]
technologyAtOrdinary := by simp [present]
technologyCapacityBounded := by
  intro i h
  cases i <;> simp_all [cap, present]
technologyProperSubset := by
  exact ⟨.cellSignal, by simp [cap, present], by simp [cap, present]⟩
cellNested := by simp [part, present]
bodyNested := by simp [part, present]
designatedDevelopment := by simp [grows]
strictExpansion := by
  exact ⟨.growth, by simp [cap, present], by simp [cap, present]⟩

end FiniteExperienceWitness
```

```
def combinedWitness (continuation : Bool) : UnifiedTheory :=
  { core := ArchitectureOfManifestation.FiniteWitness.model,
    experience := FiniteExperienceWitness.model continuation }

/-- Verified combined A1–A12 + X1–X7 existence certificate. -/
theorem combined_has_model : Nonempty UnifiedTheory :=
  ⟨combinedWitness false⟩

/-- A witness with focus on a simultaneously present alternative vehicle. -/
theorem post_loss_focus_is_consistent :
    ∃ M : UnifiedTheory,
      M.experience.focus M.experience.loss M.experience.parallel := by
  refine ⟨combinedWitness true, ?_⟩
  rfl

/-- A witness with NO effective focused vehicle after bodily disappearance.
    This does not assert the disappearance of universal consciousness. -/
theorem post_loss_no_focus_is_consistent :
    ∃ M : UnifiedTheory,
      ∀ v : M.experience.Vehicle,
        ¬ M.experience.focus M.experience.loss v := by
  refine ⟨combinedWitness false, ?_⟩
  intro v
  cases v <;> simp [combinedWitness, FiniteExperienceWitness.model,
    FiniteExperienceWitness.focused]

/-- Therefore post-loss effective focus is independent of the combined core:
    neither its presence nor its absence follows from those axioms. -/
theorem post_loss_focus_independent :
    (∃ M : UnifiedTheory,
      ∃ v : M.experience.Vehicle,
        M.experience.focus M.experience.loss v) ∧
    (∃ M : UnifiedTheory,
      ∀ v : M.experience.Vehicle,
        ¬ M.experience.focus M.experience.loss v) := by
  constructor
  · refine ⟨combinedWitness true, ?_⟩
    exact ⟨FiniteExperienceWitness.Vehicle.parallel, by rfl⟩
  · exact post_loss_no_focus_is_consistent

end ArchitectureOfExperience
```

```
/-!
Advanced formal verification module (extension of the independently
reported successful 814-line unified Lean 4 source).

This layer does not assume post-mortem continuation. Its concrete
three-state continuation witness is explicitly a relative-consistency
example, not a universal consequence of X1-X7.
-/
namespace ArchitectureOfExperience.Advanced

open ArchitectureOfExperience
open ArchitectureOfExperience.FiniteExperienceWitness

/-- This is the very same dependent combined A1-A12 + X1-X7 theory. -/
def foundational : UnifiedTheory := combinedWitness true

/-- Three designated stages ordered by their numerical ranks. -/
def stageRank : State → Nat
  | .ordinary => 0
  | .developed => 1
  | .loss => 2

def precedes (s t : State) : Prop := stageRank s ≤ stageRank t

theorem precedes_refl (s : State) : precedes s s := Nat.le_refl _

theorem precedes_trans (a b c : State)
    (hab : precedes a b) (hbc : precedes b c) :
    precedes a c := Nat.le_trans hab hbc

theorem three_stage_order :
    precedes .ordinary .developed ∧
    precedes .developed .loss ∧
    precedes .ordinary .loss := by
  simp [precedes, stageRank]

/-- Perspective-lineage structure on the exact combined model. The
    non-injective owner function is permitted: owner equality is necessary
    for lineage, but does not define lineage. No survival axiom is imposed. -/
structure LineageExtension where
  Perspective : Type
  Experiencer : Type
  perspectiveNonempty : Nonempty Perspective
```

```
  experiencerNonempty : Nonempty Experiencer
  owner : Perspective → Experiencer
  lineage : State → Perspective → State → Perspective → Prop
  lineageRefl : ∀ s x, lineage s x s x
  lineageTrans : ∀ a b c x y z,
    lineage a x b y → lineage b y c z → lineage a x c z
  lineageOrdered : ∀ a b x y, lineage a x b y → precedes a b
  lineageOwner : ∀ a b x y, lineage a x b y → owner x = owner y
  memory : State → Perspective → Vehicle → Information → Prop
  memoryBounded : ∀ s x v i, memory s x v i →
    foundational.experience.capacity s v i

/-- Identity of perspective along an admissible temporal path. -/
def identityLineage (s : State) (x : Bool)
    (t : State) (y : Bool) : Prop := precedes s t ∧ x = y

/-- One ontological experiencer with two distinct perspectives. -/
def oneExperiencer : LineageExtension where
  Perspective := Bool
  Experiencer := Unit
  perspectiveNonempty := ⟨false⟩
  experiencerNonempty := ⟨()⟩
  owner := fun _ => ()
  lineage := identityLineage
  lineageRefl := by
    intro s x
    exact ⟨precedes_refl s, rfl⟩
  lineageTrans := by
    intro a b c x y z hxy hyz
    exact ⟨precedes_trans a b c hxy.1 hyz.1, hxy.2.trans hyz.2⟩
  lineageOrdered := by
    intro a b x y h
    exact h.1
  lineageOwner := by
    intro a b x y h
    rfl
  memory := fun _ _ _ _ => False
  memoryBounded := by
    intro s x v i h
    exact False.elim h

/-- Two ontological experiencers with two distinct perspectives, on the
    SAME foundational manifest-consciousness theory. -/
```

```
def twoExperiencers : LineageExtension where
  Perspective := Bool
  Experiencer := Bool
  perspectiveNonempty := ⟨false⟩
  experiencerNonempty := ⟨false⟩
  owner := id
  lineage := identityLineage
  lineageRefl := by
    intro s x
    exact ⟨precedes_refl s, rfl⟩
  lineageTrans := by
    intro a b c x y z hxy hyz
    exact ⟨precedes_trans a b c hxy.1 hyz.1, hxy.2.trans hyz.2⟩
  lineageOrdered := by
    intro a b x y h
    exact h.1
  lineageOwner := by
    intro a b x y h
    exact h.2
  memory := fun _ _ _ _ => False
  memoryBounded := by
    intro s x v i h
    exact False.elim h

/-- Countermodels of unique / plural owners share the very same original
    core and the very same X1-X7 finite vehicle model. -/
theorem owner_cardinality_is_open :
    ((false : oneExperiencer.Perspective) ≠ true ∧
      oneExperiencer.owner false = oneExperiencer.owner true) ∧
    ((false : twoExperiencers.Perspective) ≠ true ∧
      twoExperiencers.owner false ≠ twoExperiencers.owner true) := by
  constructor
  · constructor
    · decide
    · rfl
  · constructor
    · decide
    · change (false : Bool) ≠ true
      decide

/-- A three-stage lineage exists in the finite extension while autobiographical
    memory is entirely absent; the link is strictly lineage, not memory. -/
theorem multi_stage_lineage_without_memory :
```

```
    ∃ x y z : oneExperiencer.Perspective,
      oneExperiencer.lineage .ordinary x .developed y ∧
      oneExperiencer.lineage .developed y .loss z ∧
      oneExperiencer.lineage .ordinary x .loss z ∧
      (∀ s v i, ¬ oneExperiencer.memory s x v i) := by
  refine ⟨false, false, false, ?_, ?_, ?_, ?_⟩
  · exact ⟨by simp [precedes, stageRank], rfl⟩
  · exact ⟨by simp [precedes, stageRank], rfl⟩
  · exact ⟨by simp [precedes, stageRank], rfl⟩
  · intro s v i h
    exact h

/-- Owner equality alone is insufficient for membership in a perspective
    lineage, even when all involved perspectives have the same owner. -/
theorem same_owner_not_sufficient_for_lineage :
    oneExperiencer.owner false = oneExperiencer.owner true ∧
    ¬ oneExperiencer.lineage .ordinary false .loss true := by
  constructor
  · rfl
  · intro h
    cases h.2

/-- Focus persists in one concrete combined witness after bodily loss. -/
theorem finite_post_loss_focus :
    foundational.experience.focus
      foundational.experience.loss foundational.experience.parallel := by
  rfl

/-- The same original axioms also have a combined model without post-loss
    focus; therefore continuation is not derived as an ontological theorem. -/
theorem finite_no_post_loss_focus :
    ∃ M : UnifiedTheory,
      ∀ v : M.experience.Vehicle,
        ¬ M.experience.focus M.experience.loss v :=
  post_loss_no_focus_is_consistent

/-- Strict growth of the *body vehicle* information capacity in the
    designated ordinary-to-developed stage transition. -/
theorem strict_local_growth :
    ¬ foundational.experience.capacity .ordinary .body .growth ∧
      foundational.experience.capacity .developed .body .growth := by
  change (¬ cap .ordinary .body .growth) ∧ cap .developed .body .growth
  simp [cap, present]
```

```
/-- Local loss of bodily capacity at dissolution is compatible with an
    earlier local gain. No global inevitability of growth is claimed. -/
theorem local_loss_after_growth :
    foundational.experience.capacity .developed .body .growth ∧
    ¬ foundational.experience.capacity .loss .body .growth := by
  change cap .developed .body .growth ∧ ¬ cap .loss .body .growth
  simp [cap, present]

/-- Historical repertoire is the union of capacities at all prior stages,
    not current possession by any specific vehicle. -/
def historical (t : State) (i : Information) : Prop :=
  ∃ s : State, precedes s t ∧
    ∃ v : Vehicle, foundational.experience.capacity s v i

theorem historical_monotone (a b : State)
    (hab : precedes a b) (i : Information) :
    historical a i → historical b i := by
  intro h
  obtain ⟨s, hs, v, hv⟩ := h
  exact ⟨s, precedes_trans s a b hs hab, v, hv⟩

/-- A new informational possibility genuinely enters the historical
    repertoire during the first stage transition. -/
theorem historical_strict_expansion :
    ¬ historical .ordinary .growth ∧
      historical .developed .growth := by
  constructor
  · intro h
    obtain ⟨s, hs, v, hv⟩ := h
    have sord : s = .ordinary := by
      cases s <;> simp_all [precedes, stageRank]
    subst s
    change cap .ordinary v .growth at hv
    cases v <;> simp [cap, present] at hv
  · exact ⟨.developed, precedes_refl _, .body,
      strict_local_growth.2⟩

end ArchitectureOfExperience.Advanced

/-!
Stage 3: explicit equation-level bridges and an OPTIONAL survival postulate.
The latter is additional to A1-A12 and X1-X7, and does not follow from them.
```

```
All examples share the same finite combined foundation `Advanced.foundational`.
-/
namespace ArchitectureOfExperience.Stage3

open ArchitectureOfExperience
open ArchitectureOfExperience.Advanced
open ArchitectureOfExperience.FiniteExperienceWitness

/-- The possibility repertoire Q(s,v): the exact existing capacity predicate.
    These are information possibilities; they are NOT claims of accessibility. -/
def Q (s : State) (v : Vehicle) (i : Information) : Prop :=
  foundational.experience.capacity s v i

/-- Equation (13): current possibilities are the union across vehicles. -/
def currentRepertoire (s : State) (i : Information) : Prop :=
  ∃ v : Vehicle, Q s v i

/-- Equation (14): the historical repertoire is a cumulative union. -/
def cumulativeRepertoire (t : State) (i : Information) : Prop :=
  ∃ s : State, precedes s t ∧ currentRepertoire s i

/-- The explicitly manuscript-indexed Q-union and the Stage-2 history agree. -/
theorem historical_exact_bridge (t : State) (i : Information) :
    cumulativeRepertoire t i ↔ historical t i := by
  rfl

theorem cumulative_monotone (a b : State) (i : Information)
    (h : precedes a b) :
    cumulativeRepertoire a i → cumulativeRepertoire b i := by
  intro hi
  apply (historical_exact_bridge b i).2
  exact historical_monotone a b h i ((historical_exact_bridge a i).1 hi)

theorem cumulative_strict_growth :
    ¬ cumulativeRepertoire .ordinary .growth ∧
      cumulativeRepertoire .developed .growth := by
  exact historical_strict_expansion

/-- Perspective-indexed focus (Eq. 4): this is a *specific bridge* to the
    unary finite vehicle model, not an identification of the two notions in
    arbitrary theories. Only the designated perspective `false` focuses. -/
def focus (s : State) (x : Bool) (v : Vehicle) : Prop :=
  x = false ∧ foundational.experience.focus s v
```

```
/-- Accessibility implies focus and underlying possibility (Eq. 5). -/
def access (s : State) (x : Bool) (v : Vehicle)
    (i : Information) : Prop :=
  focus s x v ∧ Q s v i

theorem access_requires_focus (s : State) (x : Bool)
    (v : Vehicle) (i : Information) :
    access s x v i → focus s x v ∧ Q s v i := by
  intro h
  exact h

/-- J: identification is a perspective-relative overlay on an effective
    focused body vehicle; it does not constitute a new ontological owner. -/
def identification (s : State) (x : Bool) (v : Vehicle) : Prop :=
  focus s x v ∧ v = .body

theorem identification_requires_focus (s : State) (x : Bool)
    (v : Vehicle) : identification s x v → focus s x v := by
  intro h
  exact h.1

/-- W: self-recognition modeled as effective attention without J (Eq. 12).
    This is a formal interpretation, not an empirical neuroscientific law. -/
def recognition (s : State) (x : Bool) (v : Vehicle) : Prop :=
  focus s x v ∧ ¬ identification s x v

theorem recognition_requires_focus_and_no_identification
    (s : State) (x : Bool) (v : Vehicle) :
    recognition s x v → focus s x v ∧ ¬ identification s x v := by
  intro h
  exact h

/-- Concrete independence: focusing and identification need not coincide. -/
theorem focused_without_identification :
    focus .loss false .parallel ∧
    ¬ identification .loss false .parallel := by
  constructor
  · exact ⟨rfl, finite_post_loss_focus⟩
  · intro h
    cases h.2

/-- Concrete instance of W with no J; no universal necessity of W follows. -/
```

```
theorem recognition_witness : recognition .loss false .parallel := by
  exact focused_without_identification

/-- Distinct memory content is represented by a Boolean record, independent
    of whether that content currently remains accessible. -/
def memoryRecord (s : State) (_x : Bool) (_v : Vehicle) : Bool :=
  if s = .ordinary then true else false

/-- Eq. (19): a genuine memory difference along a three-stage lineage. -/
theorem differing_memory_preserves_lineage :
    oneExperiencer.lineage .ordinary false .developed false ∧
    oneExperiencer.lineage .developed false .loss false ∧
    oneExperiencer.lineage .ordinary false .loss false ∧
    memoryRecord .ordinary false .body ≠
      memoryRecord .loss false .parallel := by
  constructor
  · exact ⟨by simp [precedes, stageRank], rfl⟩
  constructor
  · exact ⟨by simp [precedes, stageRank], rfl⟩
  constructor
  · exact ⟨by simp [precedes, stageRank], rfl⟩
  · decide

/-- Explicit designated bodily loss. This predicate is NOT a physiological
    model; it isolates the logical conditions assumed in Eq. (20). -/
def bodilyLoss (s t : State) (b : Vehicle) : Prop :=
  s = .ordinary ∧ t = .loss ∧ b = .body

/-- An enduring vehicle is still structurally available at the loss stage. -/
def enduring (v : Vehicle) : Prop :=
  v = .parallel

theorem loss_implies_body_absence (s t : State) (b : Vehicle) :
    bodilyLoss s t b →
      foundational.experience.available s b ∧
      ¬ foundational.experience.available t b := by
  intro h
  rcases h with ⟨rfl, rfl, rfl⟩
  change present .ordinary .body ∧ ¬ present .loss .body
  simp [present]

/-- General *postulate*, Eq. (21), kept explicitly separate from theorems
    obtained from A1-A12 and X1-X7. The owner-lineage condition cannot be
```

```
    derived merely from prior focus or survival of a vehicle. -/
structure ContinuationPostulate where
  continuation : ∀ s t x b,
    bodilyLoss s t b → focus s x b →
    ∃ (y : Bool) (v : Vehicle),
      enduring v ∧
      foundational.experience.available s v ∧
      foundational.experience.available t v ∧
      oneExperiencer.lineage s x t y ∧ focus t y v

/-- An inhabited witness demonstrates *relative consistency* of the added
    postulate with the finite joint A1-A12 + X1-X7 foundation. -/
theorem continuationWitness : ContinuationPostulate := by
  refine { continuation := ?_ }
  intro s t x b hLoss hFocus
  rcases hLoss with ⟨rfl, rfl, rfl⟩
  have hx : x = false := hFocus.1
  subst x
  refine ⟨false, .parallel, rfl, ?_, ?_, ?_, ?_⟩
  · change present .ordinary .parallel
    trivial
  · change present .loss .parallel
    trivial
  · exact ⟨by simp [precedes, stageRank], rfl⟩
  · exact ⟨rfl, finite_post_loss_focus⟩
theorem continuation_postulate_has_model : Nonempty ContinuationPostulate :=
  ⟨continuationWitness⟩

/-- Eq. (18) / (21) are consequences of *the additional postulate*, rather
    than consequences of the earlier foundational axiom systems. -/
theorem continuation_given_postulate (M : ContinuationPostulate)
    (s t : State) (x : Bool) (b : Vehicle)
    (hl : bodilyLoss s t b) (hf : focus s x b) :
    ∃ (y : Bool) (v : Vehicle),
      enduring v ∧ foundational.experience.available s v ∧ foundational.experience.available t v ∧
oneExperiencer.lineage s x t y ∧ focus t y v := by
  exact M.continuation s t x b hl hf

end ArchitectureOfExperience.Stage3


/-!
Stage 4 (review response): non-definitional cognitive structures, a memory
```

```
relation in the actual lineage model, and lineage across different perspective
representations. The exact post-loss postulate above now includes availability
at BOTH endpoints; it is NOT derived from the foundational axioms.
-/
namespace ArchitectureOfExperience.Stage4

open ArchitectureOfExperience
open ArchitectureOfExperience.Advanced
open ArchitectureOfExperience.Stage3
open ArchitectureOfExperience.FiniteExperienceWitness

/-- Cognitive distinctions are independently interpreted relations. Only
    explicitly named dependencies are axioms of this supplementary structure.
    In particular, no equivalence between reflection and recognition is assumed. -/
structure CognitiveInterpretation where
  identify : State → Bool → Vehicle → Prop
  reflect : State → Bool → Vehicle → Prop
  recognize : State → Bool → Vehicle → Prop
  identifyFocus : ∀ s x v, identify s x v → Stage3.focus s x v
  recognizeFocus : ∀ s x v, recognize s x v → Stage3.focus s x v
  recognizeNotIdentify : ∀ s x v, recognize s x v → ¬ identify s x v

/-- An interpretation with reflection but no ontological recognition. -/
def reflectiveOnly : CognitiveInterpretation where
  identify := Stage3.identification
  reflect := fun s x v => Stage3.focus s x v ∧ s = .ordinary
  recognize := fun _ _ _ => False
  identifyFocus := by
    intro s x v h
    exact h.1
  recognizeFocus := by
    intro s x v h
    exact False.elim h
  recognizeNotIdentify := by
    intro s x v h
    exact False.elim h

/-- A second interpretation over the SAME physical/vehicle foundation:
    recognition is possible without reflective cognition. -/
def recognizingOnly : CognitiveInterpretation where
  identify := Stage3.identification
  reflect := fun _ _ _ => False
  recognize := fun s x v => Stage3.focus s x v ∧ v = .parallel
```

```
  identifyFocus := by
    intro s x v h
    exact h.1
  recognizeFocus := by
    intro s x v h
    exact h.1
  recognizeNotIdentify := by
    intro s x v h hj
    have hv : v = Vehicle.parallel := h.2
    have hb : v = Vehicle.body := hj.2
    cases hv
    cases hb

/-- Recognition can occur without reflective cognition in a finite model. -/
theorem recognition_without_reflection :
    recognizingOnly.recognize .loss false .parallel ∧
    ¬ recognizingOnly.reflect .loss false .parallel := by
  constructor
  · exact ⟨⟨rfl, finite_post_loss_focus⟩, rfl⟩
  · intro h
    exact h

/-- Reflective cognition can occur without recognition in a finite model. -/
theorem reflection_without_recognition :
    reflectiveOnly.reflect .ordinary false .body ∧
    ¬ reflectiveOnly.recognize .ordinary false .body := by
  constructor
  · exact ⟨⟨rfl, foundational.experience.ordinaryFocus⟩, rfl⟩
  · intro h
    exact h

/-- A memory-bearing interpretation of the ORIGINAL LineageExtension.memory
    field, not an external auxiliary Boolean record. -/
def memoryfulLineage : LineageExtension where
  Perspective := Bool
  Experiencer := Unit
  perspectiveNonempty := ⟨false⟩
  experiencerNonempty := ⟨()⟩
  owner := fun _ => ()
  lineage := identityLineage
  lineageRefl := by
    intro s x
    exact ⟨precedes_refl s, rfl⟩
```

```
  lineageTrans := by
    intro a b c x y z hxy hyz
    exact ⟨precedes_trans a b c hxy.1 hyz.1, hxy.2.trans hyz.2⟩
  lineageOrdered := by
    intro a b x y h
    exact h.1
  lineageOwner := by
    intro a b x y h
    rfl
  memory := fun s x v i =>
    s = .ordinary ∧ x = false ∧ v = .body ∧ i = .base
  memoryBounded := by
    intro s x v i h
    rcases h with ⟨rfl, rfl, rfl, rfl⟩
    change cap .ordinary .body .base
    simp [cap, present]

/-- Real memory content in the shared lineage structure is present before
    bodily loss and absent afterwards, yet the lineage relation persists. -/
theorem lineage_with_changed_memory :
    memoryfulLineage.lineage .ordinary false .developed false ∧
    memoryfulLineage.lineage .developed false .loss false ∧
    memoryfulLineage.lineage .ordinary false .loss false ∧
    memoryfulLineage.memory .ordinary false .body .base ∧
    ¬ memoryfulLineage.memory .loss false .parallel .base := by
  refine ⟨?_, ?_, ?_, ?_, ?_⟩
  · exact ⟨by simp [precedes, stageRank], rfl⟩
  · exact ⟨by simp [precedes, stageRank], rfl⟩
  · exact ⟨by simp [precedes, stageRank], rfl⟩
  · exact ⟨rfl, rfl, rfl, rfl⟩
  · intro h
    cases h.1

/-- A second lineage model in which distinct REPRESENTATIONS (the second
    Bool coordinate) instantiate the same first-coordinate continuity thread.
    This is an additional mathematical interpretation, not empirical identity. -/
def representationLineage : LineageExtension where
  Perspective := Bool × Bool
  Experiencer := Unit
  perspectiveNonempty := ⟨(false, false)⟩
  experiencerNonempty := ⟨()⟩
  owner := fun _ => ()
  lineage := fun s x t y => precedes s t ∧ x.1 = y.1
```

```
  lineageRefl := by
    intro s x
    exact ⟨precedes_refl s, rfl⟩
  lineageTrans := by
    intro a b c x y z hxy hyz
    exact ⟨precedes_trans a b c hxy.1 hyz.1, hxy.2.trans hyz.2⟩
  lineageOrdered := by
    intro a b x y h
    exact h.1
  lineageOwner := by
    intro a b x y h
    rfl
  memory := fun _ _ _ _ => False
  memoryBounded := by
    intro s x v i h
    exact False.elim h

/-- Nontrivial multi-step lineage: the state-specific perspective data
    change while the stipulated persistent-thread key is preserved. -/
theorem changing_representations_preserve_lineage :
    representationLineage.lineage .ordinary (false, false)
      .developed (false, true) ∧
    representationLineage.lineage .developed (false, true)
      .loss (false, false) ∧
    representationLineage.lineage .ordinary (false, false)
      .loss (false, false) ∧
    (false, false) ≠ (false, true) := by
  refine ⟨?_, ?_, ?_, ?_⟩
  · exact ⟨by simp [precedes, stageRank], rfl⟩
  · exact ⟨by simp [precedes, stageRank], rfl⟩
  · exact ⟨by simp [precedes, stageRank], rfl⟩
  · decide

/-- Strict historical novelty is a model FACT, unlike monotonicity of
    cumulative union, which follows by definition. -/
theorem witnessed_novelty_not_only_union :
    ¬ cumulativeRepertoire .ordinary .growth ∧
    cumulativeRepertoire .developed .growth :=
  cumulative_strict_growth

end ArchitectureOfExperience.Stage4

/-!
```

STAGE 5 — Generalized, model-independent conditional results.

This supplements (rather than modifies) the author-checked Stage-4 finite interpretation. All constraints in GeneralContinuity and GeneralEvolution are EXPLICIT assumptions. A theorem obtained from such a structure is a conditional theorem, not an independent ontological discovery.
-/
namespace ArchitectureOfExperience.Stage5

/-- Abstract continuity framework with no commitment to the concrete finite State/Vehicle/Perspective types of Stages 1–4. All domains are nonempty so that the structure cannot be satisfied only by empty-domain vacuity. -/
structure GeneralContinuity where
  State : Type
  Perspective : Type
  Experiencer : Type
  Vehicle : Type
  stateNonempty : Nonempty State
  perspectiveNonempty : Nonempty Perspective
  experiencerNonempty : Nonempty Experiencer
  vehicleNonempty : Nonempty Vehicle
  earlier : State → State → Prop
  earlierRefl : ∀ s, earlier s s
  earlierTrans : ∀ a b c, earlier a b → earlier b c → earlier a c
  owner : Perspective → Experiencer
  available : State → Vehicle → Prop
  focus : State → Perspective → Vehicle → Prop
  loss : State → State → Vehicle → Prop
  lossAvailability : ∀ s t b, loss s t b →
    available s b ∧ ¬ available t b ∧ earlier s t
  enduring : Vehicle → Prop
  lineage : State → Perspective → State → Perspective → Prop
  lineageOwner : ∀ s x t y, lineage s x t y → owner x = owner y
  lineageOrdered : ∀ s x t y, lineage s x t y → earlier s t
  lineageTrans : ∀ s t u x y z,
    lineage s x t y → lineage t y u z → lineage s x u z
  /- An ADDITIONAL POSTULATE: continuity is not derivable from A1–A12. -/
  continuation : ∀ s t b x, loss s t b → focus s x b →
    ∃ y v, enduring v ∧ available s v ∧ available t v ∧
      lineage s x t y ∧ focus t y v

/-- Equation (20) is generalized from a single concrete transition to EVERY transition designated by an arbitrary GeneralContinuity model. -/

```
theorem loss_has_required_conditions (M : GeneralContinuity)
    (s t : M.State) (b : M.Vehicle) (h : M.loss s t b) :
    M.available s b ∧ ¬ M.available t b ∧ M.earlier s t :=
  M.lossAvailability s t b h

/-- Equation (21), parameterized over ANY instance of the abstract structure;
this follows from the *explicit continuation assumption* in that instance. -/
theorem conditional_post_loss_continuation (M : GeneralContinuity)
    (s t : M.State) (b : M.Vehicle) (x : M.Perspective)
    (hl : M.loss s t b) (hf : M.focus s x b) :
    ∃ y v, M.enduring v ∧ M.available s v ∧ M.available t v ∧
      M.lineage s x t y ∧ M.focus t y v :=
  M.continuation s t b x hl hf

/-- Equation (17) holds for all lineage pairs because it is an expressly
stipulated owner-preservation constraint. -/
theorem conditional_lineage_owner (M : GeneralContinuity)
    (s t : M.State) (x y : M.Perspective)
    (h : M.lineage s x t y) : M.owner x = M.owner y :=
  M.lineageOwner s x t y h

/-- Equation (22): compositionality does not depend on identifying x with z.
It is conditional on the separate lineage-transitivity assumption. -/
theorem conditional_multistage_lineage (M : GeneralContinuity)
    (s t u : M.State) (x y z : M.Perspective)
    (h₁ : M.lineage s x t y) (h₂ : M.lineage t y u z) :
    M.lineage s x u z ∧ M.owner x = M.owner z := by
  constructor
  · exact M.lineageTrans s t u x y z h₁ h₂
  · exact (M.lineageOwner s x t y h₁).trans
      (M.lineageOwner t y u z h₂)

/-- Abstract repertoire framework: `possible` denotes Q_s(v,i), separated
from `capacity` K_s(v,i), which need not be extensionally equal. -/
structure GeneralEvolution where
  State : Type
  Vehicle : Type
  Information : Type
  stateNonempty : Nonempty State
  vehicleNonempty : Nonempty Vehicle
  informationNonempty : Nonempty Information
  earlier : State → State → Prop
  earlierRefl : ∀ s, earlier s s
```

```
  earlierTrans : ∀ a b c, earlier a b → earlier b c → earlier a c
  available : State → Vehicle → Prop
  possible : State → Vehicle → Information → Prop
  capacity : State → Vehicle → Information → Prop
  develops : State → State → Prop
  /- Independent optional developmental bridge; not a natural law. -/
  capacityBridge : ∀ s t v i,
    develops s t → available s v → available t v →
      capacity s v i → capacity t v i

/-- Equation (13), with explicit Q predicate: present possibility-types. -/
def currentRepertoire (M : GeneralEvolution)
    (s : M.State) (i : M.Information) : Prop :=
  ∃ v, M.available s v ∧ M.possible s v i

/-- Equation (14): possibility-types present in at least one earlier state. -/
def historicalRepertoire (M : GeneralEvolution)
    (s : M.State) (i : M.Information) : Prop :=
  ∃ u, M.earlier u s ∧ currentRepertoire M u i

/-- Monotonicity of historical union follows from the order relation and
its DEFINITION, not from a separate empirical theory of evolution. -/
theorem history_monotone (M : GeneralEvolution)
    (s t : M.State) (h : M.earlier s t) (i : M.Information) :
    historicalRepertoire M s i → historicalRepertoire M t i := by
  intro hi
  rcases hi with ⟨u, hus, hcurrent⟩
  exact ⟨u, M.earlierTrans u s t hus h, hcurrent⟩

/-- Current possibilities enter historical repertoire by reflexivity. -/
theorem current_in_history (M : GeneralEvolution)
    (s : M.State) (i : M.Information)
    (h : currentRepertoire M s i) : historicalRepertoire M s i :=
  ⟨s, M.earlierRefl s, h⟩

/-- A separately stipulated NOVELTY WITNESS yields strict historical
extension, not merely monotonic inclusion. -/
theorem historical_strict_when_new (M : GeneralEvolution)
    (s t : M.State) (i : M.Information)
    (hnew : ¬ historicalRepertoire M s i)
    (hpresent : currentRepertoire M t i) :
    ¬ historicalRepertoire M s i ∧ historicalRepertoire M t i :=
  ⟨hnew, current_in_history M t i hpresent⟩
```

```
/-- Conditional capacity preservation is a direct consequence of the
independently assumed developmental bridge. -/
theorem capacity_inclusion_given_bridge (M : GeneralEvolution)
    (s t : M.State) (v : M.Vehicle)
    (hdev : M.develops s t) (hvs : M.available s v)
    (hvt : M.available t v) (i : M.Information)
    (hi : M.capacity s v i) : M.capacity t v i :=
  M.capacityBridge s t v i hdev hvs hvt hi

/- A well-scoped relative model: instantiate the GENERAL continuity
structure on the already checked Stage-3 finite interpretation. -/
open ArchitectureOfExperience.Stage3
open ArchitectureOfExperience.Advanced
open ArchitectureOfExperience.FiniteExperienceWitness

def finiteGeneralContinuity : GeneralContinuity where
  State := State
  Perspective := Bool
  Experiencer := Unit
  Vehicle := Vehicle
  stateNonempty := ⟨State.ordinary⟩
  perspectiveNonempty := ⟨false⟩
  experiencerNonempty := ⟨()⟩
  vehicleNonempty := ⟨Vehicle.body⟩
  earlier := precedes
  earlierRefl := precedes_refl
  earlierTrans := precedes_trans
  owner := fun _ => ()
  available := foundational.experience.available
  focus := Stage3.focus
  loss := bodilyLoss
  lossAvailability := by
    intro s t b hl
    rcases hl with ⟨rfl, rfl, rfl⟩
    constructor
    · change present State.ordinary Vehicle.body
      trivial
    constructor
    · change ¬ present State.loss Vehicle.body
      simp [present]
    · exact (by simp [precedes, stageRank])
  enduring := enduring
```

```
  lineage := oneExperiencer.lineage
  lineageOwner := by
    intro s x t y h
    rfl
  lineageOrdered := by
    intro s x t y h
    exact h.1
  lineageTrans := by
    intro s t u x y z h₁ h₂
    exact ⟨precedes_trans s t u h₁.1 h₂.1, h₁.2.trans h₂.2⟩
  continuation := fun s t b x hl hf =>
    continuationWitness.continuation s t x b hl hf

theorem general_continuity_is_inhabited : Nonempty GeneralContinuity :=
  ⟨finiteGeneralContinuity⟩

end ArchitectureOfExperience.Stage5

/-!
Stage 6: ontological invariance and perspectival-focus clarification.

The two universal conditions below are NEW EXPLICIT ONTOLOGICAL PREMISES.
They are consistent with the previously checked finite core but are not
theorems derivable from A1–A12/X1–X7 alone. Unlike ContinuationPostulate,
neither assumes the continuation of a particular individuated perspective.
-/
namespace ArchitectureOfExperience.Stage6

open ArchitectureOfManifestation
open ArchitectureOfExperience

/-- U1 and U2: every manifest object is immanent to the same designated
consciousness, which is manifested in every admissible model-world. -/
structure InvariantFoundation (T : CoreTheory) where
  allManifestImmanent : ∀ m : T.Manifest, T.immanent m T.consciousness
  consciousnessEveryWorld : ∀ w : T.World,
    T.manifestedAt w T.consciousness

theorem all_manifest_is_immanent (T : CoreTheory)
    (U : InvariantFoundation T) (m : T.Manifest) :
    T.immanent m T.consciousness :=
  U.allManifestImmanent m
```

```
theorem consciousness_is_world_invariant (T : CoreTheory)
    (U : InvariantFoundation T) (w₁ w₂ : T.World) :
    T.manifestedAt w₁ T.consciousness ∧
    T.manifestedAt w₂ T.consciousness :=
  ⟨U.consciousnessEveryWorld w₁, U.consciousnessEveryWorld w₂⟩

/-- Nonvacuous compatibility with the exact existing finite foundation. -/
def finiteInvariantFoundation : InvariantFoundation FiniteWitness.model where
  allManifestImmanent := by
    intro m
    rfl
  consciousnessEveryWorld := by
    intro w
    cases w <;> trivial

/-- Bridges the former `World` sort to the experiential `State` sort.
The correspondence constrains bodily availability, not consciousness. -/
structure StateWorldCoupling (M : UnifiedTheory) where
  worldAt : M.experience.State → M.core.World
  bodyAvailabilityBridge : ∀ s,
    (M.core.manifestedAt (worldAt s) M.core.body ↔
      M.experience.available s M.experience.bodyVehicle)

structure InvariantUnifiedTheory where
  base : UnifiedTheory
  invariant : InvariantFoundation base.core
  coupling : StateWorldCoupling base

theorem consciousness_after_designated_bodily_loss
    (M : InvariantUnifiedTheory) :
    M.base.core.manifestedAt
      (M.coupling.worldAt M.base.experience.loss) M.base.core.consciousness ∧
    ¬ M.base.core.manifestedAt
      (M.coupling.worldAt M.base.experience.loss) M.base.core.body := by
  constructor
  · exact M.invariant.consciousnessEveryWorld _
  · intro hbody
    have havail :=
      (M.coupling.bodyAvailabilityBridge M.base.experience.loss).mp hbody
    exact M.base.experience.bodyAbsentAfterLoss havail

def finiteWorldAt : FiniteExperienceWitness.State → FiniteWitness.World
  | .ordinary => .human
```

```
  | .developed => .human
  | .loss => .nonbodily

def finiteStateWorldCoupling (continued : Bool) :
    StateWorldCoupling (combinedWitness continued) where
  worldAt := finiteWorldAt
  bodyAvailabilityBridge := by
    intro s
    change FiniteWitness.manifestedAt (finiteWorldAt s) FiniteWitness.Manifest.body ↔
      FiniteExperienceWitness.present s FiniteExperienceWitness.Vehicle.body
    cases s <;> simp [finiteWorldAt, FiniteWitness.manifestedAt,
      FiniteExperienceWitness.present]

def finiteInvariantUnifiedTheory (continued : Bool) :
    InvariantUnifiedTheory where
  base := combinedWitness continued
  invariant := finiteInvariantFoundation
  coupling := finiteStateWorldCoupling continued

theorem invariant_extension_has_both_focus_models :
    Nonempty InvariantUnifiedTheory :=
  ⟨finiteInvariantUnifiedTheory false⟩

/-- The focus below is explicitly perspective-indexed, unlike X3 focus.
Its bridge to organizational focus is a premise, not a factorization theorem
for arbitrary perspective representations. -/
structure PerspectiveFocusTheory where
  foundation : InvariantUnifiedTheory
  Perspective : Type
  Experiencer : Type
  perspectiveNonempty : Nonempty Perspective
  experiencerNonempty : Nonempty Experiencer
  owner : Perspective → Experiencer
  focus : foundation.base.experience.State → Perspective →
    foundation.base.experience.Vehicle → Prop
  focusImpliesVehicleFocus : ∀ s x v, focus s x v →
    foundation.base.experience.focus s v

def finitePerspectiveFocusTheory (continued : Bool) :
    PerspectiveFocusTheory where
  foundation := finiteInvariantUnifiedTheory continued
  Perspective := Bool
  Experiencer := Unit
```

```
  perspectiveNonempty := ⟨false⟩
  experiencerNonempty := ⟨()⟩
  owner := fun _ => ()
  focus := fun s x v =>
    x = false ∧ (combinedWitness continued).experience.focus s v
  focusImpliesVehicleFocus := by
    intro s x v h
    exact h.2

/-- True semantic independence of effective focus for an indexed
perspective, now exhibited over the stronger invariant foundation. -/
theorem perspective_post_loss_focus_independent :
    (∃ M : PerspectiveFocusTheory,
      ∃ (x : M.Perspective) (v : M.foundation.base.experience.Vehicle),
        M.focus M.foundation.base.experience.loss x v) ∧
    (∃ M : PerspectiveFocusTheory,
      ∀ (x : M.Perspective) (v : M.foundation.base.experience.Vehicle),
        ¬ M.focus M.foundation.base.experience.loss x v) := by
  constructor
  · refine ⟨finitePerspectiveFocusTheory true,
      false, FiniteExperienceWitness.Vehicle.parallel, ?_⟩
    exact ⟨rfl, rfl⟩
  · refine ⟨finitePerspectiveFocusTheory false, ?_⟩
    intro x v h
    have hv := h.2
    cases v <;> trivial

/-- The same particular perspective focuses on the body beforehand in both
witnesses. Its later effective focus remains independent of the stated base
and the newly added universal-invariance premises. -/
theorem perspective_persistence_independent :
    (∃ M : PerspectiveFocusTheory,
      ∃ (x : M.Perspective) (v : M.foundation.base.experience.Vehicle),
        M.focus M.foundation.base.experience.ordinary x
          M.foundation.base.experience.bodyVehicle ∧
        M.focus M.foundation.base.experience.loss x v) ∧
    (∃ M : PerspectiveFocusTheory,
      ∃ x : M.Perspective,
        M.focus M.foundation.base.experience.ordinary x
          M.foundation.base.experience.bodyVehicle ∧
        ∀ v : M.foundation.base.experience.Vehicle,
          ¬ M.focus M.foundation.base.experience.loss x v) := by
  constructor
```

```
· refine ⟨finitePerspectiveFocusTheory true,
    false, FiniteExperienceWitness.Vehicle.parallel, ?_⟩
  exact ⟨⟨rfl, trivial⟩, ⟨rfl, rfl⟩⟩
· refine ⟨finitePerspectiveFocusTheory false, false, ?_⟩
  constructor
  · exact ⟨rfl, trivial⟩
  · intro v h
    have hv := h.2
    cases v <;> trivial

/-! One joint, nonvacuous compatibility witness connects the concepts that
had previously been illustrated in separate finite examples. Distinct
representations share an owner index, a declared lineage, and a changing
vehicle-focus and memory configuration. No empirical identity claim follows. -/

abbrev RepresentationPerspective := Bool × Bool

def representationBefore : RepresentationPerspective := (false, false)
def representationAfter : RepresentationPerspective := (false, true)
def representationOwner (x : RepresentationPerspective) : Bool := x.1

def representationFocus (s : FiniteExperienceWitness.State)
    (x : RepresentationPerspective) (v : FiniteExperienceWitness.Vehicle) : Prop :=
  (s = .ordinary ∧ x = representationBefore ∧ v = .body) ∨
  (s = .loss ∧ x = representationAfter ∧ v = .parallel)

def representationLineage (s : FiniteExperienceWitness.State)
    (x : RepresentationPerspective) (t : FiniteExperienceWitness.State)
    (y : RepresentationPerspective) : Prop :=
  (s = t ∧ x = y) ∨
  (s = .ordinary ∧ t = .loss ∧
    x = representationBefore ∧ y = representationAfter)

def representationMemory (s : FiniteExperienceWitness.State)
    (x : RepresentationPerspective) (v : FiniteExperienceWitness.Vehicle)
    (i : FiniteExperienceWitness.Information) : Prop :=
  s = .ordinary ∧ x = representationBefore ∧ v = .body ∧ i = .base

theorem representation_lineage_reflexive (s x) :
    representationLineage s x s x :=
  Or.inl ⟨rfl, rfl⟩

theorem representation_lineage_transitive (a b c x y z)
```

```
    (h₁ : representationLineage a x b y)
    (h₂ : representationLineage b y c z) :
    representationLineage a x c z := by
  rcases h₁ with h₁ | h₁
  · rcases h₁ with ⟨rfl, rfl⟩
    exact h₂
  · rcases h₂ with h₂ | h₂
    · rcases h₂ with ⟨rfl, rfl⟩
      exact Or.inr h₁
    · rcases h₁ with ⟨rfl, rfl, rfl, rfl⟩
      rcases h₂ with ⟨hstate, _, _, _⟩
      cases hstate

theorem representation_focus_respects_vehicle (s x v)
    (h : representationFocus s x v) :
    (combinedWitness true).experience.focus s v := by
  rcases h with h | h
  · rcases h with ⟨rfl, rfl, rfl⟩
    trivial
  · rcases h with ⟨rfl, rfl, rfl⟩
    rfl

theorem representation_lineage_preserves_owner (s x t y)
    (h : representationLineage s x t y) :
    representationOwner x = representationOwner y := by
  rcases h with h | h
  · exact congrArg representationOwner h.2
  · rcases h with ⟨rfl, rfl, rfl, rfl⟩
    rfl

theorem representation_memory_is_bounded (s x v i)
    (h : representationMemory s x v i) :
    (combinedWitness true).experience.capacity s v i := by
  rcases h with ⟨rfl, rfl, rfl, rfl⟩
  change FiniteExperienceWitness.cap .ordinary .body .base
  simp [FiniteExperienceWitness.cap, FiniteExperienceWitness.present]

def representationPerspectiveTheory : PerspectiveFocusTheory where
  foundation := finiteInvariantUnifiedTheory true
  Perspective := RepresentationPerspective
  Experiencer := Bool
  perspectiveNonempty := ⟨representationBefore⟩
  experiencerNonempty := ⟨false⟩
```

```
  owner := representationOwner
  focus := representationFocus
  focusImpliesVehicleFocus := by
    intro s x v h
    exact representation_focus_respects_vehicle s x v h

theorem integrated_vehicle_perspective_memory_witness :
    representationBefore ≠ representationAfter ∧
    representationOwner representationBefore =
      representationOwner representationAfter ∧
    representationLineage .ordinary representationBefore
      .loss representationAfter ∧
    representationFocus .ordinary representationBefore .body ∧
    representationFocus .loss representationAfter .parallel ∧
    representationMemory .ordinary representationBefore .body .base ∧
    ¬ representationMemory .loss representationAfter .parallel .base ∧
    (combinedWitness true).experience.available .ordinary .body ∧
    (combinedWitness true).experience.available .loss .parallel := by
  simp [representationBefore, representationAfter, representationOwner,
    representationLineage, representationFocus, representationMemory,
    combinedWitness, FiniteExperienceWitness.model,
    FiniteExperienceWitness.present]

end ArchitectureOfExperience.Stage6

/-!
Stage 7: interpretation and nonvacuity, explicitly dependent on Paper 1.

Paper 1, Definition D5 and Axiom A7, makes ontological immanence to the
distinguished manifested consciousness common to differentiated structures.
Its D32, Equations (123)–(128), permits consciousness without a designated
human individual or body. It does not establish personal survival.

The additions below retain all 1,827 lines of the Stage-6 proof unchanged.
They do not turn the owner index into an independent conscious substance.
-/
namespace ArchitectureOfExperience.Stage7

open ArchitectureOfManifestation
open ArchitectureOfExperience
open ArchitectureOfExperience.Stage5
open ArchitectureOfExperience.Stage6
```

```
/-- Paper 1 admits worlds without a particular individual, even while its
fundamental manifested consciousness remains represented there. -/
theorem designated_individual_is_not_world_necessary (T : CoreTheory) :
    ¬ (∀ w : T.World, T.manifestedAt w T.individual) := by
  intro hall
  obtain ⟨w, _, hAbsent⟩ := T.consciousnessWithoutIndividual
  exact hAbsent (hall w)

theorem designated_body_is_not_world_necessary (T : CoreTheory) :
    ¬ (∀ w : T.World, T.manifestedAt w T.body) := by
  intro hall
  obtain ⟨w, _, hAbsent⟩ := T.consciousnessWithoutBody
  exact hAbsent (hall w)

/-- U2 is the explicitly imported modal interpretation of the fixed
consciousness architecture of Paper 1. Human individuation and the particular
body are nonetheless not necessary in every admissible model-world. -/
theorem paper1_modal_asymmetry (T : CoreTheory)
    (U : InvariantFoundation T) :
    (∀ w : T.World, T.manifestedAt w T.consciousness) ∧
    ¬ (∀ w : T.World, T.manifestedAt w T.individual) ∧
    ¬ (∀ w : T.World, T.manifestedAt w T.body) := by
  exact ⟨U.consciousnessEveryWorld,
    designated_individual_is_not_world_necessary T,
    designated_body_is_not_world_necessary T⟩

/-- Nonidentical manifest configurations remain within one manifest field.
Paper 1 does not require immanence to vary arbitrarily between manifest
objects: differentiability, not ontological separation, supplies plurality. -/
theorem distinct_immanent_forms_share_one_ground :
    ∃ x y : FiniteWitness.Manifest,
      x ≠ y ∧
      FiniteWitness.model.immanent x FiniteWitness.model.consciousness ∧
      FiniteWitness.model.immanent y FiniteWitness.model.consciousness ∧
      ¬ FiniteWitness.model.ontSeparate x y := by
  refine ⟨.body, .experiencedWorld, ?_, ?_, ?_, ?_⟩
  · decide
  · rfl
  · rfl
  · simp [FiniteWitness.model, FiniteWitness.ontSeparate]

/-- Semantic strengthening of the owner map: every represented owner index
has at least one actually focused perspectival realization. This is a
```

```
well-formedness condition for Paper 2's P-domain, not a claim that members
of P are additional substances or must persist through every state. -/
structure ExemplifiedOwnerTheory where
  perspectiveModel : PerspectiveFocusTheory
  ownerHasFocusedInstance : ∀ p : perspectiveModel.Experiencer,
    ∃ (s : perspectiveModel.foundation.base.experience.State)
      (x : perspectiveModel.Perspective)
      (v : perspectiveModel.foundation.base.experience.Vehicle),
      perspectiveModel.owner x = p ∧ perspectiveModel.focus s x v

/-- One represented experiencer can own distinct perspective
representations before and after the loss of the designated body. -/
def sharedGroundOwnerPerspective : PerspectiveFocusTheory where
  foundation := finiteInvariantUnifiedTheory true
  Perspective := RepresentationPerspective
  Experiencer := Unit
  perspectiveNonempty := ⟨representationBefore⟩
  experiencerNonempty := ⟨()⟩
  owner := fun _ => ()
  focus := representationFocus
  focusImpliesVehicleFocus := by
    intro s x v h
    exact representation_focus_respects_vehicle s x v h

def exemplifiedSharedGroundOwner : ExemplifiedOwnerTheory where
  perspectiveModel := sharedGroundOwnerPerspective
  ownerHasFocusedInstance := by
    intro p
    cases p
    refine ⟨.ordinary, representationBefore, .body, rfl, ?_⟩
    exact Or.inl ⟨rfl, rfl, rfl⟩

theorem owner_is_exemplified_by_actual_focus :
    ∀ p : exemplifiedSharedGroundOwner.perspectiveModel.Experiencer,
      ∃ s x v,
        exemplifiedSharedGroundOwner.perspectiveModel.owner x = p ∧
        exemplifiedSharedGroundOwner.perspectiveModel.focus s x v :=
  exemplifiedSharedGroundOwner.ownerHasFocusedInstance

/-! An abstract continuity postulate can otherwise be vacuously satisfied
when no designated loss-and-focus event occurs, even with nonempty TYPES.
Here we explicitly require a realized antecedent and exhibit a model. -/
structure NonvacuousGeneralContinuity where
```

```
  base : GeneralContinuity
  realizedLossAndFocus :
    ∃ (s t : base.State) (b : base.Vehicle) (x : base.Perspective),
      base.loss s t b ∧ base.focus s x b

theorem realized_loss_has_actual_continuation
    (N : NonvacuousGeneralContinuity) :
    ∃ (s t : N.base.State) (b : N.base.Vehicle)
      (x y : N.base.Perspective) (v : N.base.Vehicle),
      N.base.loss s t b ∧ N.base.focus s x b ∧
      N.base.enduring v ∧ N.base.available s v ∧
      N.base.available t v ∧ N.base.lineage s x t y ∧
      N.base.focus t y v := by
  obtain ⟨s, t, b, x, hl, hf⟩ := N.realizedLossAndFocus
  obtain ⟨y, v, hd, hs, ht, hlin, hfuture⟩ :=
    N.base.continuation s t b x hl hf
  exact ⟨s, t, b, x, y, v, hl, hf, hd, hs, ht, hlin, hfuture⟩

/-! A small but genuinely active model makes the antecedent and consequent
of the abstract continuation theorem true in one concrete interpretation. -/
def finiteEarlier (s t : Bool) : Prop := s = false ∨ t = true
def finiteAvailable (s v : Bool) : Prop := v = true ∨ s = false
def finiteFocus (s x v : Bool) : Prop :=
  x = false ∧ ((s = false ∧ v = false) ∨ (s = true ∧ v = true))
def finiteLoss (s t b : Bool) : Prop :=
  s = false ∧ t = true ∧ b = false
def finiteLineage (s x t y : Bool) : Prop :=
  x = y ∧ finiteEarlier s t

def finiteNonvacuousContinuityBase : GeneralContinuity where
  State := Bool
  Perspective := Bool
  Experiencer := Unit
  Vehicle := Bool
  stateNonempty := ⟨false⟩
  perspectiveNonempty := ⟨false⟩
  experiencerNonempty := ⟨()⟩
  vehicleNonempty := ⟨false⟩
  earlier := finiteEarlier
  earlierRefl := by
    intro s
    cases s <;> simp [finiteEarlier]
  earlierTrans := by
```

```
  intro a b c hab hbc
  cases a <;> cases b <;> cases c <;> simp_all [finiteEarlier]
 owner := fun _ => ()
 available := finiteAvailable
 focus := finiteFocus
 loss := finiteLoss
 lossAvailability := by
  intro s t b h
  rcases h with ⟨rfl, rfl, rfl⟩
  simp [finiteAvailable, finiteEarlier]
 enduring := fun v => v = true
 lineage := finiteLineage
 lineageOwner := by
  intro s x t y _h
  rfl
 lineageOrdered := by
  intro s x t y h
  exact h.2
 lineageTrans := by
  intro s t u x y z h₁ h₂
  rcases h₁ with ⟨hxy, hst⟩
  rcases h₂ with ⟨hyz, htu⟩
  constructor
  · exact hxy.trans hyz
  · rcases hst with hs | ht
    · exact Or.inl hs
    · rcases htu with htfalse | hu
      · exfalso
        simp_all
      · exact Or.inr hu
 continuation := by
  intro s t b x hl hf
  rcases hl with ⟨rfl, rfl, rfl⟩
  have hx : x = false := hf.1
  subst x
  refine ⟨false, true, rfl, ?_, ?_, ?_, ?_⟩
  · simp [finiteAvailable]
  · simp [finiteAvailable]
  · simp [finiteLineage, finiteEarlier]
  · simp [finiteFocus]

def finiteNonvacuousGeneralContinuity : NonvacuousGeneralContinuity where
 base := finiteNonvacuousContinuityBase
```

```
 realizedLossAndFocus := by
   refine ⟨false, true, false, false, ?_, ?_⟩
   · change finiteLoss false true false
     simp [finiteLoss]
   · change finiteFocus false false false
     simp [finiteFocus]

theorem nonvacuous_general_continuity_is_satisfiable :
    Nonempty NonvacuousGeneralContinuity :=
 ⟨finiteNonvacuousGeneralContinuity⟩

theorem finite_nonvacuous_continuation_really_occurs :
    ∃ (s t : Bool) (b x y v : Bool),
      finiteLoss s t b ∧ finiteFocus s x b ∧
      v = true ∧ finiteAvailable s v ∧ finiteAvailable t v ∧
      finiteLineage s x t y ∧ finiteFocus t y v := by
  exact ⟨false, true, false, false, false, true,
    by simp [finiteLoss], by simp [finiteFocus], rfl,
    by simp [finiteAvailable], by simp [finiteAvailable],
    by simp [finiteLineage, finiteEarlier], by simp [finiteFocus]⟩

end ArchitectureOfExperience.Stage7

/-!
Stage 8: joint Paper-1-grounded continuity and realized-event ownership.

No change is made to the published Paper-1 finite core or to Stages 1--7.
The identity domain is represented as equivalence classes of ACTUAL focused
events within the same manifest foundation, not as a new consciousness sort.
The equivalence criterion and the continuation rule remain explicitly
stipulated semantic commitments. Their joint satisfiability, together with
modal U1/U2, body loss, alternate focus, and altered memory, is checked below.
-/
namespace ArchitectureOfExperience.Stage8

open ArchitectureOfManifestation
open ArchitectureOfExperience
open ArchitectureOfExperience.Stage6
open ArchitectureOfExperience.Stage7
open ArchitectureOfExperience.Stage3
open ArchitectureOfExperience.Advanced
open ArchitectureOfExperience.FiniteExperienceWitness
```

```
/-- A represented experiential event is ACTUALLY focused through a vehicle.
Its vehicle is mapped into the original Paper-1 manifest sort. -/
structure FocusedEvent (M : PerspectiveFocusTheory) where
  state : M.foundation.base.experience.State
  perspective : M.Perspective
  vehicle : M.foundation.base.experience.Vehicle
  focused : M.focus state perspective vehicle

/-- Event reality is relational: actual organizational focus and an immanent
manifest vehicle. Nothing here postulates a second consciousness substance. -/
theorem focused_event_is_paper1_manifest (M : PerspectiveFocusTheory)
    (e : FocusedEvent M) :
    M.foundation.base.experience.available e.state e.vehicle ∧
    M.foundation.base.core.immanent
      (M.foundation.base.experience.meaning e.vehicle)
      M.foundation.base.core.consciousness := by
  constructor
  · exact M.foundation.base.experience.focusAvailable e.state e.vehicle
      (M.focusImpliesVehicleFocus e.state e.perspective e.vehicle e.focused)
  · exact M.foundation.base.experience.meaningImmanent e.vehicle

/-- The original owner map induces a precise sameness relation ON realized
focused events. This is a REPRESENTED identity criterion; its ontological
applicability is an explicit semantic assumption, not proved by Lean. -/
def sameRepresentedOwner (M : PerspectiveFocusTheory)
    (e f : FocusedEvent M) : Prop :=
  M.owner e.perspective = M.owner f.perspective

def realizedOwnerSetoid (M : PerspectiveFocusTheory) : Setoid (FocusedEvent M) where
  r := sameRepresentedOwner M
  iseqv := by
    constructor
    · intro e
      rfl
    · intro e f hef
      exact hef.symm
    · intro e f g hef hfg
      exact hef.trans hfg

/-- Ontological-owner ROLES can equivalently be represented as classes of
actually focused events. This quotient does not identify all experiences. -/
abbrev RealizedOwnerClass (M : PerspectiveFocusTheory) :=
  Quotient (realizedOwnerSetoid M)
```

```
def eventOwnerClass (M : PerspectiveFocusTheory) (e : FocusedEvent M) :
    RealizedOwnerClass M := Quotient.mk (realizedOwnerSetoid M) e

theorem events_share_class_iff_owner (M : PerspectiveFocusTheory)
    (e f : FocusedEvent M) :
    eventOwnerClass M e = eventOwnerClass M f ↔
      M.owner e.perspective = M.owner f.perspective := by
  constructor
  · intro h
    exact Quotient.exact h
  · intro h
    exact Quotient.sound h

/-- ONE dependent structure over the inherited unified Paper-1 core, U1/U2,
its World/State coupling, and the SAME perspective/vehicle/state domains.
Continuation is visibly an auxiliary field, not a theorem from C alone. -/
structure Paper1JointIdentityContinuity where
  perspectives : PerspectiveFocusTheory
  ownerHasEvent : ∀ p : perspectives.Experiencer,
    ∃ (s : perspectives.foundation.base.experience.State)
      (x : perspectives.Perspective)
      (v : perspectives.foundation.base.experience.Vehicle),
      perspectives.owner x = p ∧ perspectives.focus s x v
  earlier : perspectives.foundation.base.experience.State →
    perspectives.foundation.base.experience.State → Prop
  earlierRefl : ∀ s, earlier s s
  earlierTrans : ∀ a b c, earlier a b → earlier b c → earlier a c
  loss : perspectives.foundation.base.experience.State →
    perspectives.foundation.base.experience.State →
    perspectives.foundation.base.experience.Vehicle → Prop
  lossConditions : ∀ s t b, loss s t b →
    perspectives.foundation.base.experience.available s b ∧
      ¬ perspectives.foundation.base.experience.available t b ∧ earlier s t
  enduring : perspectives.foundation.base.experience.Vehicle → Prop
  lineage : perspectives.foundation.base.experience.State →
    perspectives.Perspective → perspectives.foundation.base.experience.State →
    perspectives.Perspective → Prop
  lineageOwner : ∀ s x t y, lineage s x t y →
    perspectives.owner x = perspectives.owner y
  lineageOrdered : ∀ s x t y, lineage s x t y → earlier s t
  lineageTrans : ∀ s t u x y z,
    lineage s x t y → lineage t y u z → lineage s x u z
```

```
  memory : perspectives.foundation.base.experience.State →
    perspectives.Perspective → perspectives.foundation.base.experience.Vehicle →
    perspectives.foundation.base.experience.Information → Prop
  memoryCapacity : ∀ s x v i, memory s x v i →
    perspectives.foundation.base.experience.capacity s v i
  /- Additional continuation postulate, never derived from U2 or π. -/
  auxiliaryContinuation : ∀ s t b x, loss s t b →
    perspectives.focus s x b →
    ∃ y v, enduring v ∧ perspectives.foundation.base.experience.available s v ∧
      perspectives.foundation.base.experience.available t v ∧
      lineage s x t y ∧ perspectives.focus t y v
  /- Both antecedent and an altered-memory lineage occur in ONE model. -/
  actualLossAndFocus :
    ∃ s t b x, loss s t b ∧ perspectives.focus s x b
  changedMemoryOnLineage :
    ∃ s t b x y v i, loss s t b ∧ perspectives.focus s x b ∧
      perspectives.focus t y v ∧ lineage s x t y ∧
      memory s x b i ∧ ¬ memory t y v i

/-- Every owner index denotes an ACTUAL, immanent focused-event class.
There are no unused P-tokens in this strengthened single-framework model. -/
theorem joint_owner_has_manifest_event (J : Paper1JointIdentityContinuity)
    (p : J.perspectives.Experiencer) :
    ∃ e : FocusedEvent J.perspectives,
      J.perspectives.owner e.perspective = p ∧
      J.perspectives.foundation.base.core.immanent
        (J.perspectives.foundation.base.experience.meaning e.vehicle)
        J.perspectives.foundation.base.core.consciousness := by
  obtain ⟨s, x, v, howner, hf⟩ := J.ownerHasEvent p
  refine ⟨⟨s, x, v, hf⟩, howner, ?_⟩
  exact (focused_event_is_paper1_manifest J.perspectives ⟨s, x, v, hf⟩).2

/-- A realized representative for EVERY owner code. Its existence is not
obtained from arbitrary token nonemptiness, but from ownerHasEvent. -/
noncomputable def eventRepresentative (J : Paper1JointIdentityContinuity)
    (p : J.perspectives.Experiencer) :
    {e : FocusedEvent J.perspectives //
      J.perspectives.owner e.perspective = p} := by
  classical
  let s := Classical.choose (J.ownerHasEvent p)
  let hs := Classical.choose_spec (J.ownerHasEvent p)
  let x := Classical.choose hs
  let hx := Classical.choose_spec hs
```

```
  let v := Classical.choose hx
  let hv := Classical.choose_spec hx
  exact ⟨⟨s, x, v, hv.2⟩, hv.1⟩

def classOwnerIndex (J : Paper1JointIdentityContinuity) :
    RealizedOwnerClass J.perspectives → J.perspectives.Experiencer :=
  Quotient.lift (fun e => J.perspectives.owner e.perspective)
    (by intro a b h; exact h)

noncomputable def ownerIndexClass (J : Paper1JointIdentityContinuity)
    (p : J.perspectives.Experiencer) : RealizedOwnerClass J.perspectives :=
  eventOwnerClass J.perspectives (eventRepresentative J p).val

theorem owner_index_class_left_inverse (J : Paper1JointIdentityContinuity)
    (p : J.perspectives.Experiencer) :
    classOwnerIndex J (ownerIndexClass J p) = p := by
  exact (eventRepresentative J p).property

theorem owner_index_class_right_inverse (J : Paper1JointIdentityContinuity)
    (q : RealizedOwnerClass J.perspectives) :
    ownerIndexClass J (classOwnerIndex J q) = q := by
  induction q using Quotient.inductionOn with
  | _ e =>
    apply Quotient.sound
    exact (eventRepresentative J (J.perspectives.owner e.perspective)).property

/-- One realized loss/focus event has a continuation if and ONLY IF the
separately stipulated auxiliaryContinuation is included. No automatic
individual-survival inference is introduced into Paper 1. -/
theorem joint_realized_continuation_conditional
    (J : Paper1JointIdentityContinuity) :
    ∃ s t b x y v,
      J.loss s t b ∧ J.perspectives.focus s x b ∧ J.enduring v ∧
      J.perspectives.foundation.base.experience.available s v ∧
      J.perspectives.foundation.base.experience.available t v ∧
      J.lineage s x t y ∧ J.perspectives.focus t y v := by
  obtain ⟨s, t, b, x, hl, hf⟩ := J.actualLossAndFocus
  obtain ⟨y, v, hd, hs, ht, hlin, hfuture⟩ :=
    J.auxiliaryContinuation s t b x hl hf
  exact ⟨s, t, b, x, y, v, hl, hf, hd, hs, ht, hlin, hfuture⟩

/-- THE joint witness: all former separate structures share the same fixed
Paper-1 finite core, U1/U2, world/state coupling, owner domain, perspective,
```

```
vehicles, loss, lineage, and changing autobiographical information. -/
def finitePaper1JointIdentityContinuity : Paper1JointIdentityContinuity where
  perspectives := sharedGroundOwnerPerspective
  ownerHasEvent := exemplifiedSharedGroundOwner.ownerHasFocusedInstance
  earlier := precedes
  earlierRefl := precedes_refl
  earlierTrans := precedes_trans
  loss := bodilyLoss
  lossConditions := by
    intro s t b hl
    rcases hl with ⟨rfl, rfl, rfl⟩
    constructor
    · change present .ordinary .body
      trivial
    constructor
    · change ¬ present .loss .body
      simp [present]
    · change precedes .ordinary .loss
      simp [precedes, stageRank]
  enduring := fun v => v = Vehicle.parallel
  lineage := representationLineage
  lineageOwner := by
    intro s x t y _h
    rfl
  lineageOrdered := by
    intro s x t y h
    rcases h with h | h
    · exact h.1 ▸ precedes_refl s
    · rcases h with ⟨rfl, rfl, _, _⟩
      change precedes .ordinary .loss
      simp [precedes, stageRank]
  lineageTrans := by
    intro s t u x y z h₁ h₂
    exact representation_lineage_transitive s t u x y z h₁ h₂
  memory := representationMemory
  memoryCapacity := by
    intro s x v i h
    exact representation_memory_is_bounded s x v i h
  auxiliaryContinuation := by
    intro s t b x hl hf
    rcases hl with ⟨rfl, rfl, rfl⟩
    have hx : x = representationBefore := by
      rcases hf with hf | hf
```

```
    · exact hf.2.1
    · rcases hf with ⟨_, _, hv⟩
      cases hv
  subst x
  refine ⟨representationAfter, Vehicle.parallel, rfl, ?_, ?_, ?_, ?_⟩
  · exact (combinedWitness true).experience.parallelAtOrdinary
  · exact (combinedWitness true).experience.parallelAfterLoss
  · exact Or.inr ⟨rfl, rfl, rfl, rfl⟩
  · exact Or.inr ⟨rfl, rfl, rfl⟩
 actualLossAndFocus := by
  refine ⟨State.ordinary, State.loss, Vehicle.body, representationBefore,
    ⟨rfl, rfl, rfl⟩, ?_⟩
  exact Or.inl ⟨rfl, rfl, rfl⟩
 changedMemoryOnLineage := by
  refine ⟨State.ordinary, State.loss, Vehicle.body, representationBefore,
    representationAfter, Vehicle.parallel, Information.base,
    ⟨rfl, rfl, rfl⟩, ?_, ?_, ?_, ?_, ?_⟩
  · exact Or.inl ⟨rfl, rfl, rfl⟩
  · exact Or.inr ⟨rfl, rfl, rfl⟩
  · exact Or.inr ⟨rfl, rfl, rfl, rfl⟩
  · exact ⟨rfl, rfl, rfl, rfl⟩
  · simp [representationMemory]

theorem integrated_paper1_stage8_model_exists :
  Nonempty Paper1JointIdentityContinuity :=
 ⟨finitePaper1JointIdentityContinuity⟩

/-- Only a *finite-model witness* shows one world without both the designated
individual AND body. The general Stage-7 theorem has separate witnesses and
does not establish that they coincide in every CoreTheory. -/
theorem finite_joint_absence_of_human_individual_and_body :
  ∃ w : FiniteWitness.World,
    FiniteWitness.manifestedAt w .consciousness ∧
    ¬ FiniteWitness.manifestedAt w .individual ∧
    ¬ FiniteWitness.manifestedAt w .body := by
 refine ⟨.bareConsciousness, ?_⟩
 simp [FiniteWitness.manifestedAt]

/-- Organizational differentiation is not just unequal labels: Paper 2's
existing X6 witness exhibits a genuine information-capacity difference. -/
theorem integrated_nontrivial_vehicle_capacity_difference :
  ∃ i : Information,
    (combinedWitness true).experience.capacity .ordinary .body i ∧
```

```
    ¬ (combinedWitness true).experience.capacity .ordinary .technology i := by
  exact (combinedWitness true).experience.technologyProperSubset

end ArchitectureOfExperience.Stage8

/-!
Stage 9: individuation and simultaneous experiential vehicles.

The foundational distinction is between an individuality's simultaneous
participation in its AVAILABLE associated vehicles and its selective focus.
No transfer of an individuality between vehicles is postulated. Biological
loss is a local availability change, not a definition of individuality.

Differentiation phases are independent of biological chronology; the finite
phase witness establishes compatibility, not an inevitable progress law.
The ontological rejection of self-sufficient material origination below is
an EXPLICIT additional interpretation, not a theorem about the absence of
effective physicochemical self-organization.
-/
namespace ArchitectureOfExperience.Stage9

open ArchitectureOfManifestation
open ArchitectureOfExperience
open ArchitectureOfExperience.Stage6
open ArchitectureOfExperience.Stage7
open ArchitectureOfExperience.Stage8
open ArchitectureOfExperience.FiniteExperienceWitness

/-- Identifications are contents and organizations of an individuality's
representation, never definitions of individuality itself. -/
inductive IdentificationAspect where
  | body | mind | personality | autobiography
  deriving DecidableEq

/-- Increasing differentiation can make individuation possible before
autobiographical or egoic identification arises. This is not a physical time
coordinate and it does not measure the amount of universal consciousness. -/
inductive DifferentiationPhase where
  | minimal | individuated | identified
  deriving DecidableEq

def differentiationLevel : DifferentiationPhase → Nat
  | .minimal => 0
```

```
  | .individuated => 1
  | .identified => 2

theorem phase_order_nontrivial :
    differentiationLevel .minimal < differentiationLevel .individuated ∧
    differentiationLevel .individuated < differentiationLevel .identified := by
  decide

/-- A distinct, Paper-1-dependent model of individuality, its associated
vehicles, their simultaneous expression and its potentially selective focus.
The owner code indexes INDIVIDUALITY, not a body or a biography. -/
structure SimultaneousIndividuation where
  perspectives : PerspectiveFocusTheory
  associated : perspectives.Experiencer →
    perspectives.foundation.base.experience.Vehicle → Prop
  presentThrough : perspectives.foundation.base.experience.State →
    perspectives.Experiencer →
    perspectives.foundation.base.experience.Vehicle → Prop
  /- Every available associated vehicle is a co-present manifestation,
  whether or not the ordinary attentional focus singles it out. -/
  presentIff : ∀ s p v, presentThrough s p v ↔
    associated p v ∧ perspectives.foundation.base.experience.available s v
  focusAssociated : ∀ s x v, perspectives.focus s x v →
    associated (perspectives.owner x) v
  /- A vehicle remains a DIFFERENTIATED structure within one fixed C. -/
  vehicleDifferentiated : ∀ v,
    perspectives.foundation.base.experience.meaning v ≠
      perspectives.foundation.base.core.consciousness
  /- Ontological nonprimacy is stronger than mere effective physical
  self-organization. This additional semantic relation forbids treating
  any physical substrate as an ultimate self-sufficient origin of a
  vehicle's organization. It does not forbid local physical dynamics. -/
  ultimatePhysicalOrigin : perspectives.foundation.base.core.Physical →
    perspectives.foundation.base.experience.Vehicle → Prop
  noAutonomousMaterialOrigin : ∀ m v, ¬ ultimatePhysicalOrigin m v
  individualized : DifferentiationPhase → perspectives.Experiencer → Prop
  identifiesWith : DifferentiationPhase → perspectives.Experiencer →
    IdentificationAspect → Prop
  minimalNotIndividualized : ∀ p, ¬ individualized .minimal p
  minimalNotIdentified : ∀ p a, ¬ identifiesWith .minimal p a
  identificationRequiresIndividuation : ∀ phase p aspect,
    identifiesWith phase p aspect → individualized phase p
  /- Individuation and autobiographical ego identification are different:
```

```
  there is an intermediate, individuated but nonidentified phase. -/
  individuationBeforeEgo : ∃ p,
    individualized .individuated p ∧
      (∀ aspect, ¬ identifiesWith .individuated p aspect)
  humanIdentifiesWithBody : ∃ x,
    perspectives.focus
      perspectives.foundation.base.experience.ordinary x
      perspectives.foundation.base.experience.bodyVehicle ∧
    identifiesWith .identified (perspectives.owner x) .body
  /- A non-vacuous case of simultaneity WITHOUT exhaustive attention:
  focus on one expression does not eliminate the other expression. -/
  selectivelyFocusedCoPresence :
    ∃ s p v w x,
      v ≠ w ∧ presentThrough s p v ∧ presentThrough s p w ∧
      perspectives.owner x = p ∧ perspectives.focus s x v ∧
      (∀ y, perspectives.owner y = p → ¬ perspectives.focus s y w)

/-- Focus is a selector among already co-present manifest expressions,
not a transfer of the indexed individuality. -/
theorem focused_vehicle_is_already_present
    (I : SimultaneousIndividuation) (s x v)
    (hf : I.perspectives.focus s x v) :
    I.presentThrough s (I.perspectives.owner x) v := by
  apply (I.presentIff s (I.perspectives.owner x) v).2
  constructor
  · exact I.focusAssociated s x v hf
  · exact I.perspectives.foundation.base.experience.focusAvailable s v
      (I.perspectives.focusImpliesVehicleFocus s x v hf)

/-- The simultaneous nonfocused expression is an ACTUAL model requirement,
not a rhetorical interpretation of two merely possible vehicles. -/
theorem co_present_but_not_equally_focused
    (I : SimultaneousIndividuation) :
    ∃ s p v w x,
      v ≠ w ∧ I.presentThrough s p v ∧ I.presentThrough s p w ∧
      I.perspectives.owner x = p ∧ I.perspectives.focus s x v ∧
      (∀ y, I.perspectives.owner y = p → ¬ I.perspectives.focus s y w) :=
  I.selectivelyFocusedCoPresence

/-- Paper 1's existing X4 experiential-presentation bridge reaches an
actual focus event. This strengthens mere vehicle-immanence claims. -/
theorem focused_event_has_paper1_experiential_presentation
    (I : SimultaneousIndividuation) (s x v)
```

```
    (hf : I.perspectives.focus s x v) :
    I.perspectives.foundation.base.core.isExperience
      (I.perspectives.foundation.base.experience.presentation s v) := by
  apply I.perspectives.foundation.base.experience.focusedPresentation s v
  exact I.perspectives.focusImpliesVehicleFocus s x v hf

/-- Phase separation does not assert that every individualized experience
identifies with a body, personality, mind or autobiographical memory. -/
theorem individually_present_before_ego_identification
    (I : SimultaneousIndividuation) :
    ∃ p, I.individualized .individuated p ∧
      ∀ a, ¬ I.identifiesWith .individuated p a :=
  I.individuationBeforeEgo

theorem vehicle_is_differentiated_and_immanent
    (I : SimultaneousIndividuation) (v) :
    I.perspectives.foundation.base.experience.meaning v ≠
        I.perspectives.foundation.base.core.consciousness ∧
    I.perspectives.foundation.base.core.immanent
      (I.perspectives.foundation.base.experience.meaning v)
      I.perspectives.foundation.base.core.consciousness := by
  exact ⟨I.vehicleDifferentiated v,
    I.perspectives.foundation.base.experience.meaningImmanent v⟩

/-- Non-primary matter is not a separate consciousness ground. The first
conjunct follows the inherited A11 field, while the second is explicitly
assumed for ontological (not effective physicochemical) organization. -/
theorem material_substrate_is_not_an_ultimate_consciousness_origin
    (I : SimultaneousIndividuation) (m : I.perspectives.foundation.base.core.Physical)
    (v : I.perspectives.foundation.base.experience.Vehicle) :
    ¬ I.perspectives.foundation.base.core.grounds
        I.perspectives.foundation.base.core.consciousness m ∧
    ¬ I.ultimatePhysicalOrigin m v := by
  exact ⟨(I.perspectives.foundation.base.core.physicalNonPrimacy m).1,
    I.noAutonomousMaterialOrigin m v⟩

/-! A finite SAME-core witness with two simultaneously expressed vehicles.
The everyday focus is on the human body while the alternative organization
is already present (but not focused). At loss, the physical body's expression
ends locally while the pre-existing alternative remains expressed. -/

def finiteAssociated (_p : Unit) (v : Vehicle) : Prop :=
  v = .body ∨ v = .parallel
```

```
def finitePresentThrough (s : State) (p : Unit) (v : Vehicle) : Prop :=
  finiteAssociated p v ∧ present s v

def finiteIndividualized : DifferentiationPhase → Unit → Prop
  | .minimal, _ => False
  | .individuated, _ => True
  | .identified, _ => True

def finiteIdentifies : DifferentiationPhase → Unit → IdentificationAspect → Prop
  | .identified, _, _ => True
  | _, _, _ => False

def finiteSimultaneousIndividuation : SimultaneousIndividuation where
  perspectives := sharedGroundOwnerPerspective
  associated := finiteAssociated
  presentThrough := finitePresentThrough
  presentIff := by
    intro s p v
    rfl
  focusAssociated := by
    intro s x v hf
    rcases hf with h | h
    · exact Or.inl h.2.2
    · exact Or.inr h.2.2
  vehicleDifferentiated := by
    intro v
    change FiniteExperienceWitness.meaning v ≠ FiniteWitness.Manifest.consciousness
    cases v <;> intro h <;> cases h
  ultimatePhysicalOrigin := fun _ _ => False
  noAutonomousMaterialOrigin := by
    intro m v h
    exact h
  individualized := finiteIndividualized
  identifiesWith := finiteIdentifies
  minimalNotIndividualized := by
    intro p h
    exact h
  minimalNotIdentified := by
    intro p a h
    exact h
  identificationRequiresIndividuation := by
    intro phase p aspect h
```

```
    cases phase <;> trivial
  individuationBeforeEgo := by
    refine ⟨(), trivial, ?_⟩
    intro aspect h
    exact h
  humanIdentifiesWithBody := by
    refine ⟨representationBefore, ?_, trivial⟩
    exact Or.inl ⟨rfl, rfl, rfl⟩
  selectivelyFocusedCoPresence := by
    refine ⟨.ordinary, (), .body, .parallel, representationBefore,
      ?_, ?_, ?_, rfl, ?_, ?_⟩
    · intro h
      cases h
    · exact ⟨Or.inl rfl, trivial⟩
    · exact ⟨Or.inr rfl, trivial⟩
    · exact Or.inl ⟨rfl, rfl, rfl⟩
    · intro y _hy hf
      rcases hf with h | h
      · cases h.2.2
      · cases h.1

theorem simultaneous_individuation_has_integrated_paper1_model :
    Nonempty SimultaneousIndividuation :=
  ⟨finiteSimultaneousIndividuation⟩

/-- BEFORE death there are two co-present expressions of the SAME owner.
AFTER loss of the bodily organization, the pre-existing other expression is
still present. Nothing is moved or created at the loss event. -/
theorem finite_local_body_loss_preserves_other_expression :
    finitePresentThrough .ordinary () .body ∧
    finitePresentThrough .ordinary () .parallel ∧
    ¬ finitePresentThrough .loss () .body ∧
    finitePresentThrough .loss () .parallel ∧
    finiteAssociated () .body ∧ finiteAssociated () .parallel := by
  simp [finitePresentThrough, finiteAssociated, present]

/-- Co-presence in the ordinary state does not force co-focusing. -/
theorem finite_simultaneous_co_presence_and_selective_focus :
    finitePresentThrough .ordinary () .body ∧
    finitePresentThrough .ordinary () .parallel ∧
    representationFocus .ordinary representationBefore .body ∧
    ¬ representationFocus .ordinary representationBefore .parallel := by
  simp [finitePresentThrough, finiteAssociated, present, representationFocus]
```

```
end ArchitectureOfExperience.Stage9

/-!
Stage 10: developmental individuation and relative experiential identity.

This module supersedes the *interpretation* of the fixed Stage-9 owner
association, while preserving the earlier verified declarations as historical
special cases.  A Code is a model index for a differentiable perspective, not
proof of a plurality of independently existing consciousness substances.
Collective identity can precede specialized individual identity; individuation
and its associated vehicles change across ordered developmental phases.
The terminal reabsorption phase is represented as one possible cyclic boundary,
not equated with ordinary biological death.  Knowledge conservation is NOT
deduced from the disappearance of an individualized organization.
-/
namespace ArchitectureOfExperience.Stage10

open ArchitectureOfManifestation
open ArchitectureOfExperience
open ArchitectureOfExperience.Stage6
open ArchitectureOfExperience.FiniteExperienceWitness

/-- The phase is an ordering of differentiation, NOT fundamental physical time.
    Identity is evaluated at a phase rather than assigned once and for all. -/
structure DevelopmentalIndividuation where
  foundation : InvariantUnifiedTheory
  Phase : Type
  Code : Type
  phaseNonempty : Nonempty Phase
  codeNonempty : Nonempty Code
  rank : Phase → Nat
  collective : Phase
  specialized : Phase
  reabsorbed : Phase
  differentiatedStages : rank collective < rank specialized ∧
    rank specialized < rank reabsorbed
  /- Context-relative identity permits a collectively indistinguishable
     configuration to admit distinct later individuated descriptions. -/
  sameAt : Phase → Code → Code → Prop
  sameRefl : ∀ a p, sameAt a p p
  sameSymm : ∀ a p q, sameAt a p q → sameAt a q p
  sameTrans : ∀ a p q r, sameAt a p q → sameAt a q r → sameAt a p r
```

```
  refinement : ∀ p q, sameAt specialized p q → sameAt collective p q
  /- A code can represent a collective experiential locus even before
     specialized individual identity becomes discriminable. -/
  instantiated : Phase → Code → Prop
  associated : Phase → Code → foundation.base.experience.Vehicle → Prop
  associationRequiresLocus : ∀ a p v, associated a p v → instantiated a p
  /- All currently available associated vehicles are jointly expressed.
     This is phase-dependent and is not a transport mechanism. -/
  presentThrough : Phase → foundation.base.experience.State → Code →
    foundation.base.experience.Vehicle → Prop
  presentIff : ∀ a s p v, presentThrough a s p v ↔
    associated a p v ∧ foundation.base.experience.available s v
  /- Focus can select one, several, or none of the available expressions. -/
  focuses : Phase → foundation.base.experience.State → Code →
    foundation.base.experience.Vehicle → Prop
  focusRequiresPresence : ∀ a s p v, focuses a s p v → presentThrough a s p v
  /- The inner-to-outer relation is an explicit Paper-2 organization bridge.
     Its effective differentiation rank uses the SAME Paper-1 CoreTheory. -/
  innerToOuter : foundation.base.experience.Vehicle →
    foundation.base.experience.Vehicle → Prop
  innerPrecedesRank : ∀ u v, innerToOuter u v →
    foundation.base.core.differentiationRank
      (foundation.base.experience.meaning u) ≤
    foundation.base.core.differentiationRank
      (foundation.base.experience.meaning v)
  formsFrom : Phase → Code → foundation.base.experience.Vehicle →
    foundation.base.experience.Vehicle → Prop
  formationUsesInner : ∀ a p u v, formsFrom a p u v →
    innerToOuter u v ∧ associated a p u ∧ associated a p v
  /- Optional cyclic reabsorption does not imply any physical body died.
     This witness states that codes are no longer instantiated at the
     designated reabsorption boundary, not that C ceases to manifest. -/
  reabsorptionOfLoci : ∀ p, ¬ instantiated reabsorbed p

/-- Present expressions cannot be separated from the differentiable locus
that is represented at the selected phase. -/
theorem presence_implies_current_individuation
    (D : DevelopmentalIndividuation) (a s p v)
    (h : D.presentThrough a s p v) : D.instantiated a p := by
  exact D.associationRequiresLocus a p v ((D.presentIff a s p v).1 h).1

/-- Focusing a vehicle requires a present, associated and available
expression. This is derived from two independent bridges. -/
```

```
theorem focus_requires_dynamic_association
    (D : DevelopmentalIndividuation) (a s p v)
    (h : D.focuses a s p v) :
    D.associated a p v ∧ D.foundation.base.experience.available s v := by
  exact (D.presentIff a s p v).1 (D.focusRequiresPresence a s p v h)

/-- The Paper-1 determination/formulator law holds for ALL differentiated
vehicles independently of the identity or number of their represented codes. -/
theorem present_vehicle_preserves_paper1_formulator
    (D : DevelopmentalIndividuation) (a s p v)
    (_h : D.presentThrough a s p v) :
    D.foundation.base.core.formulator
      (D.foundation.base.experience.determination s v) =
        D.foundation.base.core.consciousness := by
  exact formulations_remain_grounded_in_consciousness D.foundation.base s v

/-- Paper 1 grounds every vehicle's experiential presentation in its
reflexiveForm. The representation of individuality does not add a new C. -/
theorem present_vehicle_uses_inherited_reflexive_presentation
    (D : DevelopmentalIndividuation) (a s p v)
    (_h : D.presentThrough a s p v) :
    ∃ w mode strength,
      D.foundation.base.core.active w mode ∧
      D.foundation.base.experience.presentation s v =
        D.foundation.base.core.reflexiveForm w mode strength
          D.foundation.base.core.consciousness := by
  exact D.foundation.base.experience.presentationReflexivelyGrounded s v

/-- A declared inner-to-outer organizational relation respects the original
differentiation rank; equality of ranks remains possible. -/
theorem generated_outer_form_respects_paper1_rank
    (D : DevelopmentalIndividuation) (a p u v)
    (h : D.formsFrom a p u v) :
    D.foundation.base.core.differentiationRank
      (D.foundation.base.experience.meaning u) ≤
    D.foundation.base.core.differentiationRank
      (D.foundation.base.experience.meaning v) := by
  exact D.innerPrecedesRank u v (D.formationUsesInner a p u v h).1

/-- A reabsorbed code has no associated present vehicles. No inference about
the extinction of manifested consciousness is involved. -/
theorem reabsorption_removes_indexed_expression
    (D : DevelopmentalIndividuation) (s p v) :
```

```
  ¬ D.presentThrough D.reabsorbed s p v := by
 intro h
 exact D.reabsorptionOfLoci p (presence_implies_current_individuation D _ _ _ _ h)

/-! A finite, two-code possibility witness with one inherited C. The two
codes are collectively equivalent in the initial phase, differentiated in
the specialized phase, and no longer instantiated at reabsorption. The two
codes do NOT constitute an ontological proof that multiple subjects exist.
Their vehicle sets change; focused experiences may be simultaneous. -/

inductive Phase where
 | collective | specialized | reabsorbed
 deriving DecidableEq

def phaseRank : Phase → Nat
 | .collective => 0
 | .specialized => 1
 | .reabsorbed => 2

def finiteSameAt : Phase → Bool → Bool → Prop
 | .specialized, p, q => p = q
 | _, _, _ => True

def finiteInstantiated : Phase → Bool → Prop
 | .reabsorbed, _ => False
 | _, _ => True

def finiteAssociated : Phase → Bool → Vehicle → Prop
 | .collective, false, v => v = .body ∨ v = .parallel
 | .collective, true, v => v = .cell ∨ v = .earth
 | .specialized, false, v =>
    v = .body ∨ v = .parallel ∨ v = .technology
 | .specialized, true, v => v = .earth
 | .reabsorbed, _, _ => False

/-- Phase-relative instantiation of a vehicle in the represented system,
as opposed to mere membership in the type of possible organizations. -/
def finiteInstantiatedVehicle (a : Phase) (v : Vehicle) : Prop :=
 ∃ p : Bool, finiteAssociated a p v

def finitePresent (a : Phase) (s : State) (p : Bool) (v : Vehicle) : Prop :=
 finiteAssociated a p v ∧ FiniteExperienceWitness.present s v
```

```
def finiteFocus : Phase → State → Bool → Vehicle → Prop
  | .collective, .ordinary, false, .body => True
  | .collective, .ordinary, true, .cell => True
  | .specialized, .developed, false, .body => True
  | .specialized, .developed, false, .parallel => True
  | .specialized, .developed, true, .earth => True
  | _, _, _, _ => False

def finiteInner : Vehicle → Vehicle → Prop
  | .parallel, .body => True
  | .parallel, .technology => True
  | .earth, .cell => True
  | _, _ => False

def finiteFormation : Phase → Bool → Vehicle → Vehicle → Prop
  | .specialized, false, .parallel, .technology => True
  | _, _, _, _ => False

def finiteDevelopmentalIndividuation : DevelopmentalIndividuation where
  foundation := finiteInvariantUnifiedTheory true
  Phase := Phase
  Code := Bool
  phaseNonempty := ⟨.collective⟩
  codeNonempty := ⟨false⟩
  rank := phaseRank
  collective := .collective
  specialized := .specialized
  reabsorbed := .reabsorbed
  differentiatedStages := by decide
  sameAt := finiteSameAt
  sameRefl := by intro a p; cases a <;> simp [finiteSameAt]
  sameSymm := by
    intro a p q h
    cases a <;> simp_all [finiteSameAt]
  sameTrans := by
    intro a p q r h₁ h₂
    cases a <;> simp_all [finiteSameAt]
  refinement := by intro p q _h; trivial
  instantiated := finiteInstantiated
  associated := finiteAssociated
  associationRequiresLocus := by
    intro a p v h
    cases a <;> cases p <;> simp_all [finiteAssociated, finiteInstantiated]
```

```
  presentThrough := finitePresent
  presentIff := by intro a s p v; rfl
  focuses := finiteFocus
  focusRequiresPresence := by
    intro a s p v h
    cases a <;> cases s <;> cases p <;> cases v <;>
      simp_all [finiteFocus, finitePresent, finiteAssociated,
        FiniteExperienceWitness.present]
  innerToOuter := finiteInner
  innerPrecedesRank := by
    intro u v h
    change ArchitectureOfManifestation.FiniteWitness.differentiationRank
      (FiniteExperienceWitness.meaning u) ≤
      ArchitectureOfManifestation.FiniteWitness.differentiationRank
      (FiniteExperienceWitness.meaning v)
    cases u <;> cases v <;>
      simp_all [finiteInner, FiniteExperienceWitness.meaning,
        ArchitectureOfManifestation.FiniteWitness.differentiationRank]
  formsFrom := finiteFormation
  formationUsesInner := by
    intro a p u v h
    cases a <;> cases p <;> cases u <;> cases v <;>
      simp_all [finiteFormation, finiteAssociated, finiteInner]
  reabsorptionOfLoci := by
    intro p h
    cases p <;> exact h

/-- Relative identity: representationally distinct codes can share
collective identity and later be specialized. This proves relative
consistency, NOT ontic numerical plurality. -/
theorem finite_collective_to_specialized_identity :
    false ≠ true ∧
    finiteSameAt .collective false true ∧
    ¬ finiteSameAt .specialized false true := by
  simp [finiteSameAt]

/-- One vehicle can become associated as another ceases to be associated.
No fixed owner-to-vehicle map could represent this example. -/
theorem finite_vehicle_emergence_and_disappearance :
    ¬ finiteAssociated .collective false .technology ∧
    finiteAssociated .specialized false .technology ∧
    finiteAssociated .collective true .cell ∧
    ¬ finiteAssociated .specialized true .cell := by
```

```
  simp [finiteAssociated]

/-- A newly active vehicle and a disappearing vehicle are witnessed at the
system level, not merely as membership changes for a single code. -/
theorem finite_system_level_formation_and_loss :
    ¬ finiteInstantiatedVehicle .collective .technology ∧
    finiteInstantiatedVehicle .specialized .technology ∧
    finiteInstantiatedVehicle .collective .cell ∧
    ¬ finiteInstantiatedVehicle .specialized .cell := by
  constructor
  · rintro ⟨p, h⟩
    cases p <;> simp [finiteAssociated] at h
  constructor
  · exact ⟨false, by simp [finiteAssociated]⟩
  constructor
  · exact ⟨true, by simp [finiteAssociated]⟩
  · rintro ⟨p, h⟩
    cases p <;> simp [finiteAssociated] at h

/-- A genuine two-vehicle focus is possible in a specialized configuration;
it does not imply simultaneous focus in all developmental phases. -/
theorem finite_multifocus_and_initial_selectivity :
    finiteFocus .specialized .developed false .body ∧
    finiteFocus .specialized .developed false .parallel ∧
    ¬ finiteFocus .collective .ordinary false .parallel ∧
    finitePresent .specialized .developed false .body ∧
    finitePresent .specialized .developed false .parallel := by
  simp [finiteFocus, finitePresent, finiteAssociated,
    FiniteExperienceWitness.present]

/-- Reabsorption removes these indexed organizations but leaves the
selected U2 universal C invariant in every modeled world. -/
theorem finite_reabsorption_without_loss_of_consciousness :
    (∀ p : Bool, ¬ finiteInstantiated .reabsorbed p) ∧
    (∀ w : ArchitectureOfManifestation.FiniteWitness.World,
      ArchitectureOfManifestation.FiniteWitness.model.manifestedAt w
        ArchitectureOfManifestation.FiniteWitness.model.consciousness) := by
  constructor
  · intro p h; cases p <;> exact h
  · exact finiteInvariantFoundation.consciousnessEveryWorld

/-- The informational trace's preservation is auxiliary and independent:
both alternatives admit the very same developmental and Paper-1 core. -/
```

```
structure OptionalTraceExtension where
  developmental : DevelopmentalIndividuation
  Trace : Type
  traceNonempty : Nonempty Trace
  retained : Trace → Prop

def finiteTraceOption (keep : Bool) : OptionalTraceExtension where
  developmental := finiteDevelopmentalIndividuation
  Trace := Unit
  traceNonempty := ⟨()⟩
  retained := fun _ => keep = true

theorem information_retention_is_an_additional_choice :
    (∃ Q : OptionalTraceExtension, ∃ t : Q.Trace, Q.retained t) ∧
    (∃ Q : OptionalTraceExtension, ∃ t : Q.Trace, ¬ Q.retained t) := by
  constructor
  · exact ⟨finiteTraceOption true, (), rfl⟩
  · refine ⟨finiteTraceOption false, (), ?_⟩
    simp [finiteTraceOption]

theorem developmental_ontology_has_integrated_paper1_model :
    Nonempty DevelopmentalIndividuation :=
  ⟨finiteDevelopmentalIndividuation⟩

end ArchitectureOfExperience.Stage10

/-!
Stage 11: corrections after independent peer review of Stage 10.

This is a conservative extension of all previous declarations.  The older
`sameAt` relation is henceforth read as PHASE-RELATIVE CLASSIFICATION / GROUP
MEMBERSHIP, not Leibnizian identity.  Actual identity of representation codes
remains equality.  A structure can mediate lower-level experience and be
organized by a higher level without introducing a second consciousness.

The finite witness below aligns multifocus with the inherited X3 vehicle
focus, constructs genuine (though stipulated) developmental update rules,
exhibits a three-step return, and derives possible information traces from
actual focused access rather than a free `Unit` flag.  These are formal
compatibility results, not discoveries of physical or metaphysical entities.
-/
namespace ArchitectureOfExperience.Stage11
```

```
open ArchitectureOfManifestation
open ArchitectureOfManifestation.FiniteWitness
open ArchitectureOfExperience
open ArchitectureOfExperience.FiniteExperienceWitness
open ArchitectureOfExperience.Stage6
open ArchitectureOfExperience.Stage10

/-! 1. Grouping and genuine representation identity must not be conflated. -/

/-- The coarse relation concerns classification; code identity is equality.
    No property-substitution principle follows from a coarse class. -/
def actualCodeIdentity (p q : Bool) : Prop := p = q

theorem collective_grouping_does_not_entail_vehicle_congruence :
    Stage10.finiteSameAt .collective false true ∧
    ¬ actualCodeIdentity false true ∧
    Stage10.finiteAssociated .collective false .body ∧
    ¬ Stage10.finiteAssociated .collective true .body := by
  simp [Stage10.finiteSameAt, actualCodeIdentity,
    Stage10.finiteAssociated]

theorem real_code_identity_preserves_associations (a : Stage10.Phase)
    (p q : Bool) (v : Vehicle) (h : actualCodeIdentity p q) :
    (Stage10.finiteAssociated a p v ↔ Stage10.finiteAssociated a q v) := by
  cases h
  rfl

/-! 2. X3 effective focus is strengthened *within* the same X1--X7 model,
    so the later two-vehicle focus cannot contradict the inherited focus. -/

def broadVehicleFocus (s : State) (v : Vehicle) : Prop :=
  FiniteExperienceWitness.focused true s v ∨
    ∃ a : Stage10.Phase, ∃ p : Bool, Stage10.finiteFocus a s p v

abbrev broadExperience : ExperienceExtension FiniteWitness.model :=
  { FiniteExperienceWitness.model true with
    focus := broadVehicleFocus
    focusAvailable := by
      intro s v hf
      change FiniteExperienceWitness.present s v
      rcases hf with hf | ⟨a, p, hf⟩
      · cases s <;> cases v <;>
          simp_all [FiniteExperienceWitness.focused,
```

```
          FiniteExperienceWitness.present]
      · cases a <;> cases s <;> cases p <;> cases v <;>
        simp_all [Stage10.finiteFocus,
          FiniteExperienceWitness.present]
    focusedPresentation := by
      intro s v _hf
      exact FiniteWitness.model.whiteOutIsExperience
    accessBound := by
      intro s v i ha
      exact ⟨Or.inl ha.1, ha.2.1⟩
    ordinaryFocus := by
      change broadVehicleFocus State.ordinary Vehicle.body
      exact Or.inl (by trivial) }

abbrev broadFoundation : InvariantUnifiedTheory where
  base := { core := FiniteWitness.model, experience := broadExperience }
  invariant := finiteInvariantFoundation
  coupling := {
    worldAt := finiteWorldAt
    bodyAvailabilityBridge := by
      intro s
      change FiniteWitness.manifestedAt (finiteWorldAt s)
        FiniteWitness.Manifest.body ↔ FiniteExperienceWitness.present s .body
      cases s <;> simp [finiteWorldAt, FiniteWitness.manifestedAt,
        FiniteExperienceWitness.present] }

/-- Keeps Stage-10's phase-dependent membership while strengthening its
    underlying organizational focus and leaving Paper 1 unchanged. -/
abbrev alignedDevelopment : DevelopmentalIndividuation :=
  { Stage10.finiteDevelopmentalIndividuation with
    foundation := broadFoundation }

/-! 3. One node has two level-relative roles simultaneously. -/

/-- These are positions in an organization, NOT independent substances. -/
inductive OrganizationalNode where
  | encompassing
  | individuation (p : Bool)
  | outer (v : Vehicle)
  deriving DecidableEq

def mediates (a : Stage10.Phase) (s : State) :
    OrganizationalNode → OrganizationalNode → Prop
```

```
  | .encompassing, .individuation p =>
      Stage10.finiteInstantiated a p
  | .individuation p, .outer v =>
      Stage10.finitePresent a s p v
  | _, _ => False

/-- Level-dependent roles with a shared Paper-1 foundation.  The joint
    boundary/reflexive witnesses are an EXTRA Paper-2 interpretation bridge;
    the productive developmental mechanism does not follow from A6 alone. -/
structure IntegratedHierarchy where
  development : DevelopmentalIndividuation
  Node : Type
  encompassing : Node
  individuality : development.Code → Node
  vehicle : development.foundation.base.experience.Vehicle → Node
  distinctLevels : ∀ p v, individuality p ≠ vehicle v
  coordinates : development.Phase →
    development.foundation.base.experience.State → Node → Node → Prop
  individualCoordinatesLower : ∀ a s p v,
    development.presentThrough a s p v →
      coordinates a s (individuality p) (vehicle v)
  higherCoordinatesIndividual : ∀ a s p,
    development.instantiated a p →
      coordinates a s encompassing (individuality p)
  focusCoherentWithX3 : ∀ a s p v,
    development.focuses a s p v →
      development.foundation.base.experience.focus s v
  /- Paper-1 A6 and X4 are joined at the SAME active differentiation event.
     This is an added joint-event bridge, not a consequence of A6 or X4
     taken in isolation. -/
  sharedReflexiveGeneration : ∀ a s p v,
    development.presentThrough a s p v →
    ∃ w mode strength,
      development.foundation.base.core.active w mode ∧
      development.foundation.base.core.boundaryForm w mode strength
        development.foundation.base.core.consciousness =
        development.foundation.base.core.individual ∧
      development.foundation.base.experience.presentation s v =
        development.foundation.base.core.reflexiveForm w mode strength
          development.foundation.base.core.consciousness

theorem individuality_is_experiencer_below_and_vehicle_above
    (H : IntegratedHierarchy) (a s p v)
```

```
    (hp : H.development.presentThrough a s p v) :
    H.coordinates a s (H.individuality p) (H.vehicle v) ∧
    H.coordinates a s H.encompassing (H.individuality p) := by
  exact ⟨H.individualCoordinatesLower a s p v hp,
    H.higherCoordinatesIndividual a s p
      (presence_implies_current_individuation H.development a s p v hp)⟩

theorem focused_events_share_an_active_reflexive_origin
    (H : IntegratedHierarchy) (a s p v)
    (hf : H.development.focuses a s p v) :
    ∃ w mode strength,
      H.development.foundation.base.core.active w mode ∧
      H.development.foundation.base.core.boundaryForm w mode strength
        H.development.foundation.base.core.consciousness =
        H.development.foundation.base.core.individual ∧
      H.development.foundation.base.experience.presentation s v =
        H.development.foundation.base.core.reflexiveForm w mode strength
          H.development.foundation.base.core.consciousness := by
  exact H.sharedReflexiveGeneration a s p v
    (H.development.focusRequiresPresence a s p v hf)

def finiteIntegratedHierarchy : IntegratedHierarchy where
  development := alignedDevelopment
  Node := OrganizationalNode
  encompassing := .encompassing
  individuality := .individuation
  vehicle := .outer
  distinctLevels := by
    intro p v h
    cases h
  coordinates := mediates
  individualCoordinatesLower := by
    intro a s p v h
    exact h
  higherCoordinatesIndividual := by
    intro a s p h
    exact h
  focusCoherentWithX3 := by
    intro a s p v h
    change Stage10.finiteFocus a s p v at h
    change broadVehicleFocus s v
    exact Or.inr ⟨a, p, h⟩
  sharedReflexiveGeneration := by
```

```
    intro a s p v _h
    refine ⟨.human, .humanIndividuation, .high, ?_, ?_, ?_⟩
    · trivial
    · rfl
    · rfl

theorem simultaneous_multifocus_agrees_with_original_X3 :
    alignedDevelopment.focuses .specialized .developed false .body ∧
    alignedDevelopment.focuses .specialized .developed false .parallel ∧
    alignedDevelopment.foundation.base.experience.focus .developed .body ∧
    alignedDevelopment.foundation.base.experience.focus .developed .parallel ∧
    alignedDevelopment.presentThrough .specialized .developed false .body ∧
    alignedDevelopment.presentThrough .specialized .developed false .parallel := by
  constructor
  · change Stage10.finiteFocus .specialized .developed false .body
    trivial
  constructor
  · change Stage10.finiteFocus .specialized .developed false .parallel
    trivial
  constructor
  · change broadVehicleFocus .developed .body
    exact Or.inl (by trivial)
  constructor
  · change broadVehicleFocus .developed .parallel
    exact Or.inr ⟨.specialized, false, by trivial⟩
  constructor
  · change Stage10.finitePresent .specialized .developed false .body
    simp [Stage10.finitePresent, Stage10.finiteAssociated,
      FiniteExperienceWitness.present]
  · change Stage10.finitePresent .specialized .developed false .parallel
    simp [Stage10.finitePresent, Stage10.finiteAssociated,
      FiniteExperienceWitness.present]

/-! 4. Formation and dissolution through an explicit transition operator.
    The rule is constructed, but it is still a Paper-2 hypothesis, not an
    independently derived causal law of physical evolution. -/

def nextPhase : Stage10.Phase → Stage10.Phase
  | .collective => .specialized
  | .specialized => .reabsorbed
  | .reabsorbed => .collective

/-- The prior membership actually enters the update rule; the output is not
```

```
    an unrelated second lookup table. Differentiation can add a technology
    organization and retire a cell organization. -/
def updateAssociations (a : Stage10.Phase)
    (prior : Bool → Vehicle → Prop) (p : Bool) (v : Vehicle) : Prop :=
  match a with
  | .collective =>
      (prior p v ∧ ¬ (p = true ∧ v = .cell)) ∨
      (p = false ∧ v = .technology)
  | .specialized => False
  | .reabsorbed => Stage10.finiteAssociated .collective p v

theorem actual_update_generates_next_phase (a : Stage10.Phase)
    (p : Bool) (v : Vehicle) :
    updateAssociations a (Stage10.finiteAssociated a) p v ↔
    Stage10.finiteAssociated (nextPhase a) p v := by
  cases a <;> cases p <;> cases v <;>
    simp [updateAssociations, nextPhase, Stage10.finiteAssociated]

theorem nontrivial_formation_and_retirement_follow_update :
    ¬ Stage10.finiteAssociated .collective false .technology ∧
    updateAssociations .collective
      (Stage10.finiteAssociated .collective) false .technology ∧
    Stage10.finiteAssociated .collective true .cell ∧
    ¬ updateAssociations .collective
      (Stage10.finiteAssociated .collective) true .cell := by
  simp [Stage10.finiteAssociated, updateAssociations]

theorem explicit_three_stage_return (a : Stage10.Phase) :
    nextPhase (nextPhase (nextPhase a)) = a := by
  cases a <;> rfl

theorem return_is_not_bodily_continuation :
    (∀ p : Bool, ¬ Stage10.finiteAssociated .reabsorbed p .body) ∧
    Stage10.finiteAssociated (nextPhase .reabsorbed) false .body ∧
    (∀ w : FiniteWitness.World,
       FiniteWitness.model.manifestedAt w
         FiniteWitness.model.consciousness) := by
  constructor
  · intro p h
    cases p <;> exact h
  constructor
  · change Stage10.finiteAssociated .collective false .body
    simp [Stage10.finiteAssociated]
```

```
  · exact finiteInvariantFoundation.consciousnessEveryWorld

/-! 5. Traces from an experienced informational item, not arbitrary flags. -/

/-- Only information actually accessed through a focused vehicle in the
    differentiated state can yield an experiential trace in this example. -/
def traceGenerated (p : Bool) (i : Information) : Prop :=
  ∃ v : Vehicle,
    alignedDevelopment.focuses .specialized .developed p v ∧
    alignedDevelopment.foundation.base.experience.access .developed v i

/-- Optional retention policy; retention never introduces information absent
    from the source experience. The policy itself is an auxiliary premise. -/
def traceRetained (policy : Bool) (p : Bool) (i : Information) : Prop :=
  policy = true ∧ traceGenerated p i

def traceRecoverable (policy : Bool) (p : Bool)
    (i : Information) : Prop :=
  traceRetained policy p i ∧
    alignedDevelopment.foundation.base.experience.access .ordinary .body i

theorem experienced_information_can_be_retained_and_reaccessed :
    traceGenerated false .base ∧
    traceRetained true false .base ∧
    traceRecoverable true false .base := by
  have h : traceGenerated false .base := by
    refine ⟨.body, ?_, ?_⟩
    · change Stage10.finiteFocus .specialized .developed false .body
      trivial
    · change FiniteExperienceWitness.accessed true .developed .body .base
      simp [FiniteExperienceWitness.accessed,
        FiniteExperienceWitness.accessed, FiniteExperienceWitness.focused,
        FiniteExperienceWitness.cap, FiniteExperienceWitness.present]
  constructor
  · exact h
  constructor
  · exact ⟨rfl, h⟩
  · refine ⟨⟨rfl, h⟩, ?_⟩
    change FiniteExperienceWitness.accessed true .ordinary .body .base
    simp [FiniteExperienceWitness.accessed,
      FiniteExperienceWitness.accessed, FiniteExperienceWitness.focused,
      FiniteExperienceWitness.cap, FiniteExperienceWitness.present]
```

```
theorem nonretention_of_same_generated_information_is_consistent :
    traceGenerated false .base ∧ ¬ traceRetained false false .base := by
  exact ⟨experienced_information_can_be_retained_and_reaccessed.1,
    by intro h; exact Bool.noConfusion h.1⟩

theorem retention_never_creates_an_unexperienced_trace
    (policy p : Bool) (i : Information)
    (h : traceRetained policy p i) : traceGenerated p i := h.2

/-! 6. Make the exact published D31 biconditional visible; the historical
    CoreTheory primitive only stipulates selected dependence propositions.
    The two are NOT equivalent in the small published-core finite witness. -/

def extensionalD31 (T : CoreTheory) (x y : T.Manifest) : Prop :=
  ∀ w : T.World, T.manifestedAt w x → T.manifestedAt w y

theorem published_D31_is_an_iff_by_definition (T : CoreTheory)
    (x y : T.Manifest) :
    (extensionalD31 T x y ↔
      ∀ w : T.World, T.manifestedAt w x → T.manifestedAt w y) := Iff.rfl

/-- Warning against claiming the Stage-1 primitive already verifies D31. -/
theorem finite_D31_and_legacy_primitive_differ :
    extensionalD31 FiniteWitness.model .body .individual ∧
    ¬ FiniteWitness.model.existentiallyDependsOn .body .individual := by
  constructor
  · change ∀ w : FiniteWitness.World,
      FiniteWitness.manifestedAt w .body →
      FiniteWitness.manifestedAt w .individual
    intro w h
    cases w <;> simp_all [FiniteWitness.manifestedAt]
  · change ¬ (FiniteWitness.Manifest.individual =
      FiniteWitness.Manifest.consciousness)
    decide

theorem stage11_formal_extension_has_paper1_dependent_model :
    Nonempty IntegratedHierarchy := ⟨finiteIntegratedHierarchy⟩

end ArchitectureOfExperience.Stage11

/-!
Stage 12: access-coherent multifocus, strict relative hierarchy, general
organizational transitions and an explicitly cycle-indexed optional trace.
```

```
All claims below concern formal interpretations and conditional results.
They do not derive neuroscience, physics, or a necessary persistence of any
particular differentiated experiencer from the Paper-1 ontology.
-/
namespace ArchitectureOfExperience.Stage12

open ArchitectureOfManifestation
open ArchitectureOfManifestation.FiniteWitness
open ArchitectureOfExperience
open ArchitectureOfExperience.FiniteExperienceWitness
open ArchitectureOfExperience.Stage6
open ArchitectureOfExperience.Stage10

/-! I. One X3 focus/access interpretation, with different accessible contents. -/

/-- Effective access uses the very same broadened focus as X3. -/
def coherentAccess (s : State) (v : Vehicle) (i : Information) : Prop :=
  Stage11.broadVehicleFocus s v ∧ FiniteExperienceWitness.cap s v i

abbrev contentExperience : ExperienceExtension FiniteWitness.model :=
  { Stage11.broadExperience with
    access := coherentAccess
    accessBound := by
      intro s v i ha
      change Stage11.broadVehicleFocus s v ∧
        FiniteExperienceWitness.cap s v i at ha
      constructor
      · exact ha.1
      · change FiniteExperienceWitness.cap s v i
        exact ha.2
    accessedInformationSpecified := by
      intro s v i _ha
      trivial }

abbrev contentFoundation : InvariantUnifiedTheory where
  base := { core := FiniteWitness.model, experience := contentExperience }
  invariant := finiteInvariantFoundation
  coupling := {
    worldAt := finiteWorldAt
    bodyAvailabilityBridge := by
      intro s
      change FiniteWitness.manifestedAt (finiteWorldAt s) .body ↔
```

```
      FiniteExperienceWitness.present s .body
    cases s <;> simp [finiteWorldAt, FiniteWitness.manifestedAt,
      FiniteExperienceWitness.present] }

abbrev contentDevelopment : DevelopmentalIndividuation :=
  { Stage10.finiteDevelopmentalIndividuation with
    foundation := contentFoundation }

abbrev contentIntegrated : Stage11.IntegratedHierarchy :=
  { Stage11.finiteIntegratedHierarchy with
    development := contentDevelopment }

/-- Both vehicles provide accessible, DIFFERENT information at the same
    developmental phase, state, and representation code. -/
theorem multifocus_has_distinct_accessible_contents :
    contentDevelopment.focuses .specialized .developed false .body ∧
    contentDevelopment.focuses .specialized .developed false .parallel ∧
    contentExperience.access .developed .body .growth ∧
    contentExperience.access .developed .parallel .parallelSignal ∧
    Information.growth ≠ Information.parallelSignal := by
  constructor
  · change Stage10.finiteFocus .specialized .developed false .body
    trivial
  constructor
  · change Stage10.finiteFocus .specialized .developed false .parallel
    trivial
  constructor
  · change coherentAccess .developed .body .growth
    exact ⟨Or.inl (by trivial), by simp [FiniteExperienceWitness.cap,
      FiniteExperienceWitness.present]⟩
  constructor
  · change coherentAccess .developed .parallel .parallelSignal
    exact ⟨Or.inr ⟨.specialized, false, by trivial⟩,
      by simp [FiniteExperienceWitness.cap,
        FiniteExperienceWitness.present]⟩
  · decide

/-- Coherent access always entails effective X3 focus and availability. -/
theorem accessed_content_is_focused_and_available (s : State)
    (v : Vehicle) (i : Information)
    (h : contentExperience.access s v i) :
    contentExperience.focus s v ∧ contentExperience.available s v := by
  have hf : Stage11.broadVehicleFocus s v := h.1
```

```
  exact ⟨hf, contentExperience.focusAvailable s v hf⟩

/-! II. Strict levels are an additional Paper-2 structure, not an
    ontological partition of consciousness. -/

def nodeLevel : Stage11.OrganizationalNode → Nat
  | .encompassing => 0
  | .individuation _ => 1
  | .outer _ => 2

structure StrictRelativeHierarchy where
  integrated : Stage11.IntegratedHierarchy
  level : integrated.Node → Nat
  directedOrder : ∀ a s u v,
    integrated.coordinates a s u v → level u < level v

def finiteStrictHierarchy : StrictRelativeHierarchy where
  integrated := contentIntegrated
  level := nodeLevel
  directedOrder := by
    intro a s u v h
    change Stage11.mediates a s u v at h
    cases u <;> cases v <;>
      simp_all [Stage11.mediates, nodeLevel]

/-- The middle organization is strictly below the more inclusive level
    and strictly above its available lower vehicle, at once. -/
theorem individually_nested_but_not_identical
    (H : StrictRelativeHierarchy) (a s p v)
    (hp : H.integrated.development.presentThrough a s p v) :
    H.level H.integrated.encompassing <
      H.level (H.integrated.individuality p) ∧
    H.level (H.integrated.individuality p) <
      H.level (H.integrated.vehicle v) := by
  have roles := Stage11.individuality_is_experiencer_below_and_vehicle_above
    H.integrated a s p v hp
  exact ⟨H.directedOrder a s _ _ roles.2,
    H.directedOrder a s _ _ roles.1⟩

/-! III. An organizational transition calculus independent of any
    particular vehicle table. It is NOT a causal law of matter. -/

structure TransitionRule (P V : Type) where
```

```
  formed : P → V → Prop
  retired : P → V → Prop

def evolveMembership {P V : Type} (rule : TransitionRule P V)
    (prior : P → V → Prop) (p : P) (v : V) : Prop :=
  (prior p v ∧ ¬ rule.retired p v) ∨ rule.formed p v

theorem prior_membership_persists_if_not_retired {P V : Type}
    (rule : TransitionRule P V) (prior : P → V → Prop)
    (p : P) (v : V) (h : prior p v) (hn : ¬ rule.retired p v) :
    evolveMembership rule prior p v := Or.inl ⟨h, hn⟩

theorem genuine_new_membership_requires_formation {P V : Type}
    (rule : TransitionRule P V) (prior : P → V → Prop)
    (p : P) (v : V) (hnew : evolveMembership rule prior p v)
    (hold : ¬ prior p v) : rule.formed p v := by
  rcases hnew with ⟨h, _⟩ | h
  · exact False.elim (hold h)
  · exact h

def finiteTransition : TransitionRule Bool Vehicle where
  formed := fun p v => p = false ∧ v = .technology
  retired := fun p v => p = true ∧ v = .cell

theorem generic_transition_realizes_the_previous_finite_update
    (p : Bool) (v : Vehicle) :
    evolveMembership finiteTransition
      (Stage10.finiteAssociated .collective) p v ↔
      Stage11.updateAssociations .collective
        (Stage10.finiteAssociated .collective) p v := by
  rfl

/-! IV. Cycle index and optional knowledge retention. A trace may
    survive reabsorption without any permanent person code; the choice
    depends on a declared, separately testable retention policy. -/

def originatedTrace (p : Bool) (i : Information) : Prop :=
  ∃ v : Vehicle,
    contentDevelopment.focuses .specialized .developed p v ∧
    contentExperience.access .developed v i

/-- The cycle counter is not identified with physical time. A trace
    crosses boundary n only if its retention policy permits it. -/
```

```
def availableTrace (retain : Nat → Bool) (p : Bool)
    (i : Information) : Nat → Prop
  | 0 => originatedTrace p i
  | n + 1 => availableTrace retain p i n ∧ retain n = true

theorem surviving_trace_has_experienced_origin
    (retain : Nat → Bool) (p : Bool) (i : Information)
    (n : Nat) (h : availableTrace retain p i n) :
    originatedTrace p i := by
  induction n with
  | zero => exact h
  | succ n ih => exact ih h.1

theorem trace_crosses_next_cycle_iff_retained
    (retain : Nat → Bool) (p : Bool) (i : Information) (n : Nat) :
    availableTrace retain p i (n + 1) ↔
    availableTrace retain p i n ∧ retain n = true := by
  rfl

/-- Recovery occurs in an explicitly later collective cycle and through
    a present associated vehicle; the body's presence is not demanded. -/
def recoverableInCycle (retain : Nat → Bool) (n : Nat)
    (p : Bool) (v : Vehicle) (i : Information) : Prop :=
  0 < n ∧ availableTrace retain p i n ∧
  Stage10.finiteAssociated .collective p v ∧
  contentExperience.access .loss v i

theorem parallel_vehicle_recovers_trace_without_body :
    recoverableInCycle (fun _ => true) 1 false .parallel .parallelSignal ∧
    ¬ FiniteExperienceWitness.present .loss .body := by
  constructor
  · refine ⟨by decide, ?_, ?_, ?_⟩
    · change originatedTrace false .parallelSignal ∧ true = true
      constructor
      · refine ⟨.parallel, ?_, ?_⟩
        · change Stage10.finiteFocus .specialized .developed false .parallel
          trivial
        · exact multifocus_has_distinct_accessible_contents.2.2.2.1
      · rfl
    · simp [Stage10.finiteAssociated]
    · change coherentAccess .loss .parallel .parallelSignal
      exact ⟨Or.inl (by trivial),
        by simp [FiniteExperienceWitness.cap,
```

```
        FiniteExperienceWitness.present]⟩
  · simp [FiniteExperienceWitness.present]

theorem loss_of_retention_blocks_later_recovery :
    ¬ recoverableInCycle (fun _ => false) 1 false .parallel
      .parallelSignal := by
  intro h
  exact Bool.noConfusion h.2.1.2

/-! V. A fully D31-faithful Paper-1 core instance, not merely an
    adjacent extensional definition. D31 still specifies necessary
    co-manifestation, not an empirically inferred causal mechanism. -/

def d31Core : CoreTheory :=
  { FiniteWitness.model with
    existentiallyDependsOn := Stage11.extensionalD31 FiniteWitness.model
    individualDependsOnConsciousness := by
      change ∀ w : FiniteWitness.World,
        FiniteWitness.manifestedAt w .individual →
          FiniteWitness.manifestedAt w .consciousness
      intro w _h
      cases w <;> trivial
    bodyDependsOnConsciousness := by
      change ∀ w : FiniteWitness.World,
        FiniteWitness.manifestedAt w .body →
          FiniteWitness.manifestedAt w .consciousness
      intro w _h
      cases w <;> trivial }

theorem d31_is_the_actual_core_dependence_relation
    (x y : d31Core.Manifest) :
    (d31Core.existentiallyDependsOn x y ↔
      ∀ w : d31Core.World,
        d31Core.manifestedAt w x → d31Core.manifestedAt w y) := by
  rfl

theorem d31_preserves_designated_individuation_and_body_dependence :
    d31Core.existentiallyDependsOn d31Core.individual d31Core.consciousness ∧
    d31Core.existentiallyDependsOn d31Core.body d31Core.consciousness :=
  ⟨d31Core.individualDependsOnConsciousness,
    d31Core.bodyDependsOnConsciousness⟩

/-- The active mode can yield a distinct reflexive presentation of a single
```

```
    manifested consciousness, while keeping one ground and one actual world. -/
def presentationMode : Vehicle → FiniteWitness.Mode
  | .body => .bodily
  | .parallel => .parallelMode
  | _ => .humanIndividuation

def differentiatedPresentation (_s : State) : Vehicle → FiniteWitness.Manifest
  | .body => .horizon
  | .parallel => .consciousness
  | _ => .whiteOut

/- Content distinctions are no longer erased by the single nameForm
   referent in the strengthened finite D31 witness. Each designated
   information content receives its own realized manifest form, none
   of which is the separate nonmanifest absolute. -/
def differentiatedInformationMeaning : Information → FiniteWitness.Manifest
  | .base => .nameForm
  | .cellSignal => .horizon
  | .growth => .individual
  | .earthSignal => .experiencedWorld
  | .parallelSignal => .whiteOut

/-- The X1-X7 interpretation is rebuilt over the D31-faithful core.
    This explicit dependent reconstruction avoids a misleading
    assumption that two unequal CoreTheory records are interchangeable. -/
def d31ContentExperience : ExperienceExtension d31Core where
  Vehicle := Vehicle
  Information := Information
  State := State
  infoInhabited := ⟨.base⟩
  informationMeaning := differentiatedInformationMeaning
  informationImmanent := by intro i; rfl
  meaning := FiniteExperienceWitness.meaning
  meaningImmanent := by intro v; rfl
  eligibleManifestForm := fun _ => True
  everyDifferentiatedFormEligible := by intro x _; trivial
  cell := .cell
  bodyVehicle := .body
  earth := .earth
  parallel := .parallel
  technology := .technology
  cellNeBody := by decide
  bodyNeEarth := by decide
```

```
earthNeParallel := by decide
technologyNeBody := by decide
bodyCorrespondence := by rfl
available := FiniteExperienceWitness.present
part := FiniteExperienceWitness.part
partRefl := by
  intro s v
  cases s <;> cases v <;>
    simp [FiniteExperienceWitness.part, FiniteExperienceWitness.present]
partAvailable := by intro s u v h; exact ⟨h.1, h.2.1⟩
partAntisym := by
  intro s u v huv hvu
  cases s <;> cases u <;> cases v <;>
    simp_all [FiniteExperienceWitness.part, FiniteExperienceWitness.present]
partTrans := by
  intro s u v w huv hvw
  cases s <;> cases u <;> cases v <;> cases w <;>
    simp_all [FiniteExperienceWitness.part, FiniteExperienceWitness.present]
capacity := FiniteExperienceWitness.cap
focus := Stage11.broadVehicleFocus
access := coherentAccess
focusAvailable := by
  intro s v h
  exact contentExperience.focusAvailable s v h
capacityAvailable := by intro s v i hc; exact hc.1
accessBound := by intro s v i h; exact h
nestedCapacity := by
  intro s u v i hp hc
  cases s <;> cases u <;> cases v <;> cases i <;>
    simp_all [FiniteExperienceWitness.part,
      FiniteExperienceWitness.cap, FiniteExperienceWitness.present]
presentation := differentiatedPresentation
focusedPresentation := by
  intro s v _
  change FiniteWitness.isExperience (differentiatedPresentation s v)
  cases v <;> simp [differentiatedPresentation,
    FiniteWitness.isExperience]
presentationReflexivelyGrounded := by
  intro s v
  refine ⟨finiteWorldAt s, presentationMode v, .high, by cases s <;> trivial, ?_⟩
  change differentiatedPresentation s v =
    FiniteWitness.reflexiveForm (finiteWorldAt s)
      (presentationMode v) .high .consciousness
```

```
  cases v <;> rfl
 determination := differentiatedPresentation
 determinationBridge := by intro s v; rfl
 informationSpecification := fun _ _ => True
 informationSpecified := by intro d; exact ⟨.base, trivial⟩
 accessedInformationSpecified := by intro s v i _; trivial
 develops := FiniteExperienceWitness.grows
 developmentMonotone := by
  intro s t v i hDev hS hT hCap
  cases s <;> cases t <;> cases v <;> cases i <;>
   simp_all [FiniteExperienceWitness.grows, FiniteExperienceWitness.cap,
    FiniteExperienceWitness.present]
 ordinary := .ordinary
 developed := .developed
 loss := .loss
 ordinaryFocus := by
  change Stage11.broadVehicleFocus .ordinary .body
  exact Or.inl (by trivial)
 bodyAtOrdinary := by simp [FiniteExperienceWitness.present]
 bodyAtDeveloped := by simp [FiniteExperienceWitness.present]
 bodyAbsentAfterLoss := by simp [FiniteExperienceWitness.present]
 parallelAtOrdinary := by simp [FiniteExperienceWitness.present]
 parallelAfterLoss := by simp [FiniteExperienceWitness.present]
 technologyAtOrdinary := by simp [FiniteExperienceWitness.present]
 technologyCapacityBounded := by
  intro i h
  cases i <;> simp_all [FiniteExperienceWitness.cap,
   FiniteExperienceWitness.present]
 technologyProperSubset := by
  exact ⟨.cellSignal,
   by simp [FiniteExperienceWitness.cap, FiniteExperienceWitness.present],
   by simp [FiniteExperienceWitness.cap, FiniteExperienceWitness.present]⟩
 cellNested := by
  simp [FiniteExperienceWitness.part, FiniteExperienceWitness.present]
 bodyNested := by
  simp [FiniteExperienceWitness.part, FiniteExperienceWitness.present]
 designatedDevelopment := by simp [FiniteExperienceWitness.grows]
 strictExpansion := by
  exact ⟨.growth,
   by simp [FiniteExperienceWitness.cap, FiniteExperienceWitness.present],
   by simp [FiniteExperienceWitness.cap, FiniteExperienceWitness.present]⟩

def d31Unified : UnifiedTheory :=
```

```
  { core := d31Core, experience := d31ContentExperience }

def d31Invariant : InvariantFoundation d31Core where
  allManifestImmanent := by intro m; rfl
  consciousnessEveryWorld := by intro w; cases w <;> trivial

def d31Foundation : InvariantUnifiedTheory where
  base := d31Unified
  invariant := d31Invariant
  coupling := {
    worldAt := finiteWorldAt
    bodyAvailabilityBridge := by
      intro s
      change FiniteWitness.manifestedAt (finiteWorldAt s) .body ↔
        FiniteExperienceWitness.present s .body
      cases s <;> simp [finiteWorldAt, FiniteWitness.manifestedAt,
        FiniteExperienceWitness.present] }

def d31Development : DevelopmentalIndividuation where
  foundation := d31Foundation
  Phase := Stage10.Phase
  Code := Bool
  phaseNonempty := ⟨.collective⟩
  codeNonempty := ⟨false⟩
  rank := Stage10.phaseRank
  collective := .collective
  specialized := .specialized
  reabsorbed := .reabsorbed
  differentiatedStages := by decide
  sameAt := Stage10.finiteSameAt
  sameRefl := by intro a p; cases a <;> simp [Stage10.finiteSameAt]
  sameSymm := by
    intro a p q h
    cases a <;> simp_all [Stage10.finiteSameAt]
  sameTrans := by
    intro a p q r h1 h2
    cases a <;> simp_all [Stage10.finiteSameAt]
  refinement := by intro p q _; trivial
  instantiated := Stage10.finiteInstantiated
  associated := Stage10.finiteAssociated
  associationRequiresLocus := by
    intro a p v h
    cases a <;> cases p <;>
```

```
    simp_all [Stage10.finiteAssociated, Stage10.finiteInstantiated]
  presentThrough := Stage10.finitePresent
  presentIff := by intro a s p v; rfl
  focuses := Stage10.finiteFocus
  focusRequiresPresence := by
    intro a s p v h
    cases a <;> cases s <;> cases p <;> cases v <;>
      simp_all [Stage10.finiteFocus, Stage10.finitePresent,
        Stage10.finiteAssociated, FiniteExperienceWitness.present]
  innerToOuter := Stage10.finiteInner
  innerPrecedesRank := by
    intro u v h
    change FiniteWitness.differentiationRank
      (FiniteExperienceWitness.meaning u) ≤
        FiniteWitness.differentiationRank (FiniteExperienceWitness.meaning v)
    cases u <;> cases v <;>
      simp_all [Stage10.finiteInner, FiniteExperienceWitness.meaning,
        FiniteWitness.differentiationRank]
  formsFrom := Stage10.finiteFormation
  formationUsesInner := by
    intro a p u v h
    cases a <;> cases p <;> cases u <;> cases v <;>
      simp_all [Stage10.finiteFormation, Stage10.finiteAssociated,
        Stage10.finiteInner]
  reabsorptionOfLoci := by
    intro p h
    cases p <;> exact h

def d31Integrated : Stage11.IntegratedHierarchy where
  development := d31Development
  Node := Stage11.OrganizationalNode
  encompassing := .encompassing
  individuality := .individuation
  vehicle := .outer
  distinctLevels := by intro p v h; cases h
  coordinates := Stage11.mediates
  individualCoordinatesLower := by intro a s p v h; exact h
  higherCoordinatesIndividual := by intro a s p h; exact h
  focusCoherentWithX3 := by
    intro a s p v h
    change Stage10.finiteFocus a s p v at h
    change Stage11.broadVehicleFocus s v
    exact Or.inr ⟨a, p, h⟩
```

```
  sharedReflexiveGeneration := by
    intro a s p v _
    refine ⟨finiteWorldAt s, presentationMode v, .high, ?_, ?_, ?_⟩
    · cases s <;> trivial
    · rfl
    · change differentiatedPresentation s v =
        FiniteWitness.reflexiveForm (finiteWorldAt s)
          (presentationMode v) .high .consciousness
      cases v <;> rfl

def d31StrictHierarchy : StrictRelativeHierarchy where
  integrated := d31Integrated
  level := nodeLevel
  directedOrder := by
    intro a s u v h
    change Stage11.mediates a s u v at h
    cases u <;> cases v <;> simp_all [Stage11.mediates, nodeLevel]

/-- The complete relative-hierarchy witness now shares the Paper-1 core
    whose existential dependence really IS published Definition D31. -/
theorem integrated_experience_with_exact_paper1_D31_is_satisfiable :
    Nonempty StrictRelativeHierarchy := ⟨d31StrictHierarchy⟩

theorem exact_D31_and_two_distinct_access_streams_coexist :
    (∀ x y : d31StrictHierarchy.integrated.development.foundation.base.core.Manifest,
      d31StrictHierarchy.integrated.development.foundation.base.core.existentiallyDependsOn x y ↔
      ∀ w : d31StrictHierarchy.integrated.development.foundation.base.core.World,
        d31StrictHierarchy.integrated.development.foundation.base.core.manifestedAt w x →
        d31StrictHierarchy.integrated.development.foundation.base.core.manifestedAt w y) ∧
    d31ContentExperience.access .developed .body .growth ∧
    d31ContentExperience.access .developed .parallel .parallelSignal := by
  constructor
  · intro x y
    exact d31_is_the_actual_core_dependence_relation x y
  constructor
  · change coherentAccess .developed .body .growth
    exact multifocus_has_distinct_accessible_contents.2.2.1
  · change coherentAccess .developed .parallel .parallelSignal
    exact multifocus_has_distinct_accessible_contents.2.2.2.1

theorem experience_origin_of_persisted_traces_is_D31_compatible
    (retain : Nat → Bool) (p : Bool) (i : Information) (n : Nat)
    (h : availableTrace retain p i n) :
```

```
    ∃ v : d31ContentExperience.Vehicle,
      d31Development.focuses .specialized .developed p v ∧
      d31ContentExperience.access .developed v i := by
  exact surviving_trace_has_experienced_origin retain p i n h

theorem no_body_is_required_for_the_D31_invariant_consciousness :
    (∀ w : d31Core.World, d31Core.manifestedAt w d31Core.consciousness) ∧
    ¬ d31Core.manifestedAt .bareConsciousness d31Core.body ∧
    d31Core.existentiallyDependsOn d31Core.body d31Core.consciousness := by
  exact ⟨d31Invariant.consciousnessEveryWorld,
    by
      change ¬ FiniteWitness.manifestedAt .bareConsciousness .body
      simp [FiniteWitness.manifestedAt],
    d31Core.bodyDependsOnConsciousness⟩

end ArchitectureOfExperience.Stage12

/-!
Stage 13: a world-coherent nonbodily model, differentiated phenomenal
presentation, asymmetric D31 witnesses, and explicit evolving cycle states.
The original Paper-1 axioms are unchanged; its finite witness is enriched with
an additional admissible model-world. All existence and experiential claims
below remain model-relative, not empirical assertions.
-/
namespace ArchitectureOfExperience.Stage13

open ArchitectureOfManifestation
open ArchitectureOfExperience
open ArchitectureOfExperience.FiniteExperienceWitness
open ArchitectureOfExperience.Stage10
open ArchitectureOfExperience.Stage12

/-- Every actually available experiential vehicle has a manifest referent
    in the exact model-world assigned to its experiential state. -/
theorem available_vehicle_has_world_manifestation
    (s : State) (v : Vehicle)
    (h : d31ContentExperience.available s v) :
    d31Core.manifestedAt (Stage6.finiteWorldAt s)
      (d31ContentExperience.meaning v) := by
  change FiniteExperienceWitness.present s v at h
  change FiniteWitness.manifestedAt (Stage6.finiteWorldAt s)
    (FiniteExperienceWitness.meaning v)
  cases s <;> cases v <;>
```

```
    simp_all [Stage6.finiteWorldAt, FiniteWitness.manifestedAt,
      FiniteExperienceWitness.meaning, FiniteExperienceWitness.present]

/-- Access to information cannot be assigned to a model-world in which
    the information's mapped manifest form is absent. -/
theorem accessed_information_has_world_manifestation
    (s : State) (v : Vehicle) (i : Information)
    (_h : d31ContentExperience.access s v i) :
    d31Core.manifestedAt (Stage6.finiteWorldAt s)
      (d31ContentExperience.informationMeaning i) := by
  change FiniteWitness.manifestedAt (Stage6.finiteWorldAt s)
    (Stage12.differentiatedInformationMeaning i)
  cases s <;> cases i <;>
    simp [Stage6.finiteWorldAt, FiniteWitness.manifestedAt,
      Stage12.differentiatedInformationMeaning]

/-- The designated individual can be instantiated without the body,
    whereas the body does not occur without that individual in this witness. -/
theorem nonbodily_individual_is_a_genuine_admissible_world :
    d31Core.manifestedAt .nonbodily d31Core.individual ∧
    ¬ d31Core.manifestedAt .nonbodily d31Core.body ∧
    d31Core.manifestedAt .bareConsciousness d31Core.consciousness ∧
    ¬ d31Core.manifestedAt .bareConsciousness d31Core.individual := by
  change FiniteWitness.manifestedAt .nonbodily .individual ∧
    ¬ FiniteWitness.manifestedAt .nonbodily .body ∧
    FiniteWitness.manifestedAt .bareConsciousness .consciousness ∧
    ¬ FiniteWitness.manifestedAt .bareConsciousness .individual
  simp [FiniteWitness.manifestedAt]

/-- The original D31 has meaningful directionality in the enriched
    three-world model: the body needs an individual, not vice versa. -/
theorem D31_body_dependence_is_not_symmetric :
    d31Core.existentiallyDependsOn d31Core.body d31Core.individual ∧
    ¬ d31Core.existentiallyDependsOn d31Core.individual d31Core.body := by
  constructor
  · change ∀ w : FiniteWitness.World,
      FiniteWitness.manifestedAt w .body →
        FiniteWitness.manifestedAt w .individual
    intro w hw
    cases w <;> simp_all [FiniteWitness.manifestedAt]
  · change ¬ (∀ w : FiniteWitness.World,
        FiniteWitness.manifestedAt w .individual →
          FiniteWitness.manifestedAt w .body)
```

```
    intro h
    have hw := h .nonbodily (by
      simp [FiniteWitness.manifestedAt])
    simp [FiniteWitness.manifestedAt] at hw

/-- Unlike the former constant white-out interpretation, the two already
    accessible informational streams can also have distinct presentations. -/
theorem simultaneous_distinct_phenomenal_presentations :
    d31ContentExperience.access .developed .body .growth ∧
    d31ContentExperience.access .developed .parallel .parallelSignal ∧
    d31ContentExperience.presentation .developed .body ≠
      d31ContentExperience.presentation .developed .parallel ∧
    d31Core.isExperience
      (d31ContentExperience.presentation .developed .body) ∧
    d31Core.isExperience
      (d31ContentExperience.presentation .developed .parallel) := by
  refine ⟨Stage12.exact_D31_and_two_distinct_access_streams_coexist.2.1,
    Stage12.exact_D31_and_two_distinct_access_streams_coexist.2.2,
    ?_, ?_, ?_⟩
  · change FiniteWitness.Manifest.horizon ≠ .consciousness
    decide
  · change FiniteWitness.isExperience .horizon
    trivial
  · change FiniteWitness.isExperience .consciousness
    trivial

/-- A6 and X4 refer to a differentiation in the same model-world as the
    current experiential state; the mode determines the experiential content. -/
theorem reflexive_presentation_uses_current_world
    (s : State) (v : Vehicle) :
    ∃ mode strength,
      d31Core.active (Stage6.finiteWorldAt s) mode ∧
      d31Core.boundaryForm (Stage6.finiteWorldAt s) mode strength
        d31Core.consciousness = d31Core.individual ∧
      d31ContentExperience.presentation s v =
        d31Core.reflexiveForm (Stage6.finiteWorldAt s)
          mode strength d31Core.consciousness := by
  refine ⟨Stage12.presentationMode v, .high, by cases s <;> trivial, by rfl, ?_⟩
  change Stage12.differentiatedPresentation s v =
    FiniteWitness.reflexiveForm (Stage6.finiteWorldAt s)
      (Stage12.presentationMode v) .high .consciousness
  cases v <;> rfl
```

```
/-- In any strict ordered hierarchy, two coordination steps imply a
    genuinely more-inclusive to more-differentiated path; feedback cycles
    are impossible without assuming this conclusion directly. -/
theorem two_step_hierarchy_is_strict
    (H : StrictRelativeHierarchy) (a s u v w)
    (huv : H.integrated.coordinates a s u v)
    (hvw : H.integrated.coordinates a s v w) :
    H.level u < H.level w :=
  Nat.lt_trans (H.directedOrder a s u v huv)
    (H.directedOrder a s v w hvw)

theorem strict_hierarchy_has_no_two_way_loop
    (H : StrictRelativeHierarchy) (a s u v)
    (huv : H.integrated.coordinates a s u v) :
    ¬ H.integrated.coordinates a s v u := by
  intro hvu
  have h1 := H.directedOrder a s u v huv
  have h2 := H.directedOrder a s v u hvu
  exact Nat.lt_asymm h1 h2

/-! A genuine indexed path: association, development phase and world-state
    change with the cycle counter. The rule does not assume identity transfer. -/

def cyclePhase : Nat → Stage10.Phase
  | 0 => .specialized
  | 1 => .reabsorbed
  | _ + 2 => .collective

def cycleState : Nat → State
  | 0 => .developed
  | _ + 1 => .loss

def cycleRule (n : Nat) : TransitionRule Bool Vehicle where
  formed := fun p v => n = 1 ∧ p = false ∧ v = .parallel
  retired := fun p v => n = 0 ∧ p = false ∧ v = .body

def cycleAssociation : Nat → Bool → Vehicle → Prop
  | 0, p, v => p = false ∧ v = .body
  | n + 1, p, v =>
      evolveMembership (cycleRule n) (cycleAssociation n) p v

def cycleOrigin (n : Nat) (p : Bool) (i : Information) : Prop :=
  ∃ v : Vehicle,
```

```
    cycleAssociation n p v ∧
    d31ContentExperience.access (cycleState n) v i

/-- An item originated in focused access remains retained through all
    subsequent selected boundaries, without requiring the old association. -/
def cycleTrace (retain : Nat → Bool) (p : Bool)
    (i : Information) : Nat → Prop
  | 0 => cycleOrigin 0 p i
  | n + 1 => cycleTrace retain p i n ∧ retain n = true

def cycleRecovery (retain : Nat → Bool) (n : Nat)
    (p : Bool) (v : Vehicle) (i : Information) : Prop :=
  0 < n ∧ cycleTrace retain p i n ∧
  cycleAssociation n p v ∧
  d31ContentExperience.access (cycleState n) v i

theorem cycle_trace_always_has_earlier_experiential_source
    (retain : Nat → Bool) (p : Bool) (i : Information)
    (n : Nat) (h : cycleTrace retain p i n) :
    cycleOrigin 0 p i := by
  induction n with
  | zero => exact h
  | succ n ih => exact ih h.1

theorem dynamic_cycle_changes_phase_vehicle_and_world :
    cyclePhase 0 = .specialized ∧
    cyclePhase 1 = .reabsorbed ∧
    cyclePhase 2 = .collective ∧
    cycleAssociation 0 false .body ∧
    ¬ cycleAssociation 1 false .body ∧
    cycleAssociation 2 false .parallel ∧
    ¬ d31Core.manifestedAt (Stage6.finiteWorldAt (cycleState 2))
      d31Core.body ∧
    d31Core.manifestedAt (Stage6.finiteWorldAt (cycleState 2))
      d31Core.individual := by
  constructor
  · rfl
  constructor
  · rfl
  constructor
  · rfl
  constructor
  · simp [cycleAssociation]
```

```
  constructor
  · simp [cycleAssociation, cycleRule, evolveMembership]
  constructor
  · simp [cycleAssociation, cycleRule, evolveMembership]
  constructor
  · change ¬ FiniteWitness.manifestedAt .nonbodily .body
    simp [FiniteWitness.manifestedAt]
  · change FiniteWitness.manifestedAt .nonbodily .individual
    simp [FiniteWitness.manifestedAt]

theorem learned_through_body_recovered_through_new_vehicle :
    cycleRecovery (fun _ => true) 2 false .parallel .base ∧
    ¬ cycleAssociation 2 false .body ∧
    ¬ d31Core.manifestedAt (Stage6.finiteWorldAt (cycleState 2))
      d31Core.body := by
  constructor
  · refine ⟨by decide, ?_, ?_, ?_⟩
    · change (cycleOrigin 0 false .base ∧ true = true) ∧ true = true
      constructor
      · constructor
        · refine ⟨.body, ?_, ?_⟩
          · simp [cycleAssociation]
          · change Stage12.coherentAccess .developed .body .base
            exact ⟨Or.inl (by trivial),
              by simp [FiniteExperienceWitness.cap,
                FiniteExperienceWitness.present]⟩
        · rfl
      · rfl
    · simp [cycleAssociation, cycleRule, evolveMembership]
    · change Stage12.coherentAccess .loss .parallel .base
      exact ⟨Or.inl (by trivial),
        by simp [FiniteExperienceWitness.cap,
          FiniteExperienceWitness.present]⟩
  constructor
  · simp [cycleAssociation, cycleRule, evolveMembership]
  · change ¬ FiniteWitness.manifestedAt .nonbodily .body
    simp [FiniteWitness.manifestedAt]

end ArchitectureOfExperience.Stage13

/-!
Stage 14 corrects the modal activation/manifestation relationship from
Paper 1, adds content-sensitive presentations and models repeated cycles
```

```
with genuinely new vehicle instances and phase-relative owner profiles.
It does not add an axiom that any person survives a reabsorption.
-/
namespace ArchitectureOfExperience.Stage14

open ArchitectureOfManifestation
open ArchitectureOfExperience
open ArchitectureOfExperience.FiniteExperienceWitness
open ArchitectureOfExperience.Stage10
open ArchitectureOfExperience.Stage12

/-! I. Explicit modal realization. Inactive differentiation cannot
    generate the stipulated human individual in the bare world. -/

structure ActivationManifestationBridge (T : CoreTheory) where
  humanMode : T.Mode
  activeBoundaryManifest : ∀ (w : T.World) (a : T.Mode)
      (s : T.Strength), T.active w a → T.positiveStrength s →
      T.manifestedAt w (T.boundaryForm w a s T.consciousness)
  inactiveHumanOmission : ∀ (w : T.World),
      ¬ T.active w humanMode → ¬ T.manifestedAt w T.individual

def coherentModalWitness : ActivationManifestationBridge d31Core where
  humanMode := .humanIndividuation
  activeBoundaryManifest := by
    intro w a strength ha hp
    change FiniteWitness.active w a at ha
    change FiniteWitness.positiveStrength strength at hp
    change FiniteWitness.manifestedAt w
      (FiniteWitness.boundaryForm w a strength .consciousness)
    cases w <;> cases a <;> cases strength <;>
      simp_all [FiniteWitness.active, FiniteWitness.positiveStrength,
        FiniteWitness.manifestedAt, FiniteWitness.boundaryForm]
  inactiveHumanOmission := by
    intro w h
    change ¬ FiniteWitness.active w .humanIndividuation at h
    change ¬ FiniteWitness.manifestedAt w .individual
    cases w <;> simp_all [FiniteWitness.active, FiniteWitness.manifestedAt]

theorem paper1_D9_D32_are_consistent_in_the_extended_witness :
    (¬ d31Core.active .bareConsciousness .humanIndividuation) ∧
    (¬ d31Core.manifestedAt .bareConsciousness d31Core.individual) ∧
    (d31Core.active .human .humanIndividuation) ∧
```

```
    (d31Core.manifestedAt .human d31Core.individual) := by
  change (¬ FiniteWitness.active .bareConsciousness .humanIndividuation) ∧
    (¬ FiniteWitness.manifestedAt .bareConsciousness .individual) ∧
    FiniteWitness.active .human .humanIndividuation ∧
    FiniteWitness.manifestedAt .human .individual
  simp [FiniteWitness.active, FiniteWitness.manifestedAt]

/-! II. Information-sensitive form and phenomenal presentation.
    A presentation signature has BOTH an experiential form and a manifest
    content referent; information need not determine personhood. -/

def experientialSignature (s : State) (v : Vehicle) (i : Information) :
    FiniteWitness.Manifest × FiniteWitness.Manifest :=
  (d31ContentExperience.presentation s v,
    d31ContentExperience.informationMeaning i)

theorem information_distinctions_are_manifestly_noncollapsed :
    d31ContentExperience.informationMeaning .growth ≠
      d31ContentExperience.informationMeaning .parallelSignal ∧
    d31ContentExperience.informationMeaning .base ≠
      d31ContentExperience.informationMeaning .growth := by
  change FiniteWitness.Manifest.individual ≠ .whiteOut ∧
    FiniteWitness.Manifest.nameForm ≠ .individual
  decide

theorem content_sensitive_presentations_at_simultaneous_focus :
    d31ContentExperience.access .developed .body .growth ∧
    d31ContentExperience.access .developed .parallel .parallelSignal ∧
    experientialSignature .developed .body .growth ≠
      experientialSignature .developed .parallel .parallelSignal ∧
    d31Core.manifestedAt .human
      (d31ContentExperience.informationMeaning .growth) ∧
    d31Core.manifestedAt .human
      (d31ContentExperience.informationMeaning .parallelSignal) := by
  refine ⟨Stage12.exact_D31_and_two_distinct_access_streams_coexist.2.1,
    Stage12.exact_D31_and_two_distinct_access_streams_coexist.2.2,
    ?_, ?_, ?_⟩
  · change (FiniteWitness.Manifest.horizon, FiniteWitness.Manifest.individual) ≠
      (FiniteWitness.Manifest.consciousness, FiniteWitness.Manifest.whiteOut)
    decide
  · change FiniteWitness.manifestedAt .human .individual
    trivial
  · change FiniteWitness.manifestedAt .human .whiteOut
```

```
    trivial

/-! III. Repeated period-three development. Model-worlds are still the
    admissible realizations of Paper 1; nextStep is an additional explicit
    Paper-2 transition relation, not a deduction from possible-world logic. -/

def periodicPhase (n : Nat) : Phase :=
  if n % 3 = 0 then .specialized
  else if n % 3 = 1 then .reabsorbed
  else .collective

def periodicWorld (n : Nat) : FiniteWitness.World :=
  if n % 3 = 0 then .human
  else if n % 3 = 1 then .bareConsciousness
  else .nonbodily

def periodicState (n : Nat) : State :=
  if n % 3 = 0 then .developed else .loss

def nextStep (n m : Nat) : Prop := m = n + 1

inductive OwnerProfile where
  | absent
  | collective (epoch : Nat)
  | specialized (epoch : Nat)
  deriving DecidableEq

def ownerAt (n : Nat) : OwnerProfile :=
  if n % 3 = 0 then .specialized (n / 3)
  else if n % 3 = 1 then .absent
  else .collective (n / 3)

theorem phases_recur_after_three_steps (n : Nat) :
    periodicPhase (n + 3) = periodicPhase n := by
  simp [periodicPhase]

theorem model_worlds_recur_after_three_steps (n : Nat) :
    periodicWorld (n + 3) = periodicWorld n := by
  simp [periodicWorld]

theorem repeated_cycle_changes_the_organization :
    periodicPhase 0 = .specialized ∧
    periodicPhase 1 = .reabsorbed ∧
```

```
    periodicPhase 2 = .collective ∧
    periodicPhase 3 = .specialized ∧
    periodicPhase 4 = .reabsorbed ∧
    periodicPhase 5 = .collective ∧
    periodicPhase 6 = .specialized ∧
    ownerAt 0 = .specialized 0 ∧
    ownerAt 1 = .absent ∧
    ownerAt 2 = .collective 0 ∧
    ownerAt 3 = .specialized 1 ∧
    ownerAt 4 = .absent ∧
    ownerAt 5 = .collective 1 ∧
    ownerAt 6 = .specialized 2 ∧
    ownerAt 0 ≠ ownerAt 3 := by
  decide

theorem intermediate_reabsorption_lacks_an_individual :
    periodicWorld 1 = .bareConsciousness ∧
    ¬ d31Core.manifestedAt (periodicWorld 1) d31Core.individual ∧
    periodicWorld 2 = .nonbodily ∧
    d31Core.manifestedAt (periodicWorld 2) d31Core.individual ∧
    periodicWorld 3 = .human := by
  change periodicWorld 1 = .bareConsciousness ∧
    ¬ FiniteWitness.manifestedAt (periodicWorld 1) .individual ∧
    periodicWorld 2 = .nonbodily ∧
    FiniteWitness.manifestedAt (periodicWorld 2) .individual ∧
    periodicWorld 3 = .human
  simp [periodicWorld, FiniteWitness.manifestedAt]

structure VehicleInstance where
  epoch : Nat
  kind : Vehicle
  deriving DecidableEq

def bodyInstance (epoch : Nat) : VehicleInstance := ⟨epoch, .body⟩
def parallelInstance (epoch : Nat) : VehicleInstance := ⟨epoch, .parallel⟩

def retiredAt (n : Nat) (v : VehicleInstance) : Prop :=
  (n % 3 = 0 ∧ v = bodyInstance (n / 3)) ∨
  (n % 3 = 2 ∧ v = parallelInstance (n / 3))

def formedAt (n : Nat) (v : VehicleInstance) : Prop :=
  (n % 3 = 1 ∧ v = parallelInstance (n / 3)) ∨
```

```
  (n % 3 = 2 ∧ v = bodyInstance (n / 3 + 1))

def cyclicalMembership : Nat → VehicleInstance → Prop
  | 0, v => v = bodyInstance 0
  | n + 1, v =>
      (cyclicalMembership n v ∧ ¬ retiredAt n v) ∨ formedAt n v

theorem genuinely_new_vehicle_requires_formation
    (n : Nat) (v : VehicleInstance)
    (old : ¬ cyclicalMembership n v)
    (new : cyclicalMembership (n + 1) v) : formedAt n v := by
  change (cyclicalMembership n v ∧ ¬ retiredAt n v) ∨ formedAt n v at new
  cases new with
  | inl h => exact False.elim (old h.1)
  | inr h => exact h

theorem two_successive_cycles_really_replace_vehicle_instances :
    cyclicalMembership 0 (bodyInstance 0) ∧
    ¬ cyclicalMembership 1 (bodyInstance 0) ∧
    cyclicalMembership 2 (parallelInstance 0) ∧
    ¬ cyclicalMembership 2 (bodyInstance 0) ∧
    cyclicalMembership 3 (bodyInstance 1) ∧
    ¬ cyclicalMembership 3 (bodyInstance 0) ∧
    ¬ cyclicalMembership 3 (parallelInstance 0) ∧
    cyclicalMembership 5 (parallelInstance 1) ∧
    ¬ cyclicalMembership 5 (parallelInstance 0) ∧
    cyclicalMembership 6 (bodyInstance 2) ∧
    bodyInstance 0 ≠ bodyInstance 1 ∧
    parallelInstance 0 ≠ parallelInstance 1 := by
  simp [cyclicalMembership, retiredAt, formedAt,
    bodyInstance, parallelInstance]

/- In Paper 1 a world denotes an admissible realization, not a moment of
   physical time. A trajectory through its worlds therefore requires an
   explicit extra state/transition relationship; this structure declares
   that relationship without claiming it follows from D8 alone. -/
structure ModalDevelopmentTrajectory (T : CoreTheory) where
  worldAt : Nat → T.World
  next : Nat → Nat → Prop
  successorCharacterization : ∀ n m, next n m ↔ m = n + 1
  consciousnessAlongTrajectory : ∀ n,
    T.manifestedAt (worldAt n) T.consciousness
```

```
def cyclicModalTrajectory : ModalDevelopmentTrajectory d31Core where
  worldAt := periodicWorld
  next := nextStep
  successorCharacterization := by
    intro n m
    rfl
  consciousnessAlongTrajectory := by
    intro n
    change FiniteWitness.manifestedAt (periodicWorld n) .consciousness
    by_cases h0 : n % 3 = 0
    · simp [periodicWorld, h0, FiniteWitness.manifestedAt]
    · by_cases h1 : n % 3 = 1
      · simp [periodicWorld, h1, FiniteWitness.manifestedAt]
      · simp [periodicWorld, h0, h1, FiniteWitness.manifestedAt]

theorem developmental_worlds_have_one_invariant_ground (n : Nat) :
    d31Core.manifestedAt (periodicWorld n) d31Core.consciousness ∧
    nextStep n (n + 1) :=
  ⟨cyclicModalTrajectory.consciousnessAlongTrajectory n, rfl⟩

theorem phase_relative_owner_and_actual_world_agree (n : Nat) :
    (ownerAt n = .absent ↔
      ¬ d31Core.manifestedAt (periodicWorld n) d31Core.individual) := by
  change ownerAt n = .absent ↔
    ¬ FiniteWitness.manifestedAt (periodicWorld n) .individual
  by_cases h0 : n % 3 = 0
  · simp [ownerAt, periodicWorld, h0, FiniteWitness.manifestedAt]
  · by_cases h1 : n % 3 = 1
    · simp [ownerAt, periodicWorld, h1,
        FiniteWitness.manifestedAt]
    · simp [ownerAt, periodicWorld, h0, h1,
        FiniteWitness.manifestedAt]

/- Information is traced against the one manifest architecture, not a
   numerically unchanging owner code. This allows dissolution, a different
   specialized profile, and optional recovery through another vehicle. -/

def cyclicalAccess (n : Nat) (v : VehicleInstance)
    (i : Information) : Prop :=
  cyclicalMembership n v ∧
  d31ContentExperience.access (periodicState n) v.kind i

def initialExperientialSource (i : Information) : Prop :=
```

```
  ∃ v : VehicleInstance, cyclicalAccess 0 v i

def universalInformationTrace (retain : Nat → Bool)
    (i : Information) : Nat → Prop
  | 0 => initialExperientialSource i
  | n + 1 => universalInformationTrace retain i n ∧ retain n = true

def cyclicalRecovery (retain : Nat → Bool) (n : Nat)
    (v : VehicleInstance) (i : Information) : Prop :=
  0 < n ∧ universalInformationTrace retain i n ∧ cyclicalAccess n v i

theorem any_retained_item_has_an_experiential_source
    (retain : Nat → Bool) (i : Information) (n : Nat)
    (h : universalInformationTrace retain i n) :
    initialExperientialSource i := by
  induction n with
  | zero => exact h
  | succ n ih => exact ih h.1

theorem base_information_was_accessed_through_first_body :
    initialExperientialSource .base := by
  refine ⟨bodyInstance 0, ?_, ?_⟩
  · rfl
  · change Stage12.coherentAccess .developed .body .base
    exact ⟨Or.inl (by trivial),
      by simp [FiniteExperienceWitness.cap,
        FiniteExperienceWitness.present]⟩

theorem optional_retention_can_preserve_information_through_all_indices
    (n : Nat) :
    universalInformationTrace (fun _ => true) .base n := by
  induction n with
  | zero => exact base_information_was_accessed_through_first_body
  | succ n ih => exact ⟨ih, rfl⟩

theorem a_retained_trace_is_a_potential_not_a_manifest_form_in_reabsorption :
    universalInformationTrace (fun _ => true) .base 1 ∧
    d31Core.manifestedAt (periodicWorld 1) d31Core.consciousness ∧
    ¬ d31Core.manifestedAt (periodicWorld 1)
      (d31ContentExperience.informationMeaning .base) := by
  constructor
  · exact optional_retention_can_preserve_information_through_all_indices 1
  constructor
```

```
  · exact cyclicModalTrajectory.consciousnessAlongTrajectory 1
  · change ¬ FiniteWitness.manifestedAt (periodicWorld 1) .nameForm
    simp [periodicWorld, FiniteWitness.manifestedAt]

theorem across_reabsorption_information_can_be_accessed_by_new_vehicles :
    cyclicalRecovery (fun _ => true) 2 (parallelInstance 0) .base ∧
    cyclicalRecovery (fun _ => true) 5 (parallelInstance 1) .base ∧
    ownerAt 1 = .absent ∧
    ownerAt 4 = .absent ∧
    ownerAt 0 ≠ ownerAt 3 ∧
    parallelInstance 0 ≠ parallelInstance 1 := by
  refine ⟨?_, ?_, by decide, by decide, by decide, by decide⟩
  · refine ⟨by decide,
      optional_retention_can_preserve_information_through_all_indices 2,
      ?_, ?_⟩
    · simp [cyclicalMembership, retiredAt, formedAt,
        bodyInstance, parallelInstance]
    · change Stage12.coherentAccess .loss .parallel .base
      exact ⟨Or.inl (by trivial),
        by simp [FiniteExperienceWitness.cap,
          FiniteExperienceWitness.present]⟩
  · refine ⟨by decide,
      optional_retention_can_preserve_information_through_all_indices 5,
      ?_, ?_⟩
    · simp [cyclicalMembership, retiredAt, formedAt,
        bodyInstance, parallelInstance]
    · change Stage12.coherentAccess .loss .parallel .base
      exact ⟨Or.inl (by trivial),
        by simp [FiniteExperienceWitness.cap,
          FiniteExperienceWitness.present]⟩

theorem both_recovery_worlds_manifest_the_vehicle_and_its_content :
    d31Core.manifestedAt (periodicWorld 2)
      (d31ContentExperience.meaning .parallel) ∧
    d31Core.manifestedAt (periodicWorld 2)
      (d31ContentExperience.informationMeaning .base) ∧
    d31Core.manifestedAt (periodicWorld 5)
      (d31ContentExperience.meaning .parallel) ∧
    d31Core.manifestedAt (periodicWorld 5)
      (d31ContentExperience.informationMeaning .base) ∧
    ¬ d31Core.manifestedAt (periodicWorld 4) d31Core.individual := by
  change FiniteWitness.manifestedAt (periodicWorld 2) .nameForm ∧
    FiniteWitness.manifestedAt (periodicWorld 2) .nameForm ∧
```

```
    FiniteWitness.manifestedAt (periodicWorld 5) .nameForm ∧
    FiniteWitness.manifestedAt (periodicWorld 5) .nameForm ∧
    ¬ FiniteWitness.manifestedAt (periodicWorld 4) .individual
  simp [periodicWorld, FiniteWitness.manifestedAt]

theorem information_recovery_is_not_forced_across_reabsorption :
    ¬ cyclicalRecovery (fun _ => false) 2 (parallelInstance 0) .base := by
  intro h
  exact Bool.noConfusion h.2.1.2

end ArchitectureOfExperience.Stage14

/-!
Stage 15 combines the previously separate modal, owner, vehicle and
informational interpretations. These additions are conditional finite-model
constructions, not empirical discoveries or axioms of the published Paper 1.
-/
namespace ArchitectureOfExperience.Stage15

open ArchitectureOfManifestation
open ArchitectureOfManifestation.FiniteWitness
open ArchitectureOfExperience.FiniteExperienceWitness
open ArchitectureOfExperience.Stage14

/-! A strengthened D9/D32 interpretation: mode-specific physical activation
    cannot occur in a world lacking that bodily form. -/

def refinedActive : FiniteWitness.World → FiniteWitness.Mode → Prop
  | .bareConsciousness, _ => False
  | .nonbodily, .bodily => False
  | _, _ => True

def refinedBoundaryForm (_w : FiniteWitness.World)
    (a : FiniteWitness.Mode) (s : FiniteWitness.Strength)
    (_x : FiniteWitness.Manifest) : FiniteWitness.Manifest :=
  match s with
  | .zero | .epsilon => .horizon
  | .high => match a with
    | .humanIndividuation => .individual
    | .bodily => .body
    | .parallelMode => .nameForm

def modalFaithfulCore : CoreTheory :=
```

```
{ Stage12.d31Core with
  active := refinedActive
  activeWitness := ⟨.human, .humanIndividuation, by trivial⟩
  boundaryForm := refinedBoundaryForm
  boundaryImmanent := by
    intro w a s _h
    change FiniteWitness.immanent
      (refinedBoundaryForm w a s .consciousness) .consciousness
    rfl
  differenceWithoutSeparation := by
    intro w a s _h
    constructor
    · change refinedBoundaryForm w a s .consciousness ≠ .consciousness
      cases s <;> cases a <;> simp [refinedBoundaryForm]
    · change ¬ FiniteWitness.ontSeparate
        (refinedBoundaryForm w a s .consciousness) .consciousness
      simp [FiniteWitness.ontSeparate]
  monotoneDifferentiation := by
    intro w a s₁ s₂ h
    change FiniteWitness.strengthLE s₁ s₂ at h
    change FiniteWitness.differentiationRank
      (refinedBoundaryForm w a s₁ .consciousness) ≤
        FiniteWitness.differentiationRank
          (refinedBoundaryForm w a s₂ .consciousness)
    cases s₁ <;> cases s₂ <;> cases a <;>
      simp_all [FiniteWitness.strengthLE, refinedBoundaryForm,
        FiniteWitness.differentiationRank]
  horizonConvergence := by
    intro w a _h
    rfl
  horizonCoordinateInfimum := by
    intro w a i _h
    cases i
    constructor
    · intro n _hn
      change 0 ≤ n
      exact Nat.zero_le _
    · intro l hl
      change l ≤ 0
      apply hl 0
      change ∃ s, FiniteWitness.positiveStrength s ∧
        FiniteWitness.coordinate .axis
          (refinedBoundaryForm w a s .consciousness) = 0
```

```
      refine ⟨.epsilon, ?_, ?_⟩
      · simp [FiniteWitness.positiveStrength]
      · rfl
  }

def humanDesignationStrength (_w : FiniteWitness.World) :
    FiniteWitness.Strength := .high

theorem exact_modal_activation_matches_designated_forms
    (w : FiniteWitness.World) :
    (modalFaithfulCore.active w .humanIndividuation ↔
      modalFaithfulCore.manifestedAt w modalFaithfulCore.individual) ∧
    (modalFaithfulCore.active w .bodily ↔
      modalFaithfulCore.manifestedAt w modalFaithfulCore.body) := by
  change (refinedActive w .humanIndividuation ↔
      FiniteWitness.manifestedAt w .individual) ∧
    (refinedActive w .bodily ↔ FiniteWitness.manifestedAt w .body)
  cases w <;> simp [refinedActive, FiniteWitness.manifestedAt]

theorem designated_human_individuation_is_the_activated_boundary_form
    (w : FiniteWitness.World)
    (h : modalFaithfulCore.active w .humanIndividuation) :
    modalFaithfulCore.boundaryForm w .humanIndividuation
      (humanDesignationStrength w) modalFaithfulCore.consciousness =
      modalFaithfulCore.individual ∧
    modalFaithfulCore.manifestedAt w modalFaithfulCore.individual := by
  constructor
  · rfl
  · exact (exact_modal_activation_matches_designated_forms w).1.mp h

theorem nonbodily_mode_is_not_inappropriately_bodily :
    ¬ modalFaithfulCore.active .nonbodily .bodily ∧
    modalFaithfulCore.active .nonbodily .humanIndividuation ∧
    ¬ modalFaithfulCore.manifestedAt .nonbodily modalFaithfulCore.body := by
  change ¬ refinedActive .nonbodily .bodily ∧
    refinedActive .nonbodily .humanIndividuation ∧
    ¬ FiniteWitness.manifestedAt .nonbodily .body
  simp [refinedActive, FiniteWitness.manifestedAt]

theorem modal_refinement_preserves_the_exact_D31_world_semantics
    (w : FiniteWitness.World) (x y : FiniteWitness.Manifest) :
    (modalFaithfulCore.manifestedAt w x ↔ Stage12.d31Core.manifestedAt w x) ∧
    (modalFaithfulCore.existentiallyDependsOn x y ↔
```

```
    Stage12.d31Core.existentiallyDependsOn x y) := by
  exact ⟨Iff.rfl, Iff.rfl⟩

/-! Concrete snapshots distinguish a recurring modal *class* from a
    generation-specific realized organization.  The higher organization
    remains available even when a particular individuality is absent. -/

inductive LayeredVehicle where
  | higher
  | individuated (epoch : Nat)
  | inner (epoch : Nat)
  | outer (vehicle : VehicleInstance)
  deriving DecidableEq

def memberAt (n : Nat) : LayeredVehicle → Prop
  | .higher => True
  | .individuated epoch => ownerAt n ≠ .absent ∧ epoch = n / 3
  | .inner epoch => ownerAt n ≠ .absent ∧ epoch = n / 3
  | .outer vehicle => cyclicalMembership n vehicle

def belongsTo (n : Nat) (owner : OwnerProfile)
    (v : LayeredVehicle) : Prop :=
  owner = ownerAt n ∧ owner ≠ .absent ∧ v ≠ .higher ∧ memberAt n v

def directlyCoordinates : LayeredVehicle → LayeredVehicle → Prop
  | .outer v, .inner epoch => v.epoch = epoch
  | .inner e, .individuated f => e = f
  | .individuated _, .higher => True
  | _, _ => False

structure DevelopmentSnapshot where
  step : Nat
  worldClass : FiniteWitness.World
  ownerProfile : OwnerProfile
  members : LayeredVehicle → Prop
  classAgreement : worldClass = periodicWorld step
  profileAgreement : ownerProfile = ownerAt step
  memberAgreement : ∀ v, members v ↔ memberAt step v

def snapshotAt (n : Nat) : DevelopmentSnapshot where
  step := n
  worldClass := periodicWorld n
  ownerProfile := ownerAt n
```

```
  members := memberAt n
  classAgreement := rfl
  profileAgreement := rfl
  memberAgreement := by intro v; rfl

theorem modal_classes_and_epoch_snapshots_are_distinct :
    (snapshotAt 0).worldClass = (snapshotAt 3).worldClass ∧
    (snapshotAt 0).ownerProfile ≠ (snapshotAt 3).ownerProfile ∧
    (snapshotAt 0).members (.outer (bodyInstance 0)) ∧
    ¬ (snapshotAt 3).members (.outer (bodyInstance 0)) ∧
    (snapshotAt 3).members (.outer (bodyInstance 1)) := by
  simp [snapshotAt, periodicWorld, ownerAt, memberAt,
    cyclicalMembership, retiredAt, formedAt, bodyInstance,
    parallelInstance]

theorem all_snapshots_agree_with_their_modal_realization (n : Nat) :
    ((snapshotAt n).ownerProfile = .absent ↔
      ¬ modalFaithfulCore.manifestedAt (snapshotAt n).worldClass
        modalFaithfulCore.individual) ∧
    modalFaithfulCore.manifestedAt (snapshotAt n).worldClass
      modalFaithfulCore.consciousness := by
  change (ownerAt n = .absent ↔
      ¬ Stage12.d31Core.manifestedAt (periodicWorld n) Stage12.d31Core.individual) ∧
    Stage12.d31Core.manifestedAt (periodicWorld n) Stage12.d31Core.consciousness
  exact ⟨phase_relative_owner_and_actual_world_agree n,
    cyclicModalTrajectory.consciousnessAlongTrajectory n⟩

theorem higher_organization_remains_when_individuality_dissolves (n : Nat) :
    memberAt n .higher ∧
    (ownerAt n = .absent → ¬ ∃ v, belongsTo n .absent v) := by
  constructor
  · trivial
  · intro _hn hex
    rcases hex with ⟨v, hv⟩
    exact hv.2.1 rfl

theorem simultaneous_inner_and_outer_vehicles_belong_to_one_owner :
    belongsTo 0 (.specialized 0) (.outer (bodyInstance 0)) ∧
    belongsTo 0 (.specialized 0) (.inner 0) ∧
    belongsTo 0 (.specialized 0) (.individuated 0) ∧
    memberAt 0 .higher ∧
    belongsTo 3 (.specialized 1) (.outer (bodyInstance 1)) ∧
    belongsTo 3 (.specialized 1) (.inner 1) := by
```

```
  simp [belongsTo, memberAt, ownerAt, cyclicalMembership,
    retiredAt, formedAt, bodyInstance, parallelInstance]

theorem hierarchy_coherently_connects_all_four_levels :
    directlyCoordinates (.outer (bodyInstance 0)) (.inner 0) ∧
    directlyCoordinates (.inner 0) (.individuated 0) ∧
    directlyCoordinates (.individuated 0) .higher ∧
    (LayeredVehicle.outer (bodyInstance 0)) ≠ (LayeredVehicle.inner 0) := by
  simp [directlyCoordinates, bodyInstance]

theorem simultaneous_inner_and_individuated_vehicles_recur_in_every_epoch
    (epoch : Nat) :
    memberAt (3 * epoch) (.inner epoch) ∧
    memberAt (3 * epoch) (.individuated epoch) ∧
    memberAt (3 * epoch) .higher := by
  have hmod : (3 * epoch) % 3 = 0 := by omega
  have hdiv : (3 * epoch) / 3 = epoch := by omega
  simp [memberAt, ownerAt, hmod, hdiv]

theorem every_reabsorption_lacks_an_owner_but_not_the_higher_organization
    (epoch : Nat) :
    ownerAt (3 * epoch + 1) = .absent ∧
    memberAt (3 * epoch + 1) .higher := by
  have hmod : (3 * epoch + 1) % 3 = 1 := by omega
  simp [ownerAt, memberAt, hmod]

/-! Information is explicitly related to its manifest conscious carrier,
    not to a numerically unchanging individual. New experiences can enter
    the trace at any later stage; retention is content-selective. -/

def newExperienceAt (n : Nat) (i : Information) : Prop :=
  ∃ v : VehicleInstance, cyclicalAccess n v i

def developingTrace (retain : Nat → Information → Bool)
    (i : Information) : Nat → Prop
  | 0 => initialExperientialSource i
  | n + 1 =>
      (developingTrace retain i n ∧ retain n i = true) ∨
      newExperienceAt (n + 1) i

def potentialIn (carrier : FiniteWitness.Manifest)
    (retain : Nat → Information → Bool) (n : Nat) (i : Information) : Prop :=
  carrier = modalFaithfulCore.consciousness ∧
```

```
  modalFaithfulCore.manifestedAt (snapshotAt n).worldClass carrier ∧
  developingTrace retain i n

theorem potential_is_anchored_to_one_manifest_consciousness
    (carrier : FiniteWitness.Manifest)
    (retain : Nat → Information → Bool) (n : Nat) (i : Information)
    (h : potentialIn carrier retain n i) :
    carrier = modalFaithfulCore.consciousness ∧
    modalFaithfulCore.manifestedAt (snapshotAt n).worldClass carrier := by
  exact ⟨h.1, h.2.1⟩

theorem initial_experience_starts_the_dynamic_trace (i : Information)
    (h : initialExperientialSource i)
    (retain : Nat → Information → Bool) : developingTrace retain i 0 := h

theorem retention_or_a_new_experience_generates_next_potential
    (retain : Nat → Information → Bool) (i : Information) (n : Nat) :
    developingTrace retain i (n + 1) ↔
      (developingTrace retain i n ∧ retain n i = true) ∨
      newExperienceAt (n + 1) i := by
  rfl

theorem persistent_information_remains_possible_over_any_number_of_steps
    (i : Information) (initial : initialExperientialSource i) (n : Nat) :
    developingTrace (fun _ _ => true) i n := by
  induction n with
  | zero => exact initial
  | succ n ih => exact Or.inl ⟨ih, rfl⟩

theorem new_parallel_information_was_not_present_in_the_initial_body :
    ¬ initialExperientialSource .parallelSignal := by
  intro h
  rcases h with ⟨v, hv, ha⟩
  change cyclicalMembership 0 v at hv
  have hbody : v = bodyInstance 0 := hv
  subst v
  change Stage12.coherentAccess .developed .body .parallelSignal at ha
  have hcap : FiniteExperienceWitness.cap .developed .body .parallelSignal := ha.2
  simp [FiniteExperienceWitness.cap, FiniteExperienceWitness.present] at hcap

theorem later_experienced_information_can_be_added_after_total_nonretention :
    newExperienceAt 2 .parallelSignal ∧
    developingTrace (fun _ _ => false) .parallelSignal 2 ∧
```

```
    ¬ developingTrace (fun _ _ => false) .parallelSignal 0 := by
  have hnew : newExperienceAt 2 .parallelSignal := by
    refine ⟨parallelInstance 0, ?_, ?_⟩
    · simp [cyclicalMembership, retiredAt, formedAt,
        bodyInstance, parallelInstance]
    · change Stage12.coherentAccess .loss .parallel .parallelSignal
      exact ⟨Or.inl (by trivial), by
        simp [FiniteExperienceWitness.cap,
          FiniteExperienceWitness.present]⟩
  refine ⟨hnew, ?_, ?_⟩
  · exact Or.inr hnew
  · exact new_parallel_information_was_not_present_in_the_initial_body

theorem latent_information_is_in_consciousness_without_a_lower_person :
    potentialIn modalFaithfulCore.consciousness (fun _ _ => true) 1 .base ∧
    ¬ modalFaithfulCore.manifestedAt (snapshotAt 1).worldClass
      modalFaithfulCore.individual ∧
    ¬ modalFaithfulCore.manifestedAt (snapshotAt 1).worldClass
      (Stage12.d31ContentExperience.informationMeaning .base) := by
  constructor
  · refine ⟨rfl, ?_, ?_⟩
    · exact (all_snapshots_agree_with_their_modal_realization 1).2
    · exact persistent_information_remains_possible_over_any_number_of_steps
        .base base_information_was_accessed_through_first_body 1
  constructor
  · change ¬ FiniteWitness.manifestedAt (periodicWorld 1) .individual
    simp [periodicWorld, FiniteWitness.manifestedAt]
  · change ¬ FiniteWitness.manifestedAt (periodicWorld 1) .nameForm
    simp [periodicWorld, FiniteWitness.manifestedAt]

/-! An explicit organizational successor law replaces period-three
    arithmetic as the sole description of recurrence. The law is a
    declared dynamical premise, not derived from the Paper-1 core. -/

def phaseAdvance : Stage10.Phase → Stage10.Phase
  | .specialized => .reabsorbed
  | .reabsorbed => .collective
  | .collective => .specialized

def ruleEvolvedPhase : Nat → Stage10.Phase
  | 0 => .specialized
  | n + 1 => phaseAdvance (ruleEvolvedPhase n)
```

```
theorem phase_successor_has_a_three_step_return (a : Stage10.Phase) :
    phaseAdvance (phaseAdvance (phaseAdvance a)) = a := by
  cases a <;> rfl

theorem successor_generated_cycles_recur_at_every_epoch (n : Nat) :
    ruleEvolvedPhase (n + 3) = ruleEvolvedPhase n := by
  induction n with
  | zero => rfl
  | succ n ih =>
    simpa [ruleEvolvedPhase, Nat.succ_add] using
      congrArg phaseAdvance ih

theorem specified_modal_phases_follow_the_same_successor_rule (n : Nat) :
    periodicPhase (n + 1) = phaseAdvance (periodicPhase n) := by
  have casesMod : n % 3 = 0 ∨ n % 3 = 1 ∨ n % 3 = 2 := by omega
  rcases casesMod with h0 | h1 | h2
  · have hnext : (n + 1) % 3 = 1 := by omega
    simp [periodicPhase, h0, hnext, phaseAdvance]
  · have hnot0 : n % 3 ≠ 0 := by omega
    have hnext : (n + 1) % 3 = 2 := by omega
    have hnextNot0 : (n + 1) % 3 ≠ 0 := by omega
    have hnextNot1 : (n + 1) % 3 ≠ 1 := by omega
    simp [periodicPhase, h1, hnextNot0,
      hnextNot1, phaseAdvance]
  · have hnot0 : n % 3 ≠ 0 := by omega
    have hnot1 : n % 3 ≠ 1 := by omega
    have hnext : (n + 1) % 3 = 0 := by omega
    simp [periodicPhase, hnot0, hnot1, hnext, phaseAdvance]

end ArchitectureOfExperience.Stage15

/-! ## Stage 16: One modal core, one experience semantics, one developmental witness

The preceding stages are preserved verbatim.  Stage 16 replaces the old
cross-model juxtaposition with a dependent reconstruction on the exact
Stage-15 D9/D32 refinement.  The two-event hierarchy bridge distinguishes
the formation of an individual from the presentation through a vehicle.
The recurring `World` values remain modal classes, not unique epoch IDs. -/

namespace ArchitectureOfExperience.Stage16

open ArchitectureOfManifestation
open ArchitectureOfManifestation.FiniteWitness
```

```
open ArchitectureOfExperience.FiniteExperienceWitness
open ArchitectureOfExperience.Stage6
open ArchitectureOfExperience.Stage12
open ArchitectureOfExperience.Stage14
open ArchitectureOfExperience.Stage15

/-- The only authoritative core used by every Stage-16 extension. -/
def finalCore : CoreTheory := Stage15.modalFaithfulCore

/-- A presentation mode must be active at the state-associated world.
    In particular, a body that is absent in the loss state cannot generate
    an active bodily event there.  The total X4 presentation operation
    instead has a human-individuation witness for that unused pairing. -/
def finalPresentationMode (s : State) (v : Vehicle) : FiniteWitness.Mode :=
  match s, v with
  | .loss, .body => .humanIndividuation
  | _, v => Stage12.presentationMode v

def finalPresentation (s : State) (v : Vehicle) : FiniteWitness.Manifest :=
  FiniteWitness.reflexiveForm (finiteWorldAt s)
    (finalPresentationMode s v) .high .consciousness

theorem final_presentation_mode_is_active (s : State) (v : Vehicle) :
    finalCore.active (finiteWorldAt s) (finalPresentationMode s v) := by
  cases s <;> cases v <;>
    simp [finalCore, Stage15.modalFaithfulCore, Stage15.refinedActive,
      finalPresentationMode, finiteWorldAt, Stage12.presentationMode]

/-- X1-X7 genuinely depend on Stage 15's refined core. -/
def finalExperience : ExperienceExtension finalCore :=
  { Stage12.d31ContentExperience with
    presentation := finalPresentation
    focusedPresentation := by
      intro s v _
      change FiniteWitness.isExperience (finalPresentation s v)
      cases s <;> cases v <;>
        simp [finalPresentation, finalPresentationMode,
          Stage12.presentationMode, FiniteWitness.reflexiveForm,
          FiniteWitness.isExperience]
    presentationReflexivelyGrounded := by
      intro s v
      refine ⟨finiteWorldAt s, finalPresentationMode s v, .high,
        final_presentation_mode_is_active s v, ?_⟩
```

```
    rfl
  determination := finalPresentation
  determinationBridge := by intro s v; rfl }

def finalUnified : UnifiedTheory where
 core := finalCore
 experience := finalExperience

def finalInvariant : InvariantFoundation finalCore where
 allManifestImmanent := by intro m; rfl
 consciousnessEveryWorld := by intro w; cases w <;> trivial

/-- The D31 witness, the experience witness, and the world-to-state
   availability coupling now refer to exactly the same core. -/
def finalFoundation : InvariantUnifiedTheory where
 base := finalUnified
 invariant := finalInvariant
 coupling := {
  worldAt := finiteWorldAt
  bodyAvailabilityBridge := by
   intro s
   change FiniteWitness.manifestedAt (finiteWorldAt s) .body ↔
    FiniteExperienceWitness.present s .body
   cases s <;> simp [finiteWorldAt, FiniteWitness.manifestedAt,
    FiniteExperienceWitness.present] }

/-- The full developmental witness is transported over the rebuilt
   dependent foundation; its phase and vehicle facts are unchanged. -/
def finalDevelopment : Stage10.DevelopmentalIndividuation :=
 { Stage12.d31Development with foundation := finalFoundation }

/-- Two linked but not identical events share the state-associated world:
   one produces the individual boundary, the other produces the vehicle's
   conscious presentation.  Neither event is a second consciousness. -/
theorem two_event_reflexive_bridge (s : State) (v : Vehicle) :
   ∃ w a, finalCore.active w .humanIndividuation ∧
    finalCore.boundaryForm w .humanIndividuation .high
     finalCore.consciousness = finalCore.individual ∧
    finalCore.active w a ∧
    finalExperience.presentation s v =
     finalCore.reflexiveForm w a .high finalCore.consciousness ∧
    w = finalFoundation.coupling.worldAt s := by
 refine ⟨finiteWorldAt s, finalPresentationMode s v, ?_, ?_,
```

```
    final_presentation_mode_is_active s v, rfl, rfl⟩
  · cases s <;> simp [finalCore, Stage15.modalFaithfulCore,
      Stage15.refinedActive, finiteWorldAt]
  · rfl

/-- Stage 11's one-event identification is not imposed: human
    individuation and the bodily boundary are distinct differentiations. -/
theorem distinct_human_and_bodily_boundary_events :
    finalCore.boundaryForm .human .humanIndividuation .high
      finalCore.consciousness = finalCore.individual ∧
    finalCore.boundaryForm .human .bodily .high
      finalCore.consciousness = finalCore.body ∧
    finalCore.individual ≠ finalCore.body := by
  constructor
  · rfl
  constructor
  · rfl
  · change FiniteWitness.Manifest.individual ≠ FiniteWitness.Manifest.body
    decide

/-- Information access in the recurring epochs is exactly access in the
    *rebuilt* final experience structure, not an unrelated older model. -/
theorem cyclical_access_uses_the_final_experience
    (n : Nat) (v : VehicleInstance) (i : Information) :
    cyclicalAccess n v i ↔
      cyclicalMembership n v ∧
      finalExperience.access (periodicState n) v.kind i := by
  rfl

/-- The existential-dependence and manifest-at interpretations from
    Paper 1 remain identical under the final core. -/
theorem published_D31_world_semantics_are_preserved
    (w : FiniteWitness.World) (x y : FiniteWitness.Manifest) :
    (finalCore.manifestedAt w x ↔ Stage12.d31Core.manifestedAt w x) ∧
    (finalCore.existentiallyDependsOn x y ↔
      Stage12.d31Core.existentiallyDependsOn x y) := by
  exact Stage15.modal_refinement_preserves_the_exact_D31_world_semantics w x y

/-- A layered organizational level is interpreted *inside* the single
    Paper-1 manifest sort.  Epoch labels are not additional substances. -/
def layeredMeaning : LayeredVehicle → FiniteWitness.Manifest
  | .higher => .consciousness
  | .individuated _ => .individual
```

```
  | .inner _ => .horizon
  | .outer vehicleInstance => FiniteExperienceWitness.meaning vehicleInstance.kind

/-- The successor law admits only the epoch's body in a specialized phase,
    no outer vehicle in reabsorption, and the epoch's parallel organization
    in a collective phase.  This is stronger than examples of a few steps. -/
theorem exact_outer_membership_for_every_step
    (n : Nat) (v : VehicleInstance) :
    cyclicalMembership n v ↔
      (n % 3 = 0 ∧ v = bodyInstance (n / 3)) ∨
      (n % 3 = 2 ∧ v = parallelInstance (n / 3)) := by
  induction n with
  | zero =>
      simp [cyclicalMembership, bodyInstance, parallelInstance]
  | succ n ih =>
      have hcases : n % 3 = 0 ∨ n % 3 = 1 ∨ n % 3 = 2 := by omega
      rcases hcases with h0 | h1 | h2
      · have hnext : (n + 1) % 3 = 1 := by omega
        have hdiv : (n + 1) / 3 = n / 3 := by omega
        simp [cyclicalMembership, ih, retiredAt, formedAt,
          h0, hnext, hdiv]
      · have hnext : (n + 1) % 3 = 2 := by omega
        have hdiv : (n + 1) / 3 = n / 3 := by omega
        simp [cyclicalMembership, ih, retiredAt, formedAt,
          h1, hnext, hdiv]
      · have hnext : (n + 1) % 3 = 0 := by omega
        have hdiv : (n + 1) / 3 = n / 3 + 1 := by omega
        simp [cyclicalMembership, ih, retiredAt, formedAt,
          h2, hnext, hdiv]

theorem all_hierarchy_levels_are_immanent (v : LayeredVehicle) :
    finalCore.immanent (layeredMeaning v) finalCore.consciousness := by
  rfl

/-- Uniform world-level compatibility: all actual members of every epoch
    have a manifestation in their epoch's Paper-1 modal world class. -/
theorem every_layered_member_is_modally_realized
    (n : Nat) (v : LayeredVehicle) (h : Stage15.memberAt n v) :
    finalCore.manifestedAt (Stage15.snapshotAt n).worldClass
      (layeredMeaning v) := by
  cases v with
  | higher =>
      change FiniteWitness.manifestedAt (periodicWorld n) .consciousness
```

```
    cases hw : periodicWorld n <;>
      simp [FiniteWitness.manifestedAt]
  | individuated epoch =>
    change FiniteWitness.manifestedAt (periodicWorld n) .individual
    change ownerAt n ≠ .absent ∧ epoch = n / 3 at h
    have hcases : n % 3 = 0 ∨ n % 3 = 1 ∨ n % 3 = 2 := by omega
    rcases hcases with h0 | h1 | h2
    · simp [periodicWorld, h0, FiniteWitness.manifestedAt]
    · simp [ownerAt, h1] at h
    · have hn0 : n % 3 ≠ 0 := by omega
      have hn1 : n % 3 ≠ 1 := by omega
      simp [periodicWorld, hn0, hn1, FiniteWitness.manifestedAt]
  | inner epoch =>
    change FiniteWitness.manifestedAt (periodicWorld n) .horizon
    cases hw : periodicWorld n <;>
      simp [FiniteWitness.manifestedAt]
  | outer vehicleInstance =>
    change cyclicalMembership n vehicleInstance at h
    rcases (exact_outer_membership_for_every_step n vehicleInstance).mp h with
      ⟨h0, hv⟩ | ⟨h2, hv⟩
    · change FiniteWitness.manifestedAt (periodicWorld n)
        (FiniteExperienceWitness.meaning vehicleInstance.kind)
      rw [hv]
      simp [periodicWorld, h0, bodyInstance,
        FiniteExperienceWitness.meaning, FiniteWitness.manifestedAt]
    · change FiniteWitness.manifestedAt (periodicWorld n)
        (FiniteExperienceWitness.meaning vehicleInstance.kind)
      rw [hv]
      have hn0 : n % 3 ≠ 0 := by omega
      have hn1 : n % 3 ≠ 1 := by omega
      simp [periodicWorld, hn0, hn1, parallelInstance,
        FiniteExperienceWitness.meaning, FiniteWitness.manifestedAt]

/-- Every actual organizational member is a form realized in its modal
    world class.  This is the explicit Paper-1 immanence bridge. -/
def actualizedAt (n : Nat) (v : LayeredVehicle) : Prop :=
  Stage15.memberAt n v ∧
  finalCore.manifestedAt (Stage15.snapshotAt n).worldClass (layeredMeaning v)

/-- Membership is an organizational relation; actualization adds the
    projection constraint of the Paper-1 modal world. -/
theorem actualized_member_has_a_manifest_realization (n : Nat)
    (v : LayeredVehicle) (h : actualizedAt n v) :
```

```
    finalCore.manifestedAt (Stage15.snapshotAt n).worldClass
      (layeredMeaning v) := h.2

theorem actualization_agrees_with_epoch_membership
    (n : Nat) (v : LayeredVehicle) :
    actualizedAt n v ↔ Stage15.memberAt n v := by
  constructor
  · exact And.left
  · intro h
    exact ⟨h, every_layered_member_is_modally_realized n v h⟩

/-- The reabsorption phase has no current outer vehicle; the subsequently
    formed parallel vehicle is actually realized in the nonbodily phase. -/
theorem reabsorption_precedes_new_vehicle_realization :
    ¬ Stage15.memberAt 1 (.outer (parallelInstance 0)) ∧
    ¬ actualizedAt 1 (.outer (parallelInstance 0)) ∧
    actualizedAt 2 (.outer (parallelInstance 0)) := by
  refine ⟨?_, ?_, ?_⟩
  · change ¬ cyclicalMembership 1 (parallelInstance 0)
    simp [cyclicalMembership, formedAt, retiredAt,
      parallelInstance, bodyInstance]
  · intro h
    have hfalse : cyclicalMembership 1 (parallelInstance 0) := h.1
    simp [cyclicalMembership, formedAt, retiredAt,
      parallelInstance, bodyInstance] at hfalse
  · constructor
    · change cyclicalMembership 2 (parallelInstance 0)
      simp [cyclicalMembership, formedAt, retiredAt,
        parallelInstance, bodyInstance]
    · change FiniteWitness.manifestedAt (periodicWorld 2) .nameForm
      simp [periodicWorld, FiniteWitness.manifestedAt]

/-- Every snapshot is an epoch-specific structure mapped to one of the
    Paper-1 modal world classes, preserving the full epoch label. -/
theorem snapshot_modal_class_is_not_epoch_identity :
    (Stage15.snapshotAt 0).worldClass =
      (Stage15.snapshotAt 3).worldClass ∧
    (Stage15.snapshotAt 0).ownerProfile ≠
      (Stage15.snapshotAt 3).ownerProfile := by
  exact ⟨Stage15.modal_classes_and_epoch_snapshots_are_distinct.1,
    Stage15.modal_classes_and_epoch_snapshots_are_distinct.2.1⟩

/-- Information may be potential in one consciousness in a reabsorption
```

```
    phase without implying that an individuated presentation is present. -/
theorem informational_potential_does_not_presuppose_a_person :
    Stage15.potentialIn finalCore.consciousness
      (fun _ _ => true) 1 .base ∧
    ¬ finalCore.manifestedAt (Stage15.snapshotAt 1).worldClass
      finalCore.individual := by
  exact ⟨Stage15.latent_information_is_in_consciousness_without_a_lower_person.1,
    Stage15.latent_information_is_in_consciousness_without_a_lower_person.2.1⟩

/-- A single inhabited model carries the new core, the dependent X-axioms,
    the developmental witness, and the generational snapshots. -/
structure JointModel where
  foundation : InvariantUnifiedTheory
  development : Stage10.DevelopmentalIndividuation
  baseIsFinal : foundation.base = finalUnified
  coreIsRefined : foundation.base.core = finalCore
  sameFoundation : development.foundation = foundation
  snapshots : Nat → Stage15.DevelopmentSnapshot
  snapshotsAgree : ∀ n, (snapshots n).worldClass =
    Stage14.periodicWorld n
  layeredRealization : ∀ n v, Stage15.memberAt n v →
    finalCore.manifestedAt (snapshots n).worldClass (layeredMeaning v)
  twoEventGrounding : ∀ s v, ∃ w a,
    finalCore.active w .humanIndividuation ∧
    finalCore.boundaryForm w .humanIndividuation .high
      finalCore.consciousness = finalCore.individual ∧
    finalCore.active w a ∧
    finalExperience.presentation s v =
      finalCore.reflexiveForm w a .high finalCore.consciousness ∧
    w = finiteWorldAt s

def jointModel : JointModel where
  foundation := finalFoundation
  development := finalDevelopment
  baseIsFinal := rfl
  coreIsRefined := rfl
  sameFoundation := rfl
  snapshots := Stage15.snapshotAt
  snapshotsAgree := by intro n; rfl
  layeredRealization := by
    intro n v h
    exact every_layered_member_is_modally_realized n v h
  twoEventGrounding := by
```

```
  intro s v
  exact two_event_reflexive_bridge s v

theorem fully_integrated_modal_experience_development_is_satisfiable :
  Nonempty JointModel := ⟨jointModel⟩

end ArchitectureOfExperience.Stage16
/-! Stage 17: necessary material-hierarchy interpretation.
The Stage-16 JointModel is inherited without modifying its proofs.
The new requirements below are additional ontological commitments. -/
namespace ArchitectureOfExperience.Stage17

inductive MaterialTier where
 | common | inclusive | individuality | subtle | material
 deriving DecidableEq

def formationRank : MaterialTier → Nat
 | .common => 0
 | .inclusive => 1
 | .individuality => 2
 | .subtle => 3
 | .material => 4

def actualMaterial (n : Nat) : Prop :=
 Stage15.memberAt n (.outer (Stage14.bodyInstance (n / 3)))

def actualInner (n : Nat) : Prop :=
 Stage15.memberAt n (.inner (n / 3))

def materialTierPresent (n : Nat) : MaterialTier → Prop
 | .common => True
 | .inclusive => True
 | .individuality => (actualMaterial n ∨ actualInner n) ∨
    Stage15.memberAt n (.individuated (n / 3))
 | .subtle => actualMaterial n ∨ actualInner n
 | .material => actualMaterial n

structure NecessaryMaterialHierarchy where
 inherited : Stage16.JointModel
 present : Nat → MaterialTier → Prop
 bodyLink : ∀ n, present n .material ↔ actualMaterial n
 materialRequiresSubtle : ∀ n,
  present n .material → present n .subtle
```

```
  subtleRequiresIndividuality : ∀ n,
    present n .subtle → present n .individuality
  individualityRequiresInclusive : ∀ n,
    present n .individuality → present n .inclusive
  inclusiveRequiresCommon : ∀ n,
    present n .inclusive → present n .common

def selectedNecessaryHierarchy : NecessaryMaterialHierarchy where
  inherited := Stage16.jointModel
  present := materialTierPresent
  bodyLink := by intro n; exact Iff.rfl
  materialRequiresSubtle := by
    intro n h
    exact Or.inl h
  subtleRequiresIndividuality := by
    intro n h
    exact Or.inl h
  individualityRequiresInclusive := by
    intro n h
    trivial
  inclusiveRequiresCommon := by
    intro n h
    trivial

theorem necessary_predecessors_of_embodiment
    (H : NecessaryMaterialHierarchy) (n : Nat)
    (h : H.present n .material) :
    H.present n .subtle ∧ H.present n .individuality ∧
      H.present n .inclusive ∧ H.present n .common := by
  have hs := H.materialRequiresSubtle n h
  have hi := H.subtleRequiresIndividuality n hs
  have he := H.individualityRequiresInclusive n hi
  exact ⟨hs, hi, he, H.inclusiveRequiresCommon n he⟩

theorem material_is_maximally_constrained (t : MaterialTier)
    (h : t ≠ .material) :
    formationRank t < formationRank .material := by
  cases t <;> simp_all [formationRank]

theorem selected_material_existence_is_nonvacuous :
    selectedNecessaryHierarchy.present 0 .material := by
  change Stage15.memberAt 0 (.outer (Stage14.bodyInstance 0))
  change Stage14.cyclicalMembership 0 (Stage14.bodyInstance 0)
```

```
  rfl

theorem joint_necessary_material_hierarchy_is_satisfiable :
    Nonempty NecessaryMaterialHierarchy :=
  ⟨selectedNecessaryHierarchy⟩

end ArchitectureOfExperience.Stage17

/-! Stage 18: conditional sequential withdrawal and universal retention.
These are additional transition premises, not consequences of the Stage-17
material-hierarchy premise alone. In particular, retention of universal
information does not entail continuing individual access. -/
namespace ArchitectureOfExperience.Stage18

inductive FocusTier where
  | inclusive | individuality | subtle | material
  deriving DecidableEq

def nextInner : FocusTier → Option FocusTier
  | .material => some .subtle
  | .subtle => some .individuality
  | .individuality => some .inclusive
  | .inclusive => none

structure SequentialContinuity where
  inherited : Stage17.NecessaryMaterialHierarchy
  State : Type
  Info : Type
  available : State → FocusTier → Prop
  focused : State → FocusTier → Prop
  activeIndividual : State → Prop
  evolving : State → Prop
  loss : State → State → FocusTier → Prop
  personalRecall : State → Info → Prop
  acquiredInsight : State → Info → Prop
  universalRecord : Info → Prop
  boundary : State → Prop
  universalRetention : ∀ s i, acquiredInsight s i → universalRecord i
  recallNotRequired : ∃ s t i,
    acquiredInsight s i ∧ acquiredInsight t i ∧
      personalRecall s i ∧ ¬ personalRecall t i
  inwardFocus : ∀ s t tier inner,
    evolving s → activeIndividual s → focused s tier →
```

```
    loss s t tier → nextInner tier = some inner → available t inner →
      focused t inner ∧ activeIndividual t
  acquiredPreservation : ∀ s t tier i,
    evolving s → loss s t tier → acquiredInsight s i →
      acquiredInsight t i
  boundaryEndsIndividuality : ∀ s,
    boundary s → ¬ activeIndividual s

theorem inward_continuity_given_transition
    (M : SequentialContinuity) (s t : M.State)
    (tier inner : FocusTier)
    (he : M.evolving s) (ha : M.activeIndividual s)
    (hf : M.focused s tier) (hl : M.loss s t tier)
    (hn : nextInner tier = some inner) (hv : M.available t inner) :
    M.focused t inner ∧ M.activeIndividual t :=
  M.inwardFocus s t tier inner he ha hf hl hn hv

theorem universal_insight_retention_without_personal_recall
    (M : SequentialContinuity) :
    ∃ s t i, M.universalRecord i ∧
      M.acquiredInsight t i ∧ M.personalRecall s i ∧
      ¬ M.personalRecall t i := by
  obtain ⟨s, t, i, hs, ht, hr, hnr⟩ := M.recallNotRequired
  exact ⟨s, t, i, M.universalRetention s i hs, ht, hr, hnr⟩

end ArchitectureOfExperience.Stage18

/-! Stage 19: developmental vehicle refinement and episode-level access.
Practice-induced enduring refinement is an additional model premise. It is
separate from a temporary episode opening an experiential space. -/
namespace ArchitectureOfExperience.Stage19

structure TrainingRefinement where
  inherited : Stage17.NecessaryMaterialHierarchy
  State : Type
  Space : Type
  next : State → State → Prop
  systematicPractice : State → State → Prop
  capacity : State → Stage17.MaterialTier → Nat
  requiredCapacity : Space → Nat
  openEpisode : State → Space → Prop
  stableAccess : State → Space → Prop
  capacityMonotone : ∀ s t tier,
```

```
    next s t → systematicPractice s t →
      capacity s tier ≤ capacity t tier
  accessRequiresCapacity : ∀ s space,
    stableAccess s space →
      requiredCapacity space ≤ capacity s .subtle
  trainedAccess : ∀ s t space,
    next s t → systematicPractice s t →
      requiredCapacity space ≤ capacity t .subtle →
      stableAccess t space
  transientWithoutRefinement : ∃ s t space,
    openEpisode s space ∧ ¬ stableAccess s space ∧
      next s t ∧ ¬ systematicPractice s t ∧
      capacity s .subtle = capacity t .subtle

theorem trained_vehicle_capacity_is_nondecreasing
    (M : TrainingRefinement) (s t : M.State)
    (hstep : M.next s t) (hpractice : M.systematicPractice s t)
    (tier : Stage17.MaterialTier) :
    M.capacity s tier ≤ M.capacity t tier :=
  M.capacityMonotone s t tier hstep hpractice

theorem stable_access_after_sufficient_refinement
    (M : TrainingRefinement) (s t : M.State) (space : M.Space)
    (hstep : M.next s t) (hpractice : M.systematicPractice s t)
    (hcap : M.requiredCapacity space ≤ M.capacity t .subtle) :
    M.stableAccess t space :=
  M.trainedAccess s t space hstep hpractice hcap

theorem acute_episode_does_not_force_stable_access
    (M : TrainingRefinement) :
    ∃ s space, M.openEpisode s space ∧ ¬ M.stableAccess s space := by
  obtain ⟨s, _t, space, hopen, hnot, _hnext, _hnopractice, _hcap⟩ :=
    M.transientWithoutRefinement
  exact ⟨s, space, hopen, hnot⟩

def selectedTrainingRefinement : TrainingRefinement where
  inherited := Stage17.selectedNecessaryHierarchy
  State := Nat
  Space := Nat
  next := fun s t => t = s + 1 ∨ (s = 0 ∧ t = 0)
  systematicPractice := fun s t => t = s + 1
  capacity := fun s _ => s
  requiredCapacity := id
```

```
  openEpisode := fun s space => s = 0 ∧ space = 1
  stableAccess := fun s space => space ≤ s
  capacityMonotone := by
    intro s t tier _ hpractice
    subst t
    exact Nat.le_succ s
  accessRequiresCapacity := by
    intro s space h
    exact h
  trainedAccess := by
    intro s t space _ _ h
    exact h
  transientWithoutRefinement := by
    refine ⟨0, 0, 1, ?_, ?_, ?_, ?_, ?_⟩
    · simp
    · simp
    · simp
    · simp
    · rfl

theorem training_refinement_is_satisfiable :
    Nonempty TrainingRefinement := ⟨selectedTrainingRefinement⟩

end ArchitectureOfExperience.Stage19

/-! Stage 20: a joint local transition on the same five-tier hierarchy.
The local loss trajectory is distinct from the three-step reabsorption cycle:
its epoch projection selects the specialized bodily configuration, then a
nonbodily configuration with an active owner, and finally a reabsorbed
configuration. This projection is a modal correspondence, not an assertion
that the selected configurations are consecutive steps of the cyclic model.
The cross-structure compatibility is a finite satisfiability result. -/
namespace ArchitectureOfExperience.Stage20

def localEpoch (s : Nat) : Nat :=
  if s = 0 then 0 else if s = 1 then 2 else 1

def focusTierAsMaterial : Stage18.FocusTier → Stage17.MaterialTier
  | .inclusive => .inclusive
  | .individuality => .individuality
  | .subtle => .subtle
  | .material => .material
```

```
def localLineageRelation (s t : Nat) : Prop := s = 0 ∧ t = 1

def selectedContinuity : Stage18.SequentialContinuity where
  inherited := Stage17.selectedNecessaryHierarchy
  State := Nat
  Info := Bool
  available := fun s tier =>
    Stage17.materialTierPresent (localEpoch s) (focusTierAsMaterial tier)
  focused := fun s tier =>
    (s = 0 ∧ tier = .material) ∨ (s = 1 ∧ tier = .subtle)
  activeIndividual := fun s => s = 0 ∨ s = 1
  evolving := fun s => s = 0
  loss := fun s t tier => s = 0 ∧ t = 1 ∧ tier = .material
  personalRecall := fun s info => s = 0 ∧ info = true
  acquiredInsight := fun _ info => info = true
  universalRecord := fun info => info = true
  boundary := fun s => s ≠ 0 ∧ s ≠ 1
  universalRetention := by
    intro s info h
    exact h
  recallNotRequired := by
    refine ⟨0, 1, true, ?_, ?_, ?_, ?_⟩ <;> decide
  inwardFocus := by
    intro s t tier inner _ _ _ hl hn _
    obtain ⟨hs, ht, hmt⟩ := hl
    subst s
    subst t
    subst tier
    have hinner : inner = .subtle := by
      simpa [Stage18.nextInner] using hn.symm
    subst inner
    constructor
    · exact Or.inr ⟨rfl, rfl⟩
    · exact Or.inr rfl
  acquiredPreservation := by
    intro s t tier info _ _ h
    exact h
  boundaryEndsIndividuality := by
    intro s hbound hactive
    rcases hactive with hzero | hone
    · exact hbound.1 hzero
    · exact hbound.2 hone
```

```
structure IntegratedContinuityAndRefinement where
  continuity : Stage18.SequentialContinuity
  refinement : Stage19.TrainingRefinement
  sameHierarchy : continuity.inherited = refinement.inherited
  sameStates : continuity.State = refinement.State
  epoch : continuity.State → Nat
  availabilityAgreesWithHierarchy : ∀ s tier,
    continuity.available s tier ↔
      continuity.inherited.present (epoch s) (focusTierAsMaterial tier)
  focusRequiresAvailability : ∀ s tier,
    continuity.focused s tier → continuity.available s tier
  lossReallyRemovesOuterTier : ∀ s t tier,
    continuity.loss s t tier →
      continuity.available s tier ∧ ¬ continuity.available t tier
  activeOwnerAgreesWithSnapshot : ∀ s,
    continuity.activeIndividual s ↔
      Stage14.ownerAt (epoch s) ≠ .absent
  terminalBoundaryAgreesWithSnapshot : ∀ s,
    continuity.boundary s ↔
      Stage14.ownerAt (epoch s) = .absent
  localLineage : continuity.State → continuity.State → Prop
  lossPreservesDeclaredLineage : ∀ s t tier,
    continuity.loss s t tier → localLineage s t
  declaredLineageRequiresActiveOwner : ∀ s t,
    localLineage s t →
      continuity.activeIndividual s ∧ continuity.activeIndividual t
  continuityEvent : ∃ (s t : continuity.State),
    continuity.loss s t .material ∧
    continuity.focused s .material ∧
    continuity.focused t .subtle
  trainingEvent : ∃ (s t : refinement.State),
    refinement.next s t ∧ refinement.systematicPractice s t ∧
    refinement.capacity s .subtle < refinement.capacity t .subtle

def integratedContinuityAndRefinement : IntegratedContinuityAndRefinement where
  continuity := selectedContinuity
  refinement := Stage19.selectedTrainingRefinement
  sameHierarchy := rfl
  sameStates := rfl
  epoch := localEpoch
  availabilityAgreesWithHierarchy := by
    intro s tier
    rfl
```

```
focusRequiresAvailability := by
  change ∀ (s : Nat) (tier : Stage18.FocusTier),
    ((s = 0 ∧ tier = .material) ∨ (s = 1 ∧ tier = .subtle)) →
      Stage17.materialTierPresent (localEpoch s) (focusTierAsMaterial tier)
  intro s tier hf
  rcases hf with ⟨hs, ht⟩ | ⟨hs, ht⟩
  · subst s
    subst tier
    exact Stage17.selected_material_existence_is_nonvacuous
  · subst s
    subst tier
    simp [localEpoch, focusTierAsMaterial,
      Stage17.materialTierPresent, Stage17.actualInner,
      Stage15.memberAt, Stage14.ownerAt]
lossReallyRemovesOuterTier := by
  change ∀ (s t : Nat) (tier : Stage18.FocusTier),
    (s = 0 ∧ t = 1 ∧ tier = .material) →
      Stage17.materialTierPresent (localEpoch s) (focusTierAsMaterial tier) ∧
        ¬ Stage17.materialTierPresent (localEpoch t) (focusTierAsMaterial tier)
  intro s t tier hl
  rcases hl with ⟨hs, ht, hv⟩
  subst s
  subst t
  subst tier
  constructor
  · exact Stage17.selected_material_existence_is_nonvacuous
  · simp [localEpoch, focusTierAsMaterial,
      Stage17.materialTierPresent, Stage17.actualMaterial,
      Stage15.memberAt, Stage14.cyclicalMembership,
      Stage14.retiredAt, Stage14.formedAt,
      Stage14.bodyInstance, Stage14.parallelInstance]
activeOwnerAgreesWithSnapshot := by
  change ∀ (s : Nat),
    (s = 0 ∨ s = 1) ↔ Stage14.ownerAt (localEpoch s) ≠ .absent
  intro s
  by_cases h0 : s = 0
  · subst s
    decide
  by_cases h1 : s = 1
  · subst s
    decide
  simp [localEpoch, h0, h1, Stage14.ownerAt]
terminalBoundaryAgreesWithSnapshot := by
```

```
    change ∀ (s : Nat),
      (s ≠ 0 ∧ s ≠ 1) ↔ Stage14.ownerAt (localEpoch s) = .absent
    intro s
    by_cases h0 : s = 0
    · subst s
      decide
    by_cases h1 : s = 1
    · subst s
      decide
    simp [localEpoch, h0, h1, Stage14.ownerAt]
  localLineage := localLineageRelation
  lossPreservesDeclaredLineage := by
    change ∀ (s t : Nat) (tier : Stage18.FocusTier),
      (s = 0 ∧ t = 1 ∧ tier = .material) → s = 0 ∧ t = 1
    intro s t tier h
    exact ⟨h.1, h.2.1⟩
  declaredLineageRequiresActiveOwner := by
    change ∀ (s t : Nat),
      (s = 0 ∧ t = 1) → (s = 0 ∨ s = 1) ∧ (t = 0 ∨ t = 1)
    intro s t h
    exact ⟨Or.inl h.1, Or.inr h.2⟩
  continuityEvent := by
    dsimp [selectedContinuity]
    refine ⟨0, 1, ?_, ?_, ?_⟩
    · exact ⟨rfl, rfl, rfl⟩
    · exact Or.inl ⟨rfl, rfl⟩
    · exact Or.inr ⟨rfl, rfl⟩
  trainingEvent := by
    dsimp [Stage19.selectedTrainingRefinement]
    refine ⟨0, 1, ?_, ?_, ?_⟩
    · exact Or.inl rfl
    · rfl
    · decide

theorem continuity_and_refinement_have_one_joint_witness :
    Nonempty IntegratedContinuityAndRefinement :=
  ⟨integratedContinuityAndRefinement⟩

theorem bodily_loss_focus_and_refinement_are_jointly_realizable :
    (∃ (s t : selectedContinuity.State),
      selectedContinuity.loss s t .material ∧
      selectedContinuity.focused t .subtle) ∧
    (∃ (s t : Stage19.selectedTrainingRefinement.State),
```

```
    Stage19.selectedTrainingRefinement.systematicPractice s t ∧
    Stage19.selectedTrainingRefinement.capacity s .subtle <
      Stage19.selectedTrainingRefinement.capacity t .subtle) := by
  dsimp [selectedContinuity, Stage19.selectedTrainingRefinement]
  constructor
  · exact ⟨0, 1, ⟨rfl, rfl, rfl⟩, Or.inr ⟨rfl, rfl⟩⟩
  · exact ⟨0, 1, rfl, by decide⟩

theorem ordinary_loss_is_an_actual_material_withdrawal :
    ∃ (s t : selectedContinuity.State),
      selectedContinuity.loss s t .material ∧
      selectedContinuity.available s .material ∧
      ¬ selectedContinuity.available t .material ∧
      selectedContinuity.available t .subtle ∧
      selectedContinuity.focused s .material ∧
      selectedContinuity.focused t .subtle ∧
      selectedContinuity.activeIndividual s ∧
      selectedContinuity.activeIndividual t := by
  dsimp [selectedContinuity]
  refine ⟨0, 1, ?_, ?_, ?_, ?_, ?_, ?_, ?_, ?_⟩
  · decide
  · exact Stage17.selected_material_existence_is_nonvacuous
  · simp [localEpoch, focusTierAsMaterial,
      Stage17.materialTierPresent, Stage17.actualMaterial,
      Stage15.memberAt, Stage14.cyclicalMembership,
      Stage14.retiredAt, Stage14.formedAt,
      Stage14.bodyInstance, Stage14.parallelInstance]
  · simp [localEpoch, focusTierAsMaterial,
      Stage17.materialTierPresent, Stage17.actualInner,
      Stage15.memberAt, Stage14.ownerAt]
  · exact Or.inl ⟨rfl, rfl⟩
  · exact Or.inr ⟨rfl, rfl⟩
  · exact Or.inl rfl
  · exact Or.inr rfl

theorem terminal_boundary_is_distinct_from_ordinary_loss :
    ∃ (s : selectedContinuity.State),
      selectedContinuity.boundary s ∧
      ¬ selectedContinuity.activeIndividual s ∧
      Stage14.ownerAt (localEpoch s) = .absent := by
  dsimp [selectedContinuity]
  refine ⟨2, ?_, ?_, ?_⟩ <;> decide
```

```
theorem same_transition_has_inward_focus_and_capacity_growth :
    ∃ (s t : Nat),
      selectedContinuity.loss s t .material ∧
      selectedContinuity.focused t .subtle ∧
      Stage19.selectedTrainingRefinement.next s t ∧
      Stage19.selectedTrainingRefinement.systematicPractice s t ∧
      Stage19.selectedTrainingRefinement.capacity s .subtle <
        Stage19.selectedTrainingRefinement.capacity t .subtle := by
  dsimp [selectedContinuity, Stage19.selectedTrainingRefinement]
  refine ⟨0, 1, ?_, ?_, ?_, ?_, ?_⟩
  · exact ⟨rfl, rfl, rfl⟩
  · exact Or.inr ⟨rfl, rfl⟩
  · exact Or.inl rfl
  · rfl
  · decide

end ArchitectureOfExperience.Stage20
```