

Technical Supplement to

From Physical Comparison to Relational Appearance

Jeremy Rodgers
Independent Researcher

16 October 2026 Version 1.4

DOI: [10.5281/zenodo.23408737](https://doi.org/10.5281/zenodo.23408737).

Purpose and conventions

This supplement preserves the mathematical, empirical and philosophical depth supporting the main paper. It is organised by inference rather than research chronology. Module A develops adequate-source and calibration constraints; B treats occurrence, inclusion and ownership; C distinguishes finalisation, access, sampling and resource contracts; D studies retention, reset and return; E constructs and tests exact native causal fields; F develops metric and realisation-identification diagnostics; G records empirical methods and the retrospective application; H preserves typed constitutive alternatives and countermodels. Each module states which conclusion its result can support and which connecting premise remains separate.

Dependency and reading guide. Readers assessing the main conclusion should begin with the corrected concrete-performance argument in Sections [8.10–8.12](#), the actual archive and its interpretive limits in Sections [7.2–7.5](#), and the presented-form and basing distinctions in Sections [9.1](#) and [9.5](#). These develop the premises used by the main argument. The content-signature theorem in Sections [9.2–9.4](#) is a separate conditional constraint on content laws, not a proof of actual occurrence or bearer identity.

For the main objections, Sections [8.3–8.5](#) separate causal, epistemic and bearer claims, and Section [8.6](#) develops the mixed-act alternative. The pair/common-witness distinction in Section [2.2](#) and the current-source counterexamples in Section [9.5](#) explain why separate successful reports or faithful transmission need not establish one operative current field. Empirical provenance, exposure and supplementary analyses are in Module G; Module J provides selected further applications and the fixed predictive failure, with reproduction limits stated at the end.

Modules A and C–F provide optional technical investigations of adequate descriptions, access, retention, native causal structures and metric recovery. Their full assumptions and proofs remain available without being premises of every main-paper inference. In particular, Sections [3.1–3.2](#) distinguish abstract common finalisation from a fixed passive apparatus’s early marking ability; their difference does not determine phenomenal onset. Readers pursuing those technical questions can follow their internal dependencies without treating the supplement’s order as a cumulative proof of a universal manifestation law.

The physical nomination P and experience-inclusive act A follow the main paper. Q denotes a qualitative mode except in explicitly subscripted probability kernels $Q_b(\cdot \mid h)$. H is a causal-prefix history, C a nominated final content, and μ a prefix law. Total variation is $\text{TV}(\nu, \nu') = \sup_E |\nu(E) - \nu'(E)|$. Finite models use sums; extensions to general spaces require

the stated measurability and disintegration conditions and are not presumed by notation alone. In the parity construction q is the correct-update probability, $\eta = 1 - q$, and $L_q = \log_2(2q)$; a graph Laplacian is written L .

Formal examples with assigned phenomenal labels are countermodels or tests of proposed laws, not observations of appearance. Published experimental findings are attributed to their original authors. The principal actual application is an already exposed archive reanalysis; data hashes certify provenance and decoding rather than Q. Established mathematical machinery is cited where it enters, and scope-sensitive corrections are carried into the derivations.

The accompanying public reproducibility archive separates directly runnable finite checks from empirical analyses requiring external public data. Its README specifies acquisition instructions, schemas, hashes and expected outputs. Recorded outputs are supplied for comparison; they do not replace the proofs or the stated empirical and constitutive warrants.

Module I develops the presented-form argument, the exact target-specific content-signature theorem and the separation of current sensory basing from physical-port constitution. Module J places selected empirical extensions and a failed fixed predictive assay beside the claims they constrain. Module B distinguishes occurrence, recognition, personal appropriation and retrospective interpretation. These materials extend the argument without changing the original archive into a fresh validation study or treating the open general manifestation law as resolved.

Contents

Purpose and conventions	1
1 Adequate sources, quotients and calibrated identification	5
1.1 Controlled lumpability and continuation	5
1.2 Common decoder comparison	5
1.3 Exact qualitative equality certificates	6
1.4 Native dependency and source fibres	6
1.5 Restricted adaptation and calibrated contrast	7
1.6 What relational contrasts leave unidentified	8
2 Occurrence, inclusion, and ownership	8
2.1 Faithful descent of occurrence identity	9
2.2 Pair witnesses, common witnesses, and Fusion	9
2.3 Exact partial identification under exclusive ownership	10
2.4 Reader validity, probe creation, and context	11
2.5 Fixed content maps and support intersection	12
2.6 Regularity and correlated indicators	13
2.7 Native articulation, manifestation, and categorical grounding	13
2.8 Continuous interaction and primitive support	14
2.9 Action, articulation rates, and quantitative support	15
2.10 Collective capacity and a conditional content-grounding bound	16
2.11 Descriptive gluing versus actual common occurrence	17
2.12 Native replacement and the corrected acquaintance condition	18
2.13 Awareness, access and the construction of a personal event	18
2.14 A conditional connection to the full constitution	19
2.15 The October draft and the scope of the recollective thesis	20
2.16 Occurrence without recognition and the limiting memory question	21

3	Finalization, selection and physical access	22
3.1	Common prefixes and immutable finalization	22
3.2	Fixed passive native apparatus	23
3.3	Approximation and calibration	24
3.4	Sharp sampling of the same completed episode	25
3.5	Completing an inadequate source	26
3.6	Persistent draws and adaptive threshold access	27
3.7	Reconstruction, current knowledge and timing	28
3.8	Common descendants and duplicate readers	28
3.9	Repeated fields and historical dependence	29
4	Retention, reset, recurrence and return	30
4.1	Reversible records and finite recurrence	30
4.2	Exact integration–retention access	31
4.3	Marginals, fixed-time erasure and reset flags	32
4.4	Pair reliability and calibrated field proposals	33
4.5	Alternating dwell constraints	34
4.6	Return, padding and retained dependence	34
4.7	Sealing and preparation equivalence	35
5	A selected native parity structure and its limits	35
5.1	Native model and repertoire convention	36
5.2	Typed partitions and selected distinctions	36
5.3	Native subsystem and complex selection	37
5.4	Spectators and normalization sensitivity	39
5.5	All relations and total structure	39
5.6	Symmetry does not select a spatial layout	40
5.7	Failed motifs and a weak-link qualification	40
6	Spatial response, native equivalence and relational events	42
6.1	One native edge and all-pair response	42
6.2	An exact inverse native-edge criterion	43
6.3	Projected fluctuations and a retention tradeoff	43
6.4	Equal relative laws, unequal native organizations	44
6.5	Material event evaluation	45
6.6	Prediction and feasible planning	45
6.7	Optical geometry and worldly constituents	45
7	Empirical application, measurement and temporal scope	46
7.1	Identifying a measurement model without identifying appearance	46
7.2	The archived Ebbinghaus experiment	48
7.3	A physical-only nomination and its retrospective status	49
7.4	From an answer to a current relational appearance	50
7.5	The deadline is by uptake, not at stimulus onset	50
7.6	Exploratory transfer of local reader maps	51
7.7	A public feature-binding control and a restricted mixture test	52
7.8	Perturbation and sensory construction	53
7.9	Reports during REM sleep	54
7.10	Grouping, report-independent accumulation and motor correction	55
7.11	Affective counterparts and the limits of modality extension	56
7.12	What the combined evidence licenses	56

8	Typed epistemic and constitutive arguments	56
8.1	Current grounding and evidential parity	57
8.2	Anti-luck constraints and their physical antecedent	57
8.3	A finite current scoped-carrier countermodel	58
8.4	Causal exclusion does not fix the first stage	59
8.5	A reader model and a typed realization failure	60
8.6	Possessed reasons, operative expression, and a mixed act	61
8.7	Categorical assembly and physical inheritance	62
8.8	Harmony and qualitative powers	62
8.9	Whole-act realization and literal mode preservation	64
8.10	The corrected concrete-performance/mode principle	64
8.11	Ownership, phase, and the broader programme	66
8.12	How the current connection differs from the conditional routes	66
9	Presented form, content signatures and current sensory basing	67
9.1	Relational aspects of one presented form	67
9.2	The exact covariance contract for a content law	68
9.3	An attained minimum content signature	69
9.4	Stochastic content and limited observations	70
9.5	Current basing without physical-port constitution	71
9.6	What a selective physical route contrast establishes	72
10	Presented form, empirical tests and the limits of transfer	73
10.1	From an extensive form to a modest native application	73
10.2	What the basing repair changes in the original archive	74
10.3	A fixed physical/report assay that failed its primary criterion	75
10.4	A felt act and its bodily execution	76
10.5	What the additional evidence warrants	76
	Reproduction and verification limits	77

1 Adequate sources, quotients and calibrated identification

A physical description can preserve a response while omitting variables needed for another response or for its interpretation. Adequacy is therefore assessed relative to specified ports, preparations and readers. A quotient or statistic is not promoted to an experiential bearer merely because it is sufficient for one task. These distinctions develop the programme's source and intrinsic-grain analysis (Rodgers, 2026h,i).

1.1 Controlled lumpability and continuation

Let S be a finite physical state set, a a native control, y an observed output and $K_a(s, y, s')$ a joint transition instrument. Let $\phi : S \rightarrow B$ be a surjective proposed state quotient. It reproduces the complete nominated output/block process for arbitrary preparations exactly when

$$\sum_{s': \phi(s')=b'} K_a(s, y, s') \quad \text{depends on } s \text{ only through } \phi(s) \quad (1)$$

for every a, y, b' . For necessity, compare point preparations in one fibre. For sufficiency, define the reduced kernel by this value and induct over trajectories. Adaptive controls are also preserved when their policy kernels depend on the corresponding prior outputs. A weaker port family gives a weaker adequacy condition; returning one display does not reset the whole state.

For deterministic controlled updates F_a and output g , define $s \sim t$ when every finite control word gives the same future output word from s and t . Then g is constant on classes and $s \sim t \Rightarrow F_a(s) \sim F_a(t)$. Hence the classes form an autonomous output-sufficient quotient. Conversely any autonomous quotient with $g = r \circ \phi$ has fibres contained in these classes, by induction on control words. Thus continuation equivalence is the coarsest such quotient. This is the familiar finite automata/sufficiency principle, now with an explicitly physical control alphabet. Refining the observation aperture may split these classes; it cannot justify deleting genuinely distinguishable native tests.

At zero error, distinguishable continuation classes need disjoint retained record supports. If a deterministic finite record has K states, at most K classes can be recovered. Counting distinct *probability laws* does not give that storage bound: many overlapping stochastic laws can use the same finite alphabet. Approximate or analogue records require a decision or information bound instead (Module 3.5).

For $F(a, b) = (b, a \oplus b)$ with output $g(a, b) = a$, $F^3 = I$ and the first two outputs recover (a, b) . A report partition alone permits arbitrary refinements; requiring autonomous continuation and these separating outputs recovers the four-state quotient. The premise is physical observability, not a claim that four qualitative states exist.

1.2 Common decoder comparison

For finite source and target experiments E_x, G_x on the same input alphabet, define one-decoder deficiency

$$\delta(E, G) = \inf_D \max_x \text{TV}(E_x D, G_x), \quad \text{TV}(p, q) = \frac{1}{2} \sum_z |p_z - q_z|.$$

D is one stochastic kernel, independent of the unknown input except through the accessible source. TV contracts under kernels, so any bounded target decision simulated through D differs by at most δ . If two preparations have target contrast γ and source contrast ζ , then $\gamma \leq \zeta + 2\delta$, by triangle inequality and contraction. Errors of two approximate source/target

descriptions add. In particular a common binary decision with errors e_0, e_1 requires source TV at least $1 - e_0 - e_1$.

For binary symmetric channels parametrized by their contrast, write $E_x^\zeta(x) = (1 + \zeta)/2$ and $G_x^\gamma(x) = (1 + \gamma)/2$, $0 \leq \zeta, \gamma \leq 1$. Then

$$\delta(E^\zeta, G^\gamma) = (\gamma - \zeta)_+/2.$$

Necessity is the contrast bound. If $\gamma \leq \zeta$, a symmetric output flip reduces contrast to γ ; otherwise the identity decoder attains the bound. For a constant source and a deterministic target naming one of k inputs, the decoder is one common law r , so maximum error is $1 - \min_x r_x \geq 1 - 1/k$, attained by uniform r . Multiclass deficiency is a finite LP using absolute-value slacks. Coarsening target observations cannot increase it; common relabeling leaves it unchanged. Independent decoders selected separately for each input do not meet the premise.

An intermediate record may be better than the terminal output. If two inputs give intermediate binary contrast .9, a later fixed channel reduces it to .18, and target contrast is .8, intermediate deficiency is zero while terminal deficiency is .31. A terminally poor report is neither an absence of earlier information nor a timestamp for experience.

1.3 Exact qualitative equality certificates

Suppose independent calibration supplies exact same/different qualitative judgments on nominated tokens. Collapse the same-judgment components; different judgments give edges of a graph on the remaining k components. Compatible qualitative partitions are precisely its proper colorings, with arbitrary unrestricted labels. Such data uniquely specify the partition iff this graph is complete: a missing edge permits those two components to merge; a complete graph forbids every merge. Autonomy can add equalities through continuation, but a report code alone cannot add calibration.

For n original tokens and k classes the smallest certificate has $n - k + \binom{k}{2}$ comparisons. Every class needs a connected equality graph, requiring its size minus one edges; each pair of classes needs an inequality. Spanning trees and one inequality per pair attain the lower bound. A fixed known number of qualitative labels imposes a different coloring problem and is not assumed here.

With known metric prototypes separated by Δ , observation error at most ϵ uniquely identifies a prototype when $\Delta > 2\epsilon$, by triangle inequality. If prototypes themselves are inferred from one noisy labelled anchor each, same-class points can be 2ϵ apart and different-class points as close as $\Delta - 2\epsilon$; separation $\Delta > 4\epsilon$ suffices. The latter threshold is sharp without further information: at $\epsilon = .1$, anchors .1, .5 and new observation .3 fit centers .2, .6 with the middle point in the first class, or centers 0, .4 with it in the second. Both prototype separations are .4. Boundary equality does not secure uniqueness.

Even a calibrated stochastic factorization can be nonunique. Let a report matrix be $R = ZD$, with positive row-stochastic full-rank factors. For an invertible T near I with $T\mathbf{1} = \mathbf{1}$, factors $ZT, T^{-1}D$ remain positive and row-stochastic for small perturbations, and have the same product. They need not be label permutations. If D is independently known with full row rank, a right inverse instead recovers Z uniquely. Factorization of public probabilities does not calibrate the latent labels by itself.

1.4 Native dependency and source fibres

Let $F : \prod_i S_i \rightarrow \prod_j S_j$ be a finite bijection with full Cartesian preparation support and nontrivial native ports. Join input i to output j when varying only i can change F_j . The

bipartite essential-dependency components give the unique finest routed factorization. Each output depends only on inputs in its component, so a product decomposition exists. Global injectivity and surjectivity force each component map to be bijective. Any other routed product cannot split an essential edge, proving fineness and uniqueness. For two bits, eight of the 24 bijections are products of local flips and a possible swap; sixteen are prime. Global mixed recoding is not native gauge: it can conjugate a swap to a controlled-XOR update while failing independent local clamp correspondence (Module 2).

A downstream component without a return path into the executive component cannot alter that component's kernels. The directed dependency graph's return-strongly-connected component supplies a physical prefilter, not a phenomenal-inertness theorem for spectators.

For a graph on n source bits, edge parities $x_i \oplus x_j$ have incidence rank $n - c$ over $\mathbb{F}_2$, where c is the number of connected components. The kernel consists exactly of vectors constant on each component, hence has 2^c members. One source-bit anchor per component removes this ambiguity. Strong pair dependency does not entail a scalar triple term: the period-four map $(a, b, c) \mapsto (c, a \oplus c, b \oplus c)$ has a strongly connected dependency graph while every coordinate depends on at most two inputs. The graph is an organization descriptor, not an identified qualitative relation.

1.5 Restricted adaptation and calibrated contrast

Suppose two contexts read one baseline-corrected latent mean z_h with fixed positive gains: $r_G = g_G z_h, r_P = g_P z_h$. Strict opposing means are impossible. If observed means are $(x, -y)$ with $x, y > 0$ and total errors below x, y , this model is excluded. For fixed $k = g_P/g_G > 0$,

$$\inf_z \max\{|x - z|, |-y - kz|\} = \frac{kx + y}{1 + k}. \quad (2)$$

Indeed $kx + y = k(x - z) + (kz + y) \leq (k + 1)e$ for a fit of uniform error e ; equality is attained at $z = (x - y)/(k + 1)$. With unequal errors, the intervals $[x - e_G, x + e_G]$ and $[(-y - e_P)/k, (-y + e_P)/k]$ must intersect. Allowing arbitrary positive k gives infimum $\min(x, y)$, sometimes only at an inadmissible zero/infinite gain limit.

A positive two-mode transfer matrix B predicts opposing-dose responses $(b_{GG} - rb_{GP}, b_{PG} - rb_{PP})$. Positive first and negative second occur exactly when $b_{PG}/b_{PP} < r < b_{GG}/b_{GP}$, a nonempty interval iff $\det B > 0$. For $B = \begin{pmatrix} 4 & 1 \\ 1 & 2 \end{pmatrix}$, state $(1, -1)$ gives $(3, -1)$. This is a model-class consequence, not a general two-dimensional lower bound. A smooth scalar counterexample takes controls $z \mapsto z + 1, z \mapsto z + 2$ and readouts $f_G(z) = z, f_P(z) = z - z(z - 1)(z - 2)$: separate controls agree, their composition gives $(3, -3)$. Positive state-dependent gains on equally likely $z = \pm 1$ can also give means $(1, -1)$, and increasing nonlinear functions z and $e^z - 1$ give opposite mean shifts for a half/half mixture of $-2, +1$. Test-dependent drift is a further escape. Fixed gains and a common latent mean are substantive.

For two histories, let source laws P_w, P_v , content laws Q_w, Q_v and reader laws R_w, R_v obey common kernels with approximation budgets $\text{TV}(Q_i, P_i \mathcal{K}) \leq a_i$ and $\text{TV}(R_i, Q_i \mathcal{J}) \leq e_i$. Then

$$\text{TV}(P_w, P_v) \geq \text{TV}(R_w, R_v) - a_w - a_v - e_w - e_v.$$

This follows by contraction and triangle inequality. The budgets must include relevant calibration, drift and timing; a returning display alone supplies none.

1.6 What relational contrasts leave unidentified

For $\delta \in L^2(\mu \otimes \nu)$ define $a(x) = \mathbb{E}_y \delta$, $b(y) = \mathbb{E}_x \delta$, $m = \mathbb{E} \delta$, and

$$D\delta = \delta(x, y) - \delta(x, y') - \delta(x', y) + \delta(x', y').$$

Orthogonally decompose $\delta = m + (a - m) + (b - m) + r$ with both margins of r zero. Independent product quadruples give $\|D\delta\|_2^2 = 4\|r\|_2^2$ because its four terms are orthogonal. Therefore

$$\|\delta\|_2^2 = \frac{1}{4}\|D\delta\|_2^2 + \|a - m\|_2^2 + \|b - m\|_2^2 + m^2. \quad (3)$$

Contrasts alone miss additive rows/columns. For example $\delta = \theta xy$ on independent uniform signs has contrast norm $2|\theta|$ and zero margins; adding $u(x) + v(y)$ leaves that contrast unchanged. Correlated or selected quadruples need a separate law; the identity cannot be assumed there.

For a finite difference space and accessible test vectors v_j , a full Gram operator $G = \sum_j v_j v_j^*$ with lower bound $G \succeq aI$, $a > 0$, gives $\|\delta\|^2 \leq a^{-1} \sum_j |\langle v_j, \delta \rangle|^2$. Positive nonzero eigenvalues on a smaller span do not control its nullspace.

Finally suppose finite atoms have diameter at most D , slacks vanish on an affinely independent face F and sum to at least γ outside. If a law p has expected slack at most ϵ , its escaped mass satisfies $\ell \leq \epsilon/\gamma$. Let q be on F with mean within ζ of p , and let the inverse barycentric map have zero-sum norm bound $\|z\|_1 \leq M \|\sum_j z_j a_j\|$. For $\ell < 1$, normalized p_F has mean within ℓD of p , hence

$$\text{TV}(p, q) \leq \min\{1, \ell + \frac{M}{2}(\zeta + \ell D)\}.$$

This supplies stable joint-law identification from support and means. Matching means is inadequate without the face/slack and inverse assumptions. Applying the bound requires physical tests that establish those data; the algebra alone does not determine what appeared.

Two further transfer facts make the full-law requirement explicit. If one common decoder satisfies $\sup_x \text{TV}(R_x, D(P_x)) \leq \epsilon$, independent m -sample experiments differ after that decoder by at most $m\epsilon$. Couple the coordinates independently and bound the probability of any disagreement. A success probability s on R therefore transfers with lower bound $s - m\epsilon$; an input-dependent decoder would inject the answer.

For a full density comparison, let $f_i = e^{X_i} \xi_i > 0$ and $Z_i = \int f_i$. If $\|X_2 - X_1\|_\infty \leq \epsilon$ and $Z_1^{-1} \int e^{X_1} |\xi_2 - \xi_1| \leq e^\epsilon - 1$, expansion gives $Z_1^{-1} \int |f_2 - f_1| \leq (e^\epsilon - 1)(1 + e^\epsilon) = e^{2\epsilon} - 1$. The normalizer difference costs at most the same L^1 discrepancy, so $\text{TV}(f_1/Z_1, f_2/Z_2) \leq \min\{1, e^{2\epsilon} - 1\}$. Listed moments or separate margins do not supply these full positive-density and normalizer hypotheses.

2 Occurrence, inclusion, and ownership

Compatible descriptions of two qualities do not establish relational appearance. The counterparts and their relation must be given in an actual presentation. This module distinguishes four questions: whether descriptions descend faithfully from occurrence tokens, whether several tokens have a common presentation, whether ownership is exclusive, and whether a physical relation supplies an occurrence law. These distinctions refine the source-aperture-readout framework of [Rodgers \(2026e\)](#) without assuming its constitutive assignment. A new presentation can meet the relational target; the original tokens need not fuse or continue.

Throughout, P denotes a physical performance, A an experience-inclusive act, and Q its actual qualitative mode. A finite token set E , a partition Π , and a downward-closed family

$\mathcal{K}$ are mathematical objects. Their interpretation as experiential occurrences or domains requires independent grounds. In particular, a physical port, an equal content label, and a numerically identical qualitative occurrence are different things.

2.1 Faithful descent of occurrence identity

Let E be a finite nonempty set, Π a partition of E , and $q : E \rightarrow V$ a surjection. Write $\ker q$ for its fibre partition, and write $\Pi \preceq \Pi'$ when Π refines Π' . A label partition is *faithful* if it preserves both sameness and difference of the nominated domains.

Proposition 2.1 (Occurrence descent). *There is a partition Λ of V satisfying*

$$e \sim_{\Pi} e' \iff q(e) \sim_{\Lambda} q(e')$$

if and only if $\ker q \preceq \Pi$. When it exists, it is unique and its blocks are $q(B)$ for $B \in \Pi$.

Proof. If $q(e) = q(e')$, reflexivity in Λ gives $e \sim_{\Pi} e'$, proving necessity. Conversely, if $q(B)$ and $q(B')$ intersect, some members of B, B' lie in one fibre. Fibre purity then gives $B = B'$. Thus the nonempty block images partition V , and they satisfy the asserted equivalence. Surjectivity proves uniqueness. $\square$

The finest coarsening that admits descent is $\Pi \vee \ker q$, the equivalence relation generated by both partitions. Every descending coarsening must contain both relations; their join satisfies the proposition. This is a repair of a description, not evidence that actual domains merged.

An alternative is to preserve the missing identity. For each $v \in V$, let m_v count the Π -blocks meeting $q^{-1}(v)$. A refining description $q' = (q, \text{tag})$ needs at least m_v labels over v , because distinct blocks in that fibre cannot share a refined label. The assignment $q'(e) = (q(e), [e]_{\Pi})$ attains the bound. The minimum total alphabet is therefore $\sum_v m_v$; a uniform reusable tag alphabet needs $\max_v m_v$ values, or $\lceil \log_2 \max_v m_v \rceil$ binary bits. These are coding bounds conditional on the independently nominated partition.

For example, take

$$E = \{a, b_1, b_2, c\}, \quad \Pi = \{\{a, b_1\}, \{b_2, c\}\},$$

and give b_1, b_2 the same label b . The projected domains $\{a, b\}$ and $\{b, c\}$ cannot form a faithful label partition. Their transitive completion merges all three labels only because the description identified two tokens. Two physically separate recurrent cores can instantiate the same error: with independent native bits,

$$T(a, b_1, b_2, c) = (b_1, a \oplus b_1, c, b_2 \oplus c)$$

is the product of two bijective two-bit maps. Equal current b values or copied descriptions do not introduce a cross-core operation. Assigning qualitative occurrences to these cores would be an additional interpretation, not a consequence of T .

2.2 Pair witnesses, common witnesses, and Fusion

Let $\mathcal{K} \subseteq 2^E$ contain every singleton and be closed under subsets. A face represents joint inclusion in at least one nominated domain; downward closure does not make every subset a separate subject. Define

$$e R_{\mathcal{K}} e' \iff \{e, e'\} \in \mathcal{K}.$$

For $|E| \geq 3$, the boundary family $2^E \setminus \{E\}$ and the full family 2^E agree on every proper-subset query. For three tokens, their pair relation is complete and transitive in both cases, but only one contains the common three-token face. The quantifiers differ:

$$\forall e, e' \exists W \supseteq \{e, e'\} \quad \text{versus} \quad \exists W \supseteq E.$$

Pairwise transitivity cannot exchange these quantifiers. For a fixed pair graph, every possible face must be a clique, but including every clique is an additional completion rule, and maximal cliques can overlap.

Proposition 2.2 (Fusion and exclusive maximal domains). *For finite $\mathcal{K}$ as above, the condition*

$$F, G \in \mathcal{K}, F \cap G \neq \emptyset \implies F \cup G \in \mathcal{K} \quad (\text{Fusion})$$

holds if and only if the distinct maximal faces form a partition of E . Equivalently, $\mathcal{K}$ consists of the subsets of partition blocks.

Proof. If two maximal faces intersect, Fusion places their union in the family, so maximality makes them equal. Finiteness and the singleton condition place each token in a maximal face. Downward closure supplies every subset of each block. Conversely, intersecting faces in a family of partition-block subsets lie in the same block, and their union is again a subset of it. $\square$

Fusion is a precise single-owner commitment about the same tokens. It does not follow from interaction or from a relation being computed. An overlapping-domain ontology can reject it without inconsistency. If a unique owner map is assumed at the outset, co-presence is equality of owners and a partition follows by definition; that assumption must not be mistaken for a physical discovery.

Uncertainty about token identity also yields a quantitative bound. On one common coupling, let X indicate $a \sim b_1$, Y indicate $b_2 \sim c$, and Z indicate $a \sim c$. Assume equivalence-domain ownership and $\Pr(b_1 \neq b_2) \leq \delta$. On the event that the middle token is identical, $XY \leq Z$, hence $X + Y - Z \leq 1$; elsewhere its maximum is two. Therefore

$$p_{ab} + p_{bc} - p_{ac} \leq 1 + \delta. \quad (4)$$

If each estimated marginal has absolute error at most ϵ_i , add $\sum_i \epsilon_i$ to the right-hand side. Different trials do not automatically supply this coupling or stable middle-token identity. Passing the inequality also does not select a common higher face: the boundary-family example passes it.

2.3 Exact partial identification under exclusive ownership

For three nominated occurrences, permit absence but assume each present occurrence has at most one owner in the target occasion. The allowed pair-indicator patterns, ordered (12, 23, 13), are

$$000, \quad 100, \quad 010, \quad 001, \quad 111.$$

Let their pair probabilities be p_1, p_2, p_3 , and let t be the mass of 111.

Proposition 2.3 (Three-pair identification). *The exact identified interval is*

$$\max \left\{ 0, \frac{p_1 + p_2 + p_3 - 1}{2} \right\} \leq t \leq \min_i p_i.$$

It is nonempty exactly when $0 \leq p_i \leq 1$ and $p_i + p_j - p_k \leq 1$ for all distinct i, j, k . If only jointly valid boxes $p_i \in [\ell_i, u_i] \subseteq [0, 1]$ are available, the exact interval becomes $[L, H]$, where

$$L = \max \left\{ 0, \max_{i < j} (\ell_i + \ell_j - 1), \frac{\ell_1 + \ell_2 + \ell_3 - 1}{2} \right\}, \quad H = \min_i u_i. \quad (5)$$

Compatibility is $L \leq H$, equivalently $\ell_i + \ell_j - u_k \leq 1$ for all distinct i, j, k .

Proof. The atom masses must be t , $p_i - t$ for each single edge, and $1 - \sum_i p_i + 2t$ for 000. Nonnegativity proves necessity and constructs every admissible exact solution. For boxes and fixed $t \leq \min_i u_i$, choose $p_i = \max(\ell_i, t)$, which minimizes their sum. Feasibility is then $\sum_i \max(\ell_i, t) \leq 1 + 2t$. Expand the left side as the maximum, over $S \subseteq \{1, 2, 3\}$, of $\sum_{i \in S} \ell_i + (3 - |S|)t$. Empty and singleton sets impose only $t \leq 1$ and $\ell_i \leq 1$; pairs and the full set give exactly the lower bounds in (5). The atom construction attains every resulting t . Taking an index minimizing u_k proves the equivalent three box inequalities. $\square$

Triple tests do not characterize every global random partition. Split five tokens into S of size two and T of size three. Every partition satisfies

$$\sum_{i \in S, j \in T} p_{ij} - \sum_{\{i, j\} \subset S} p_{ij} - \sum_{\{i, j\} \subset T} p_{ij} \leq 2. \quad (6)$$

Indeed, a block containing a members of S and b of T contributes $ab - \binom{a}{2} - \binom{b}{2} \leq \min(a, b)$. For $b \geq a$, subtracting a gives $-(b - a)(b - a - 1)/2 \leq 0$, and the other case is symmetric. Summing blocks gives at most $\min(|S|, |T|) = 2$; expectation proves the inequality. Set every cross marginal to $1/2$ and every within-side marginal to zero. All triple inequalities hold, but (6) has left side three. General finite compatibility is a linear programme over admissible partitions, or over a different domain family if exclusive ownership is rejected.

The probability polytope constrains one common target ensemble under the ownership premise. It neither infers that the nominated tokens exist nor imposes that premise on every possible presentation theory.

2.4 Reader validity, probe creation, and context

Let R_i be a positive assertion about a specified joint appearance, and Z_i the occurrence at its readout time. Correct comparison of stimulus values does not by itself calibrate this assertion. Suppose, in the relevant assay context,

$$\Pr(R_i = 1 \mid Z_i = 0) \leq \alpha_i < 1.$$

Writing $q_i = \Pr(R_i = 1)$ and $z_i = \Pr(Z_i = 1)$ gives $q_i \leq \alpha_i + (1 - \alpha_i)z_i$, hence

$$z_i \geq \max\{0, (q_i - \alpha_i)/(1 - \alpha_i)\}.$$

No sensitivity premise is needed for this lower bound. Silence supplies no upper bound. A further guarantee $\Pr(R_i = 0 \mid Z_i = 1) \leq \beta_i < 1$ gives $z_i \leq \min\{1, q_i/(1 - \beta_i)\}$.

Let Y_i denote the same-episode earlier target, with independently defended creation/destruction allowances

$$\Pr(Y_i = 0, Z_i = 1) \leq d_i^+, \quad \Pr(Y_i = 1, Z_i = 0) \leq d_i^-.$$

Then $\Pr(Y_i = 1) \in [z_i - d_i^+, z_i + d_i^-]$, clipped to $[0, 1]$. If the assay's target distribution differs from a common reference ensemble by total variation at most ρ_i , subtract or add ρ_i as well. Thus jointly valid response intervals $[q_i^-, q_i^+]$ give

$$\ell_i = \max \left\{ 0, \frac{q_i^- - \alpha_i}{1 - \alpha_i} - d_i^+ - \rho_i \right\}, \quad (7)$$

$$u_i = \min \left\{ 1, \frac{q_i^+}{1 - \beta_i} + d_i^- + \rho_i \right\}. \quad (8)$$

With specificity alone use $u_i = 1$. These boxes can enter Proposition 2.3, but an accurate later report does not establish $d_i^+ = 0$: the probe may create the new third. Random selection after a completed episode is also insufficient unless its target and exogeneity contract are warranted.

For m assays, with n_i independent Bernoulli repetitions of common mean q_i within assay i , the simultaneous Hoeffding radius $s_i = \sqrt{\log(2m/\eta)/(2n_i)}$ gives $q_i^\pm$ by clipping $\hat{q}_i \pm s_i$, with total failure probability at most η . Independence between assays is unnecessary for the union bound. Calibration uncertainty needs a separate joint budget. Repeated observations cannot calibrate the phenomenal specificity they presuppose. For illustration only, $q = .80$, $\alpha = .05$, $d^+ = .02$, $\rho = 0$ give a lower target probability .7694736842. These are stipulated assay parameters, not measurements of consciousness.

2.5 Fixed content maps and support intersection

Let a finite physical domain X have independently warranted allowed-content sets $\Gamma(x)$, and let $\Delta : X \rightarrow Z$ claim sufficient target description. A function h with $h(\Delta(x)) \in \Gamma(x)$ exists exactly when every nonempty Δ -fibre has nonempty intersection of its Γ sets. Necessity follows from the common value $h(z)$; choosing one value per fibre proves sufficiency. Pairwise intersections are insufficient: $\{a, b\}, \{b, c\}, \{a, c\}$ have no common member.

If independent counterpart choices have m, n values and the target preserves both projections, all mn complete target values differ. A sufficient aperture needs at least mn mathematical values. If each pair also has r independently different presented relations, the count is mnr . This is not a Hilbert-dimension, orthogonality or accessible-bit theorem.

Proposition 2.4 (Same-function support intersection). *On a full Cartesian domain $X = \prod_{i=1}^n X_i$, suppose the same function f factors through coordinate supports S and T . Then it factors through $S \cap T$.*

Proof. For x, y agreeing on $S \cap T$, the Cartesian domain admits w with $w_S = x_S$ and $w_T = y_T$. The prescriptions agree on the intersection. S -sufficiency gives $f(x) = f(w)$ and T -sufficiency gives $f(w) = f(y)$. Thus f is constant on every intersection fibre. $\square$

Two separately feasible maps cannot be substituted for this premise. On binary (x, y) , take $\Gamma(0, 0) = \{a\}$, $\Gamma(1, 1) = \{b\}$ and both off-diagonal sets $\{a, b\}$. A map through x and another through y are feasible, while no constant map is. On a correlated diagonal $x = y$, even one nonconstant function has either coordinate as a sufficient description; the mixed point needed by the proof is absent. Nor is a quantum tensor factorization automatically a Cartesian domain of independently variable complete states.

2.6 Regularity and correlated indicators

On a fixed metric space with probability anchors $p(x_i) \in [\ell_i, u_i]$ and an independently warranted upper Lipschitz constant $L \geq 0$, define

$$\underline{p}(x) = \max\{0, \max_i [\ell_i - Ld(x, x_i)]\}, \quad \bar{p}(x) = \min\{1, \min_i [u_i + Ld(x, x_i)]\}.$$

An admissible function exists exactly when $\ell_i \leq u_j + Ld(x_i, x_j)$ for every pair, with valid anchor intervals. Necessity is the Lipschitz inequality. For sufficiency, maxima and minima of these cones are L -Lipschitz; the pair conditions place both envelopes within every anchor interval. The triangle inequality makes $\underline{p} \leq \bar{p}$. Each envelope is itself admissible, and every admissible function lies between them, proving sharpness. The consistency lower bound

$$L \geq \max_{i,j:d(x_i,x_j)>0} \frac{(\ell_i - u_j)_+}{d(x_i, x_j)}$$

does not warrant the upper regularity used to transport an anchor.

For two indicators Y_1, Y_2 of one binary target J , independently justified error budgets imply

$$\Pr(Y_1 \neq Y_2) \leq \Pr(Y_1 \neq J) + \Pr(Y_2 \neq J) \leq \eta_1 + \eta_2.$$

A disagreement rate .12 contradicts two .05 budgets even when the indicators' marginals agree. The exact unrestricted latent test uses nonnegative cells π_{j,y_1,y_2} , fixes their observed (y_1, y_2) marginal, constrains $\sum \mathbf{1}_{y_i \neq j} \pi \leq \eta_i$, and minimizes/maximizes $\sum \pi_{1,y_1,y_2}$. Every feasible cell table defines a joint law, so the linear-programme bounds are sharp for that model class. Without target-error restrictions, any target prevalence is compatible: draw J independently of the complete observed pair. Hardware independence is not independence conditional on actual appearance, and an experienced word such as “different” need not present the original sensory counterparts.

2.7 Native articulation, manifestation, and categorical grounding

The earlier proposals motivate distinct constitutive laws. The following arguments also identify the premises each law still requires.

Native Articulation Law (NAL). The proposal assigns an elementary presentation to each actual irreducible native transformation. Its motivation is immanence and structural fidelity: do not add a phenomenal fusion across independently operating transformations or a phenomenal division inside a native prime without further lawlike structure. It addresses organization rather than an ingredient list and needs no additional spectator. Its strongest objection is carrier-centered: an irreducible physical event can still have several carriers with separate qualitative states. Rejecting their experiential division already adopts the event-centered individuation criterion. Native elementary-event grain and qualitative duration also need independent specification. A content map could be constant, so one presentation per prime would not itself supply two qualitative counterparts and their relation.

Relational Manifestation (RM). RM proposes that a concretely realized intrinsic relation has a manifest counterpart preserving its distinction, with some common presentation supported by its contributors. Ontological uniformity motivates the proposal: if intrinsic qualitative terms are real, wholly unmanifest connections between them should not simply be assumed. A serious rival nevertheless retains qualitative terms and real intrinsic relations

without their being given together; it need not introduce another substance. Uniformity therefore supplies a reason to investigate the law, not a proof of its co-presentation clause.

This proposal also changes the object represented by the family. If $\mathcal{R}$ lists required *realizing contributor supports*, the least downward-closed family containing them is

$$\mathcal{F}_{\min} = \{\emptyset\} \cup \{\{e\} : e \in E\} \cup \bigcup_{R \in \mathcal{R}} 2^R.$$

It records common realizing support. It is not the earlier family $\mathcal{K}$ of qualitative occurrences jointly given. A subset of a realizing support need not be sufficient for the target. A compressed parity can preserve a distinction without presenting both full argument qualities. Identifying $\mathcal{F}$ with $\mathcal{K}$ would need content fidelity and actual occurrence, neither supplied by set closure.

Intrinsic Qualitative Grounding (IQG). IQG adds: (i) actual concrete categorical character is qualitative; (ii) irreducible relational facts have categorical grounds; (iii) the nominated relation's ground is a presentation in which that relation is manifest. The positive rationale integrates intrinsic actuality and accepted relational phenomenology without an added spectator. Clause (iii) is not a consequence of the first two: a relational ground can contain qualitative terms without one common presentation. The objection concerns assembly/ownership, not whether the relation exists. The broader categorical and whole-act alternatives are developed in Module 8. None of these principles is assumed to establish the main paper's native-human induction.

2.8 Continuous interaction and primitive support

A finite tick does not independently individuate a physical elementary event. Let independently fixed parts have connected open coordinate domains X_i , and let $f(t, x)$ be a C^1 vector field on their full product, with local uniqueness. At t_0 , join parts i, j when a cross derivative $D_j f_i$ or $D_i f_j$ is nonzero somewhere in the intervention domain at times arbitrarily near t_0 .

Proposition 2.5 (Finest interaction-germ decomposition). *The connected components of this symmetric germ graph give the unique finest fixed-part product decomposition of the vector-field germ.*

Proof. Every missing cross-block edge vanishes on some time neighbourhood. Finitely many pairs supply a common neighbourhood. Connected Cartesian coordinate domains and vanishing cross derivatives imply that each block's vector field depends only on that block, giving local product flows. Conversely, a product germ has zero cross-block derivatives, so every germ edge must have its ends in one block. Each graph component must consequently lie in any admissible block. $\square$

Separate smooth invertible part-coordinate changes, consistent part permutations and orientation-preserving smooth time diffeomorphisms preserve the zero/nonzero cross-dependence. Arbitrary mixing of native parts does not. For $\dot{x} = \sin(2\pi t)y$, $\dot{y} = \sin(2\pi t)x$ on $[0, 1]$, the flow is $\exp(M\alpha(t))$ with off-diagonal M and $\alpha(t) = (1 - \cos 2\pi t)/(2\pi)$. It returns to identity while its intermediate flow couples the inputs.

A two-sided germ can depend on later coupling. A coupling zero for $t \leq 0$ and e^{-1/t^2} afterward is included at zero despite an idle past and identical instantaneous derivatives. Coupling 1–2 only before zero and 2–3 only afterward connects all three at zero without simultaneous edges. Product indecomposability of a germ is thus different from instantaneous exchange or co-presentation.

For independently fixed finite tensor factors, let E_i replace factor i by its normalized partial trace times identity. The E_i commute and are Hilbert–Schmidt orthogonal projections. Define

$$\mathcal{P}_S = \prod_{i \in S} (\text{Id} - E_i) \prod_{j \notin S} E_j, \quad H_S = \mathcal{P}_S H.$$

Expanding $\prod_i [E_i + (\text{Id} - E_i)]$ proves $H = \sum_S H_S$; mutually orthogonal projector ranges prove uniqueness. Each included factor is traceless and each omitted factor is identity. Local unitary frames preserve support, while their derivative terms add only singleton generators; a scalar shift changes only the empty support. Pointwise support needs regularity: a change on one time point in an integrable generator does not alter the propagator. Pair supports need not exhaust state/history structure: $[Z_1 X_2, Y_2 Z_3] = 2i Z_1 Z_2 Z_3$, and the commuting chain $Z_1 Z_2 + Z_2 Z_3$ acting on $|++\rangle$ at angle $\pi/4$ produces a pure state with every one-qubit reduction maximally mixed. It is entangled across each bipartition although the primitive triple support is zero.

2.9 Action, articulation rates, and quantitative support

On fixed factors $\mathcal{H}_L \otimes \mathcal{H}_R$, with dimensions d_L, d_R , remove scalar and local Hamiltonian terms by

$$H_\times = H - \frac{\text{Tr}_R H}{d_R} \otimes I_R - I_L \otimes \frac{\text{Tr}_L H}{d_L} + \frac{\text{Tr} H}{d_L d_R} I.$$

For locally integrable Hermitian H , define $\mu(I) = \hbar^{-1} \int_I \|H_\times(t)\|_{\text{op}} dt$. It is additive under faithful subdivision. An absolutely continuous local frame adds only local derivative terms and conjugates $H_\times$; an increasing absolutely continuous time change rescales the generator and preserves the integral.

Proposition 2.6 (Zero action and product subintervals). *The action vanishes exactly when every subinterval propagator is a product unitary up to scalar phase. With $H_0 = H - H_\times$ and its propagator V_0 ,*

$$\|V(t, s) - V_0(t, s)\|_{\text{op}} \leq \mu([s, t]), \quad \frac{1}{2} \|V \rho V^\dagger - V_0 \rho V_0^\dagger\|_1 \leq \min\{1, \mu([s, t])\}.$$

Proof. Zero integral makes $H_\times = 0$ almost everywhere, so the local generators yield product propagation. Conversely the tangent of a product-unitary propagator at almost every identity-time lies in the local Lie algebra, excluding a cross term. Duhamel’s integral expression for $V - V_0$, unitary invariance of operator norm and integration give the first bound. Expanding the density difference into two terms gives trace norm at most $2\|V - V_0\|_{\text{op}}$; trace distance is also at most one. $\square$

For $H = g(t) Z_L Z_R$, $\mu = \int |g|/\hbar$ while the accumulated angle is $\theta = \int g/\hbar$. A forward angle $\pi/4$ followed by its inverse has identity endpoint and action $\pi/2$. Exchange SWAP generated by $g(I + XX + YY + ZZ)/2$ has cross norm $3|g|/2$ and action $3\pi/4$ at its SWAP endpoint. Endpoint permutation does not certify an interaction-free physical history.

Finite-Rate Articulation (FRA). FRA proposes joint-presentation occurrences with survival $S(\mu)$. If $S(0) = 1$, continuity at zero and action-homogeneous memoryless survival imply $S(x + y) = S(x)S(y)$, then $S(\mu) = e^{-c\mu}$ for $c \geq 0$. To prove this, continuity excludes a zero survival at finite action by repeatedly halving it; $-\log S$ is continuous and additive, hence linear. Probability of at least one occurrence is $1 - e^{-c\mu}$. Finite response, composability and invariance under descriptive subdivision motivate the proposal, but no such property earns $c > 0$, selects the norm, or makes survival memoryless.

For an external equal-probability lottery over actions $0, 2x$, tokenwise conditioning gives $\frac{1}{2}(1 - e^{-2cx})$, not $1 - e^{-cx}$; their gap is $\frac{1}{2}(1 - e^{-cx})^2$. A state-sensitive completion is also needed if the proposal is to distinguish $|00\rangle$ from $|++\rangle$ under ZZ : their action agrees despite different state evolution. Finally, alternating $g = \pm 1$ on $2n$ equal bins gives fixed action one and maximum signed phase $1/(2n)$. Its propagator path tends uniformly to idle while the proposed occurrence probability stays $1 - e^{-c}$. This is a dependence on actual control history, not a failure of invariance under redescribing one unchanged history.

Reciprocal Articulation Field (RAF). An alternative introduces actual amplitudes a_1, a_2 with potential

$$V = \frac{r}{2}(a_1^2 + a_2^2) + \frac{u}{4}(a_1^4 + a_2^4) - \kappa a_1 a_2 - h(a_1 + a_2), \quad r, u > 0.$$

At $h = 0$, $\kappa \geq 0$, the zero state's Hessian eigenvalues are $r \mp \kappa$. For $\kappa > r$ the aligned minima have $a_1 = a_2 = \pm\sqrt{(\kappa - r)/u}$ and Hessian eigenvalues $2(\kappa - r), 4\kappa - 2r$. Small forcing satisfies $um^3 + (r - \kappa)m = h$, giving susceptibility $[3um^2 + r - \kappa]^{-1}$ along a stable aligned branch. Relaxation additionally requires a kinetic law: under $\dot{a}_i = -\gamma\partial_{a_i}V$, $\gamma > 0$, the linear relaxation rates are γ times the Hessian eigenvalues. If κ depends on a physical coordinate, differentiating V produces a corresponding backreaction force; the field is therefore a physical hypothesis, not a cost-free phenomenal label.

Those predictions do not validate the field or its qualitative interpretation. At every strictly positive finite temperature its Gibbs density is positive throughout the plane, giving positive $\mathbb{E}a_i^2$ even below threshold and zero $\mathbb{E}a_i$ in the symmetric equilibrium even above it. Quartic domination makes the finite partition function locally analytic in κ ; the zero-temperature bifurcation is not a universal biological-temperature cutoff. Nonzero forcing already gives a nonzero response below threshold. If each uncoupled core is already ordered, replace r by $-\alpha$, $\alpha > 0$: aligned and antialigned energies are $-(\alpha + \kappa)^2/(2u)$ and $-(\alpha - \kappa)^2/(2u)$. Every positive κ favours aligned global minima, while antialigned states remain locally stable only for $\kappa < \alpha/2$. Thus ordering does not settle a one-subject fusion boundary. FRA and RAF concern different physical/constitutive commitments and cannot be combined by sharing an articulation label.

2.10 Collective capacity and a conditional content-grounding bound

Pairwise generators can encode globally irreducible physical distinctions. For n qubits with control c , take the bounded autonomous Hamiltonian

$$H = \frac{\pi\hbar}{2T} \sum_{j=2}^n |1\rangle\langle 1|_c \otimes (I - X_j).$$

Its commuting pair terms implement controlled- X at T , mapping $|\pm\rangle_c|0\rangle^{\otimes(n-1)}$ to $|\text{GHZ}_{\pm}\rangle = (|0^n\rangle \pm |1^n\rangle)/\sqrt{2}$. The states are orthogonal and $X^{\otimes n}$ distinguishes them; tracing out any factor removes their differing coherence, so every proper reduction agrees. Primitive pair arity therefore supplies no upper bound on collective physical distinction order. This is not an observation of a GHZ presentation.

If, additionally, a reduced density operator is a sufficient target aperture and its finite content probabilities are affine on *all* density operators, they have POVM form $F(\rho)_k = \text{Tr}(E_k\rho)$ with $E_k \geq 0$, $\sum_k E_k = I$. An affine extension to Hermitian operators gives the trace representation; positivity on all pure states and normalization give the effects. Consequently

$\text{TV}(F(\rho_0), F(\rho_1)) \leq \frac{1}{2} \|\rho_0 - \rho_1\|_1$. A binary target distinguishing equiprobable preparations with average error at most ϵ thus requires

$$\frac{1}{2} \|\rho_0 - \rho_1\|_1 \geq 1 - 2\epsilon. \quad (9)$$

The lower bound follows because the two correct-decision errors sum to at most 2ϵ . Sufficient grounding and affinity are extra correspondence premises; a physical ensemble representation alone does not supply them.

For an explicit changing aperture, let $H = \hbar\omega|1\rangle\langle 1|_L \otimes (I - X_R)$ act on $|\Phi_{\pm}\rangle = (|00\rangle \pm |11\rangle)/\sqrt{2}$. With $\theta = \omega t$,

$$|\psi_{\pm}\rangle = \frac{|00\rangle \pm ie^{-i\theta} \sin \theta |10\rangle \pm e^{-i\theta} \cos \theta |11\rangle}{\sqrt{2}}.$$

Direct partial traces give $D_{LR} = 1$, $D_L = |\sin \theta|$, $D_R = 0$. If the phase distinction were actually presented with error at most .1, then at $\theta = \pi/4$ neither local density aperture meets the required .8 contrast. At $\theta = \pi/2$ the states are $|\pm\rangle_L |0\rangle_R$, so the same target becomes locally realizable. No subject migration, preserved original token, or actual qubit appearance follows. Generator, realizing support, encoded distinction and qualitative presentation are separate objects.

2.11 Descriptive gluing versus actual common occurrence

The global-structure proposal of [Lee-Youngzie et al. \(2026\)](#) motivates testing whether independently measured local qualitative structure determines a broad structure. A presheaf F has identity/composition restrictions; a sheaf adds existence *and uniqueness* of a glue for every compatible local family. A category-valued dissimilarity object needs a specified section/underlying-set construction before these set-valued conditions apply.

Finiteness alone does not turn existence into uniqueness. On a discrete two-point space, let $F(X) = \{0, 1\}$ and let every proper-open set have a singleton section set, with both globals restricting to it. Every matching family glues: a cover containing X fixes its global member, and a proper cover admits either global. The cover by the two singleton opens has two glues. Injective restrictions or a jointly separating restriction family can instead supply uniqueness, but their independent role, not finiteness, does the work.

Nor does an incompatible family disprove the sheaf condition. Binary functions on three positions form a sheaf; left/middle and middle/right assignments that disagree on the middle have no glue because they are not matching. An impossible three-dimensional interpretation likewise need not mean the actual two-dimensional scene lacks unity.

An expansive restriction postulated to obey

$$d_X(x, x') \leq d_V(r(x), r(x'))$$

cannot forget a positively distinguishable feature: equal restricted values force zero broad dissimilarity. Restricting the left coordinate of binary pairs with normalized Hamming distance violates this for $(0, 0), (0, 1)$. An attentional manipulation may instead create a new context or token and sharpen discriminability. The arrow between attention contexts must then be distinguished from passive part restriction of one unchanged presentation; unchanged retinal input does not establish the latter.

Attach independently supported token sets $T_i(d_i)$ to local descriptions d_i : these are the nominated actual presentations of which the datum is warranted as an aspect. A common occurrence witness exists exactly when $\bigcap_i T_i(d_i) \neq \emptyset$. Compatible descriptions separately

witnessed by τ_1, τ_2 need no common token. A new τ_3 genuinely presenting both can supply the common witness without fusing τ_1, τ_2 . Descriptive gluing does not establish that lifting. Even a common token needs independent evidence that the *relation*, rather than just separate counterparts, belongs to it. Equal binary local marginals conceal this: equal-pair and opposite-pair distributions both have uniform margins, while their joint-equality probabilities are one and zero. Independently measured broad relational data, with fixed readers and token/context indices, can discriminate them.

2.12 Native replacement and the corrected acquaintance condition

The fading/dancing-qualia argument supplies a cognitive-coherence motivation for organizational transfer (Chalmers, 1995). Its exact physical premise is stronger than boundary-output agreement. Fix components, local states, native independent preparations, controlled kernels, output ports, clock, initial law and environmental coupling. A product of local bijections and a component permutation, with corresponding interventions, is a native isomorphism only if every controlled kernel and those boundary/clock conditions commute. Induction proves equality of all finite trajectory laws, including adaptive policies that choose corresponding actions from matched prior outputs. The induction concerns physical trajectories; it does not identify a detector with direct acquaintance.

For example, $F(a, b) = (b, a)$ and $G(r, s) = (r \oplus s, s)$ obey $hF = Gh$ for $h(a, b) = (a, a \oplus b)$. Yet across the sixteen state/single-port/value preparations, eight corresponding same-port clamps fail: four first-port failures have clamped value different from a , and four second-port failures have $a = 1$. No product bit-bijection with permutation conjugates them: under such maps both swap outputs remain cross-only dependencies, whereas G has an isolated self-dependent second component. Global predictive recoding is not a physical-copy theorem.

Likewise, let a current/remembered comparator update $(x, m)' = (u, x)$, and suppose a material chart sends both presented values to $q_z(v) = v \oplus z$. Switching z changes absolute labels in all four states while preserving their presented equality. A change between tokens does not itself produce a presentation comparing the old and new qualities. Occurrence transfer is weaker than exact qualitative-chart transfer, but still needs its own warrant.

The corrected no-silent-loss schema is especially instructive. Let r_v mean occurrence, k_v genuine current acquaintance, B_v independently specified checking background, and D_{uv} a possible physical discrepancy on a replacement edge. The proposed condition is

$$B_u \wedge k_u \wedge r_u \wedge \neg r_v \implies D_{uv}.$$

Native matching supplies $\neg D_{uv}$. One anchored edge can yield r_1 , but not k_1 . On a three-vertex path, take $r = (1, 1, 0)$, $k = (1, 0, 0)$, all backgrounds true and no discrepancy. The schema holds in both directions on every edge, while endpoint occurrence fails. An occurrence-edge principle $r_u \wedge \neg r_v \implies D_{uv}$ repairs the first-loss proof; alternatively add $B_v \wedge r_v \implies k_v$ at every vertex. Each is a new premise, not an implication of transported occurrence. Interval occurrence also does not automatically mean an attended presentation at the checking instant. These are the exact obligations that a transfer account must earn, and they are distinct from the main paper's narrow continuing-human capacity induction.

2.13 Awareness, access and the construction of a personal event

The awareness-first account distinguishes the proposed knowing aspect of reality, denoted U in the monograph, from the differentiated contents available through a particular apparatus and history. This ground is not an additional localized subject. The monograph's starting commitment and the development paper's operational distinctions have different roles (Rodgers,

2026e,c). The former proposes an ontological basis; the latter distinguishes a source, the access available to an observer, and the representation constructed through that access. An operational model can characterize dependence on apparatus or acquired constraints without deriving the fundamental commitment. Conversely, granting that commitment does not determine the extension of a particular experiential predicate.

This distinction matters even if one accepts that all differentiated terms belong to one underlying reality. Two differentiated processes may have separate perspectives; they may contribute to a new shared presentation; or their interaction may introduce no additional joint perspective. A premise about the underlying basis alone does not decide among those local possibilities. The present paper’s current-act argument supplies a scoped positive attribution rather than treating fundamental awareness as a substitute for its activity and bearer premises.

Perceptual presentation is formed through bodily and sensory processing and acquired organisation, including classifications, memories, expectations, feelings and beliefs. These conditions shape the sensory presentation itself; they are not merely descriptions added after a consciously viewed raw image. Ongoing seeing is perceptual processing, which can continue when reflective naming, commentary or personal appropriation is suspended. Perceptual construction, recognition and the sense of an event happening to me are different functional roles; they can operate concurrently within one activity. A practical history can therefore alter the organisation of current access itself. In the development account, a relational product can be retained and become available to subsequent interactions; it need not be a third substance (Rodgers, 2026c, §3.1). Retained constraints then shape activity, and activity can revise them. The reflective-alignment paper develops that reciprocity (Rodgers, 2026b, §4.1); its operational description does not by itself establish one phenomenal subject.

The personal observer is also constructed within this process. A central self-image organizes ownership, relevance and narrative continuity. The proposed reflective recognition of its constructed character need not erase memory, practical identity or the usable self-model. It changes the model’s claim to be the exhaustive centre (Rodgers, 2026c, §5.4). Whether an artificial or biological implementation has such recognition as experience requires its own warrant; recursive updating or an articulate self-report does not settle it (Rodgers, 2026j,b).

2.14 A conditional connection to the full constitution

The current-act argument is developed independently of assuming the full A1–A3 constitution. A defensible application of SPC-2 requires a justified physical realisation and native operating doctrine (Rodgers, 2026e, ch. 17). A1 assigns a perspective to a qualifying maximal internal strongly connected component. Qualification requires an executable covering return and at least two distinct native predictive classes in the actual operating/protocol type and resource context. Incompatible control modes cannot be combined into a fictitious return. These conditions are not strengthened here by a new requirement for language, autobiographical reflection or a rich human scene.

A2 assigns phenomenal relational organisation as a structural copy of the core’s complete endogenous predictive object over all physically admitted finite continuations. The actual phenomenal point corresponds to the predictive class of the realised intrinsic state. Native operation and outcome labels, finite test laws, compatible horizon restrictions and well-defined class transition instruments are preserved. This is the full structural assignment, not a selected finite report profile or an investigator’s preferred time horizon. A3 then determines episode continuation through nonbranching realised process provenance; matching memories or outputs alone do not supply that continuity.

To connect the present case to those laws, an appropriate phase of its performance would

have to be shown to belong to a justified qualifying core, with the relational mode Q identified as an aspect of the core’s current scene. A performance’s executing contributors and a subject’s boundary are different nominations requiring a bridge. An environmental source or instrument can contribute causally without thereby becoming part of that subject. With the realisation supplied and SPC-2 accepted, phenomenal states, their timing and continuation are assigned at its declared native temporal resolution. No such complete application is demonstrated here. The local current-act argument neither validates A2 nor independently selects the first onset of a scene, and it does not turn the subject boundary into the set of everything causally involved in the performance. First presentation at current uptake, J , remains an admitted option.

2.15 The October draft and the scope of the recollective thesis

The unpublished 12 October 2026 draft of *Experience as Recollective Interpretation: Awareness, Scaffolding and the Question of Machine Experience* (Rodgers, 2026d) defines experience as the interpretation of a retained occurrence as having occurred. Its Section 5 explicitly allows minimal retention without language, explicit temporal concepts or autobiographical memory. An ongoing act can interpret its recent history: the original process need not be complete before reflective uptake starts. The relevant temporal ordering concerns the particular registered material and its uptake, rather than a requirement that seeing stop before reflection can begin. It does not place a consciously viewed, unprocessed image before all interpretation: perceptual construction already shapes what is seen.

Table 1 makes the uses explicit. It records the roles of the terms rather than treating the companion draft’s vocabulary as a proof of its constitutive thesis.

Term	Present paper	October recollective draft
Occurrence	Actual taking place; a qualitative occurrence requires its own warrant. Retention is a separate question.	Something happening in a system and registered or retained by it; seeing can occur without being classified as experience.
Appearance	Actual qualitative character of a constructed presentation, including the joint relation targeted here.	No independent admission rule for this target is supplied; seeing can continue without reflective personal classification, while presence is identified with construction.
Interpretation	Perceptual construction and reflective uptake have distinguishable, possibly concurrent roles.	Uptake of retained material as prior to its interpretation; explicit concepts of time are unnecessary.
Experience	Used for a qualitative episode or mode unless a narrower use is specified.	Recollective interpretation of a retained occurrence as having occurred.
Personal experience	Appropriation and interpretation as happening to a person.	The further subjective or personalised layer organised through concepts, feeling and a constructed self.
Awareness	An ontological starting commitment, distinct from evidence for a specified local appearance.	The proposed undivided ground remaining when interpretative divisions are removed.

Table 1: Terminology across the present argument and the unpublished October draft. The last column records that draft’s definitions and proposals, especially Sections 1, 5 and 7; it does not promote them to independently established results.

Part of the apparent tension is therefore terminological. The companion draft can withhold its defined word *experience* from seeing without reflective self-classification while leaving

perceptual processing in place. This does not remove the acquired organisation shaping that processing. Part is a difference in scope. The present paper defends a local sensory-capacity projection and a contestable bearer attribution; the companion proposes an account of all experience and discusses artificial systems. Its Section 10 expressly acknowledges that the universal recollective thesis is not established by the relational-awareness results. In particular, allowing first appearance at current uptake, *J*, does not make every appearance a recollection or make every retained descriptor appear.

A substantive question remains after those distinctions. Section 7 of the companion draft argues that presence is no additional ingredient beyond the constructed process, and Section 8 declines a functional account that would leave presence as a further open fact. Those claims are not merely a preference for *personalised* over *subjective*. Their weakest reading denies a separate inner spectator; that is compatible with the present act/mode argument. A stronger reading identifies actual qualitative appearance with suitably organised retentive interpretation under the awareness premise. That identification needs substantive warrant. The present paper neither derives it for every interpreting system nor establishes an irreducible remainder that would refute it. The companion's Section 7 itself records that the move from reflective classification to experiential constitution has not been proved, and that a defender of seeing without reflective classification as experience has not thereby been refuted. The precise unresolved choice is which constitutive identification is intended and what supports its extension beyond the locally warranted case.

The comparison also limits inferences about artificial systems. Section 8's narrow verdict concerns interpretation and recollection without the human personal layer. It does not supply the present paper with an independent appearance anchor, jointness test or physical bearer identification for an artificial interpreter. Conversely, failure to replicate human autobiographical or emotional organisation alone would not exclude every possible appearance. Both claims concern the scope of an inference, not a verdict about a particular system's consciousness.

2.16 Occurrence without recognition and the limiting memory question

Something occurring, its currently appearing, its recognition as a particular object or event, its appropriation as happening to a person, and its subsequent interpretation are distinct questions. They can overlap in ordinary life. The locally supported current presentation need not await a later autobiographical account, and no such account is required by the concrete-performance principle. This does not decide the companion draft's universal identification of experience with recollective interpretation.

The limiting condition that removes all acquired scaffolding and the ability to form memory must be distinguished from suspending naming or personal recognition. Its proposed underlying basis does not itself specify an impression carrying a discriminating record. Something occurring and its recognition as an event are different claims; absence of recognition does not establish absence of every process or retained dependence. Neither the absence of a named object nor the inability to describe a condition entails that no change took place. Equally, the stronger limiting condition should not be replaced with an ordinary recognised scene and a failed report.

The positive recollective model in the October draft explicitly includes retention. Its Section 5 distinguishes such minimal retention from conceptual or autobiographical memory; its limiting seeing case withholds interpretative experience while preserving an occurrence. Those claims do not establish an unrecognised retained trace in the separate limiting condition that removes the ability to form memory. No retention mechanism for that stronger condition is supplied by this comparison.

The remaining explanatory question is specific. If later interpretations differ with a particular antecedent, what makes their dependence on that antecedent possible and their historical reference warranted? The claim that memory categories are supplied later does not by itself answer that question. The following elementary result identifies a stronger condition than absence of conscious, conceptual or autobiographical memory. It is a conditional diagnostic; it does not establish that the limiting condition actually satisfies that stronger condition.

Proposition 2.7 (No antecedent discrimination without a dependence route). *Let A denote a nominated preceding condition. At the start of a later interpretation let S include every variable available to that interpretation, including restored scaffolding, apparatus state and relevant continuing environment. Suppose $\text{Law}(S \mid A = a) = \nu$ is the same for every admitted a , and a common stochastic kernel $T(\cdot \mid S)$ generates a later account Y without a further A -dependent input. Then $\text{Law}(Y \mid A = a)$ is the same for every admitted a .*

Proof. For every account event E ,

$$\Pr(Y \in E \mid A = a) = \int T(E \mid s) \nu(ds),$$

which is independent of a . An external input whose conditional law varies with a would violate the stated completeness or common-kernel premise. $\square$

No conscious recollection, named object, faithful replay or material trace is assumed in this proof. The converse claim that every actual dependence must be a memory trace is not proved. A continuing external source, nonconceptual state or separately proposed nonphysical relation would constitute a different dependence route and would need to be specified and justified. Mere persistence of one undifferentiated basis does not yet explain discrimination among antecedents. Absence of an ability to form memory also does not by itself establish the independence premise for all these variables. The stronger no-dependence stipulation and the no-memory limiting condition must therefore not be silently identified.

If the apparent historical reference is instead entirely a present construction, the account must explain what warrants relating it to one particular antecedent. This is an open explanatory obligation, not an established retained-information mechanism. The current-act conclusion does not depend on choosing a resolution: ordinary current sensory evidence and the constitutive argument have their own stated domain.

The further proposal that fundamental awareness may be known as conceptual scaffolding falls away is philosophical and motivated by first-person experience. It does not follow from the impossibility of reproducing an occurrence in a description. The distinction preserves that proposal while keeping particular claims of occurrence, content, basing and bearer assessable.

3 Finalization, selection and physical access

The same retained record can support a provisional comparison, an eventual correct answer and a later current presentation. These are different targets. The source/readout contracts below distinguish these targets and establish accessibility constraints without dating first appearance.

3.1 Common prefixes and immutable finalization

Let $b \in \{1, \dots, m\}$ index a later physical branch. Let H denote an adequate observable history available before the branch, with common law μ . A common nonanticipating kernel generates

an early output from H and independent private randomness. Then every branch has the same early output law: integrate that one kernel against μ . This includes adaptive earlier operations if their full relevant controlled history is in H . Equality of displayed stimuli alone does not establish this contract.

Let C be a nominated eventual content on a finite alphabet $\mathcal{C}$, $P_b(h, c) = \Pr_b(H = h, C = c)$ and $Q_b(c | h) = P_b(h, c)/\mu(h)$ when $\mu(h) > 0$. An early flag F with marker V finalizes C if, on $F = 1$, $V = C$ in every branch under the stipulated contract. Its event must be determined early, not retrospectively defined as $\{V = C\}$. An immutable early value cannot have distinct certain eventual values across branches with a common adequate prefix. This does not prohibit provisional content or a correct early guess on a particular realized branch.

Theorem 3.1 (Abstract common-mass maximum). *If the joint early finalized submeasure is common to the branches, its mass is at most*

$$\alpha = \sum_{h,c} \min_b P_b(h, c). \quad (10)$$

The bound is attained in the unrestricted finite class in which future completions may be jointly constructed to fit the prescribed P_b .

Proof. Write $f(h, c) = \Pr(H = h, F = 1, V = c)$. Finality gives $0 \leq f(h, c) \leq P_b(h, c)$ for every branch, proving the upper bound. For attainment take $f = \min_b P_b$. For each h , select early outcomes of masses $f(h, c)$ and a residual mass $\mu(h) - \sum_c f(h, c)$. On flagged outcomes force every eventual branch value to equal c . On unflagged outcomes use the normalized residual distributions $P_b(h, c) - f(h, c)$, using a joint conditional coupling if desired. Each branch has its required law. A null residual requires no further choice. $\square$

Equation (10) is established maximal all-equal coupling mathematics: the generalized Doeblin coefficient in Makur and Singh (2024, Theorem 2). The contribution here is its prefix/finality application and the distinction from fixed passive access, not a priority claim for the common-mass identity. Equivalently its elementary LP dual assigns nonnegative weights $\lambda_b(h, c)$ with $\sum_b \lambda_b(h, c) \geq 1$ and minimizes $\sum_{b,h,c} \lambda_b(h, c) P_b(h, c)$; concentrating weight on a minimum branch at each atom certifies equality.

Pairwise overlap need not be global. On three content values, take

$$P_1 = (1/2, 1/2, 0), \quad P_2 = (0, 1/2, 1/2), \quad P_3 = (1/2, 0, 1/2).$$

Every pair has common mass $1/2$, while $\alpha = 0$. The history H also matters: a fair history bit with $C = H$ in one branch and $C = 1 - H$ in another has identical marginal content distributions but zero joint history/content overlap. In contrast, dependence $H = b$ violates the common-prefix premise and can permit complete early finalization.

3.2 Fixed passive native apparatus

The attaining architecture above may engineer its future through F, V . Suppose instead a *fixed* apparatus has conditional future laws Q_b , and the early flag/marker is passive: conditional on the complete relevant pretime H , its private seed is independent of future innovations and F, V do not influence future dynamics. H excludes independent innovations that have not yet occurred; including their realized values would give premature access by definition.

Proposition 3.2. *In this class the optimal zero-error flagged mass is*

$$\beta = \sum_h \mu(h) \mathbf{1}\{\exists c \in \mathcal{C} : Q_b(c | h) = 1 \text{ for all } b\}. \quad (11)$$

Proof. If the early marker selects c with positive mass at h , conditional independence makes its error probability in branch b equal to $1 - Q_b(c | h)$. Zero error requires this to vanish in every branch. Conversely flag every eligible h and choose a common certain value there. No private randomization can turn an ineligible h into an eligible one. $\square$

A single branch with a fair future coin and trivial history has $\alpha = 1$ but $\beta = 0$. Thus unrestricted coupling is not a capacity certificate for a passive physical controller. For a tolerance imposed *conditional on each realized (h, c) marker*, eligibility is $\max_c \min_b Q_b(c | h) \geq 1 - \epsilon$. A tolerance averaged over flags or histories instead requires a different optimization.

For total branch error budgets ε_b , write $x(h, c) = \Pr(H = h, F = 1, V = c)$. The exact passive optimum is the finite LP

$$\begin{aligned} \max_x \sum_{h,c} x(h, c), \quad & x(h, c) \geq 0, \quad \sum_c x(h, c) \leq \mu(h), \quad (12) \\ & \sum_{h,c} x(h, c)[1 - Q_b(c | h)] \leq \varepsilon_b \quad \text{for every } b. \end{aligned}$$

Necessity follows from conditional independence; sufficiency implements the selection probabilities $x(h, c)/\mu(h)$ with an independent seed. For two opposite deterministic branches, random guessing can share an allowed total error budget even though no individual marker is conditionally certain. An average max-min or sum-min expression cannot replace this LP.

3.3 Approximation and calibration

Given estimates $\hat{P}_b$ and independently warranted bounds $\text{TV}(P_b, \hat{P}_b) \leq \epsilon_b$, the unrestricted robust maximum is

$$\begin{aligned} \max_{f, p_b} \sum_x f(x), \quad & x = (h, c), \quad (13) \\ 0 \leq f(x) \leq p_b(x), \quad & p_b(x) \geq 0, \quad \sum_x p_b(x) = 1, \quad \frac{1}{2} \sum_x |p_b(x) - \hat{P}_b(x)| \leq \epsilon_b. \end{aligned}$$

If common history marginals are part of the contract, impose them as additional linear constraints. Absolute values can be represented by nonnegative slack variables, so this is a finite LP, not a floating-point heuristic.

For the cyclic three laws above and equal ϵ , the exact optimum is $\min(1, 3\epsilon)$. If a coordinate is zero in one estimated law, its common mass cannot exceed ϵ , giving the upper bound 3ϵ . For $\epsilon \leq 1/3$, set $f = (\epsilon, \epsilon, \epsilon)$, and in each law put ϵ on its missing coordinate and $(1 - \epsilon)/2$ on the others. Each change has TV ϵ and dominates f . At and above $1/3$ all three laws may be the uniform distribution. This is a synthetic sharp certificate, not an empirical error estimate.

More generally let early extended laws (H, F, V) differ from a reference branch by at most δ_b in TV, and let branch finality error be at most ε_b . If f_0 is the reference finalized submeasure and P_b the eventual joint law, then

$$\sum_x (f_0(x) - P_b(x))_+ \leq \delta_b + \varepsilon_b.$$

Indeed the early-law discrepancy bounds the positive difference from branch b 's finalized submeasure, and finality error bounds its deficit from P_b . Since $f_0 - \min_b P_b \leq \sum_b (f_0 - P_b)_+$ atomwise,

$$\Pr_0(F = 1) \leq \alpha(P_1, \dots, P_m) + \sum_b (\delta_b + \varepsilon_b), \quad \delta_0 = 0. \quad (14)$$

Without warranted budgets the bound has no empirical force.

Report laws may replace content laws only through a defended common-alphabet coupling such as $\Pr(Y \neq C) \leq \epsilon$, which implies TV error at most ϵ . Correct task performance alone does not provide this coupling. The cyclic report laws are compatible with constant content and a branch-dependent physical report channel as well as with truthful varying content. These models require different finality inferences.

An imperfect occurrence witness need not be exhaustive. In this paragraph let Z denote the target occurrence and B its positive indication. If $\Pr(B = 1 \mid Z = 0) \leq a < 1$, total probability gives the sharp bound $\Pr(Z = 1) \geq \max\{0, [\Pr(B = 1) - a]/(1 - a)\}$. False-positive probability a and sensitivity 1 attain it. More general calibrated ranges $f \in [f_L, f_+]$, $s \in [s_L, s_+]$, $s_L > f_+$, give compatible prevalence bounds

$$\max\{0, (r - f_+)/(s_+ - f_+)\} \leq \Pr(Z = 1) \leq \min\{1, (r - f_L)/(s_L - f_L)\}, \quad r = \Pr(B = 1).$$

Neither specificity nor sensitivity follows from ordinary task correctness; temporal and context transport require the separate bounds in Module 2.4.

For a randomized physical intervention, let (Z_0, Z_1, B_0, B_1) be potential outcomes on one justified coupling. If $\Pr(B_1 \neq B_0, Z_1 = Z_0) \leq d$, then

$$\Pr(Z_1 \neq Z_0) \geq \max\{0, |\Pr(B_1 = 1) - \Pr(B_0 = 1)| - d\}.$$

The report-change event splits into target-change and bypass cases; marginal contrast is at most its probability. Probabilities .5 for both changing, .1 for report-only change and .4 for neither attain the bound. Marginal response rates do not identify the bypass allowance or common coupling.

Calibration and sampling uncertainty impose separate obligations. For Bernoulli mean r , the centered log moment generating function has second derivative equal to a tilted Bernoulli variance, at most $1/4$, so it is bounded by $t^2/8$. Independence and exponential Markov inequality give tails $e^{-2n\epsilon^2}$. This proves the usual Hoeffding/union-bound intervals directly. Uncertain calibration needs its own simultaneous confidence budget.

3.4 Sharp sampling of the same completed episode

Sampling an episode differs from changing its mechanism. Let p, q be two complete joint source laws and let one common conditional reader have event probabilities $k_x \in [0, 1]$. If $p \cdot k \geq \ell$, the sharp transferred lower bound is

$$\min\{q \cdot k : 0 \leq k \leq 1, p \cdot k \geq \ell\} = \max_{\lambda \geq 0} \left[\lambda \ell - \sum_x (\lambda p_x - q_x)_+ \right]. \quad (15)$$

The solution fills atoms in ascending q_x/p_x , possibly partially filling the last, and sets $k_x = 0$ when $p_x = 0$ unless irrelevant. To prove the dual, add multiplier λ to the constraint and minimize each affine coordinate over $[0, 1]$; sorting the ratios yields a feasible attaining point and multiplier. With multiple anchors $p^j \cdot k \geq \ell_j$, replace $\lambda \ell$ by $\sum_j \lambda_j \ell_j$ and λp_x by $\sum_j \lambda_j p_x^j$. This is finite Neyman–Pearson/LP geometry, not a new measurement law.

For example $p = (2/5, 7/20, 1/4)$, $q = (17/20, 1/10, 1/20)$ and $\ell = 2/5$ give $k = (0, 3/7, 1)$, hence minimum $13/140$. Here $\text{TV}(p, q) = 9/20$, so the coarse TV bound $\max(0, \ell - \text{TV}(p, q))$ is zero. The improvement uses the full source distributions, not stronger phenomenal evidence. Independent input-only selection of the *same completed physical episodes* can preserve k ; replacement of the substrate, later probe creation or different history need not. A selection that depends on unobserved response variables also need not preserve the stipulated conditional law.

For the displayed example, adding anchor $p^2 = (1/10, 1/10, 4/5)$ with lower bound $9/10$ raises the optimum to $3/20$, attained by $(0, 1, 1)$. All anchors must concern the same conditional assignment. On a general source, write the absolutely continuous part of q as $r dp$. Randomized selection gives the analogous infimum $\int_0^\ell F_r^{-1}(u) du$; put zero event probability on the q -singular part. This follows by the same exchange of equal p -mass from a higher to a lower likelihood ratio. The finite theorem already suffices for the examples.

3.5 Completing an inadequate source

Let a target variable J take values in an alphabet of size $m \geq 2$, and suppose the physical source chain is $J \rightarrow (R, M) \rightarrow \hat{J}$, with the decoder also taking values in that alphabet. Write $\delta = \Pr(\hat{J} \neq J)$ for its actual error. If only an upper budget $\delta \leq e \leq 1$ is supplied, put $\bar{e} = \min\{e, 1 - 1/m\}$. Fano's inequality and data processing give the correctly clipped budget bound

$$I(J; M | R) \geq H(J) - h_2(\bar{e}) - \bar{e} \log_2(m - 1) - I(J; R). \quad (16)$$

Here $h_2(t) = -t \log_2 t - (1 - t) \log_2(1 - t)$, with $0 \log_2 0 = 0$. To prove the underlying actual-error bound, let $E = \mathbf{1}\{\hat{J} \neq J\}$. Conditional on $\hat{J}$, a correct answer fixes J , while an incorrect answer leaves at most $m - 1$ possibilities. Thus

$$H(J | R, M) \leq H(J | \hat{J}) \leq h_2(\delta) + \delta \log_2(m - 1).$$

Subtract this from $H(J)$ and use $I(J; R, M) = I(J; R) + I(J; M | R)$. This actual-error form holds for every $\delta \in [0, 1]$. Substitution of a larger budget needs care: the function $f_m(t) = h_2(t) + t \log_2(m - 1)$ increases only up to $t = 1 - 1/m$, where it equals $\log_2 m$. Indeed its derivative on $(0, 1)$ is $\log_2[(m - 1)(1 - t)/t]$. If $e \leq 1 - 1/m$, monotonicity gives the displayed budget bound. If $e > 1 - 1/m$, the elementary bound $H(J | R, M) \leq \log_2 m = f_m(\bar{e})$ gives it instead. At such loose budgets it may be uninformative. A fair binary target, constant source and constant decoder have zero information and actual error $1/2$: they satisfy the budget $e = 1$, but one must use $\bar{e} = 1/2$, not $h_2(1) = 0$.

The minimum completion information for a general distortion measure is conditional rate distortion, provided encoding and decoding are unrestricted as specified. These are source-adequacy conditions; the variables' qualitative interpretation needs separate evidence.

For a fair bit independently erased in R with probability $0 < e_0 \leq 1$, the optimal unrestricted reader need incur distortion only on erased cases. An allowed error budget $0 \leq e \leq e_0/2$ gives the sharp minimum completion information $e_0[1 - h_2(e/e_0)]$; it is zero for $e \geq e_0/2$, since a fair guess on erased cases meets the budget. Necessity applies binary Fano conditional on erasure in its increasing range; sufficiency transmits the erased bit through a binary symmetric channel of error e/e_0 . At $e_0 = 0$ no completion is needed and no ratio e/e_0 is used. Exact binding of n labelled positions has $n!$ alternatives and needs $\log_2(n!)$ retained information only under the stipulated zero-error complete-record convention, not $n!$ neurons.

For later random access, use the main article's notation: let $X = (X_1, \dots, X_n)$ be independent fair input bits, W the complete retained state and R an explicitly included auxiliary route or independent seed. The query index J is uniform on $\{1, \dots, n\}$, independent of (X, W, R) , and chosen after storage. A common reader answering bit queries with actual average error $e \in [0, 1]$ must satisfy

$$I(X; W, R) \geq n[1 - h_2(e)]. \quad (17)$$

For a direct proof, let $\hat{X}_i$ be the implemented answer to query i , with actual error e_i . At each fixed query the common reader is one stochastic kernel from (W, R) to its answer, giving the Markov chain $X_i \rightarrow (W, R) \rightarrow \hat{X}_i$. Any further decoder randomness must be independent of

the whole (X, W, R) conditional on that query. For binary variables the error indicator and $\hat{X}_i$ together determine X_i , so

$$H(X_i | W, R) \leq H(X_i | \hat{X}_i) \leq h_2(e_i).$$

Conditional entropy subadditivity and concavity of h_2 on its *whole* domain now give $H(X | W, R) \leq \sum_i h_2(e_i) \leq n h_2(e)$, since independent uniform query selection makes $e = n^{-1} \sum_i e_i$. Subtract from $H(X) = n$. No comparison with an optimal decoder, or monotonicity above error $1/2$, is used. A binary decoder that is always wrong has actual error one and can be inverted perfectly; the positive information requirement at $e = 1$ is therefore consistent. If e denotes only an upper budget instead, replace it in Equation (17) by $\min\{e, 1/2\}$; a budget at least $1/2$ alone yields only the trivial bound zero.

An independent seed R has $I(X; R) = 0$, although its joint use with W can improve decoding; it is not dropped from the joint information term. A further decoder seed independent only of X , rather than the whole (X, W, R) , can carry extra conditional information and is not free under this contract. If the query is known before storage, one stored bit suffices for that query. Source-correlated bypass information is counted in R rather than treated as free randomness. Analogue noisy storage needs an operational information ceiling, not a count of mathematical real-valued states.

With exactly K finite retained states and no bypass, uniform independent bits have optimal average distortion

$$D_{n,K} = \frac{1}{n2^n} \min_{|A| \leq K} \sum_{w \in \{0,1\}^n} \min_{a \in A} d_H(w, a).$$

Deterministic encoders achieve the optimum, since mixing cannot improve a pointwise minimum. For $K = 2$, let the codewords differ in d coordinates. Expected nearest distance is $n/2 - \mathbb{E}|B_d - d/2|$ with B_d binomial. The absolute displacement of a symmetric random walk is a submartingale, so antipodal words attain the minimum. Thus $D_{3,2} = 1/4$ and $D_{6,2} = 11/32$. These exact finite examples do not establish a biological memory ceiling.

3.6 Persistent draws and adaptive threshold access

Let X have one of two nonatomic laws ρ_0, ρ_1 on an interval and be retained across queries. Put $\nu = \rho_0 - \rho_1$, and define

$$D_L = \frac{1}{2} \sup_{t_0 < \dots < t_L} \sum_{j=1}^L |\nu((t_{j-1}, t_j])|,$$

with the endpoints covering the full support. A k -step deterministic threshold decision tree has at most 2^k interval leaves; its transcript TV is exactly the half-sum over those leaves. Conversely balanced binary search realizes any ordered partition with at most 2^k leaves. Therefore adaptive and nonadaptive optimal TVs are respectively

$$V_k = D_{2^k}, \quad W_k = D_{k+1}. \quad (18)$$

Conditioning on an independent retained seed gives mixtures of trees and cannot exceed their maximum. Fresh independent draws would be a different experiment.

For $K = 2^m$ equal bins with density 2 on alternate bins under the two laws, each interval has signed mass magnitude at most $2/K$. Total positive and negative mass agree, so an L -interval partition has TV at most $2\lfloor L/2 \rfloor / K$, capped at one. Alternating bin boundaries

attain it: $D_L = \min\{1, 2\lfloor L/2 \rfloor / K\}$. Perfect distinction needs m adaptive queries but $K - 1$ nonadaptive queries.

The access norm matters. Define Volterra operators $Af(t) = \int_0^t f(x)dx$ and $A_N f(t) = \int_0^{\lfloor Nt \rfloor / N} f(x)dx$ on $[0, 1]$. The difference kernel has row and column integrals at most $1/N$, so the Schur bound gives $\|A - A_N\|_{2 \rightarrow 2} \leq 1/N$. Yet densities alternating on the $2N$ half-cells are completely sealed to grid-snapped thresholds and perfectly distinguishable by unrestricted threshold search of depth $\lceil \log_2(2N) \rceil$. Small operator error is not a sequential physical access bound.

With independent bit-flip noise $\eta < 1/2$ on each threshold answer, repeat each of the m adaptive comparisons r odd times. If $e_r = \Pr\{\text{Bin}(r, \eta) > r/2\}$, path success is at least $(1 - e_r)^m$ and transcript TV at least $2(1 - e_r)^m - 1$. For $m = 4, \eta = .1, r = 5$ this exceeds .932. This is an achievable lower bound, not optimality of the noisy protocol. Bounds on unconditional one-query differences cannot be telescoped without controlling the conditional histories.

3.7 Reconstruction, current knowledge and timing

Fix K distinct sites in a common geometry, with no three collinear, and use each once. The static contour joins consecutive sites. Two orders give the same undirected labelled path exactly when they reverse one another: choosing an endpoint fixes the whole traversal. Distinct edge sets give distinct embedded unions, since a segment cannot be covered by finitely many crossings with noncollinear other segments. There are $K!/2$ literal contours and $K!$ directed orders. Equality modulo alignment or rotation is a different quotient. Zero-error complete records need that many distinct states; four sites require 12 contour or 24 order states. Templates, coordinates and any external drawing archive are apparatus resources. A constant unordered inventory cannot track the independently selected contour beyond best-prior success.

A retained ordered word and a generic interpolation rule suffice to generate novel contours without learned names or a sensory movie. The same physical construction can assign a first presentation during integration or during later inspection, with a later current token in both accounts. Bounded displacement/uncertainty summaries likewise permit delayed reconstructions that preserve all nominated physical kernels. Equal likelihood leaves rational prior evaluation open. Spatial replay support requires actual content fidelity, not simply equality of a decoded average.

A genuinely current acquaintance with a relation does impose a current basis deadline. A report vehicle or stored answer alone does not establish such acquaintance. The main article defends a scoped current-human conclusion; these theorems delimit alternative mechanisms without dating first onset.

3.8 Common descendants and duplicate readers

For a deterministic finite source, exact output factorization $F = g \circ z$ implies $z(x) = z(y) \Rightarrow F(x) = F(y)$. A separator therefore needs at least the number of complete output classes. For $F(a, b) = (a, b, a \oplus b)$ there are four classes, so an XOR-only two-state record cannot recover the complete pair, whereas a two-bit record can. This sharp finite content constraint does not impose a human memory ceiling.

The scalar XOR coordinate has mixed difference $r_{00} - r_{01} - r_{10} + r_{11} = -2$. A fixed common-origin equality with no native comparison gives zero instead after independent preparations. In a finite causal graph unrolled over the fixed operation window, such mixed dependence

requires an operation, possibly the output itself, to be a common descendant of both variations. Otherwise every output's ancestors omit one variation and mixed dependence vanishes. It does not require an earlier binding node or prove a passive presented relation must explicitly calculate XOR.

One retained pair can feed two separate readers performing the same local operation. A model assigning appearance both at integration and to each later current reader, and a model first assigning it to the later readers, have the same physical reports and genuine late acquaintance within their stipulated interpretations. Shared source does not make the reader tokens one scene. An outside-history freeze plus independently anchored current phenomenal variation under a local preparation establishes local involvement under supervenience on the nominated complete basis, not a sufficient or minimal bearer. A few fixed recorded channels are not the complete outside basis.

Likewise ordinary feedback $X' = Y, Y' = X$ gives causal sensitivity in both directions while a current mode determined by current Y can remain unchanged under an X preparation until the next update. Mutual sensitivity is not current constitution. For a report-rescue example, hold scene vehicles X, Y fixed, let separate classifiers C, T compute XOR at the next step, and let a later selector report one classifier. There is no classifier-to-scene feedback. Disabling C removes its report; selecting T restores the correct report for every pair. A declared joint-scene interpretation can leave its current relation unchanged. The physical counterexample separates classification from the stipulated scene; it does not observe preservation of actual appearance.

3.9 Repeated fields and historical dependence

Exact repetition supplies a further conditional connecting test. Take two registers X, Y , each with four active pair values and one inactive value. A load sets both to a supplied pair, reset clears them, native preparations set either register, and a probe copies the retained active pair. The update kernel is fixed. An early load and a later probe can leave the same (v, v) state and hence all the same native future kernels. Their incoming operations and external phase/history differ.

If a *deterministic* occurrence law depends only on an independently adequate current field and is invariant under this native match, an accepted late current occurrence transfers to the earlier field. That is a one-step conditional result: applying the same function to matched arguments gives the same value. It does not promote an intermediate occurrence to a fresh knowledge anchor (Module 2.12), nor derive the needed psychophysical current-source law from future Markovity.

A fixed delayed rival uses the passive fact that the last nonidle operation was probe: it grants occurrence only for an active probed field. A controller bit storing that fact need not affect any module output. If included in the physical source, complete current packages differ; if erased, the law can depend on the causal-past fact instead. Arbitrarily long idle padding matches every fixed finite recent-history window without removing that one-bit historical distinction. Bounded record capacity is not a bound on influence duration. Omitted attention, boundary coupling or physical age can likewise invalidate the adequacy premise.

A different stronger match uses a bi-infinite periodic native process. For an eight-step closed cycle, positions separated by eight have identical relative material histories to every past depth. A deterministic history-covariant occurrence law gives the same occurrence there. An origin, age, external controller or environment tag is extra material data; if relevant it must be matched as well. A stochastic law gives equal probabilities rather than identity of actual occurrence tokens unless its relevant actual innovations are also matched. The recurrence tests

therefore expose precise current/history invariance obligations; they do not earn those laws through repeated kernel equality or relocate a late anchor to an earlier time by themselves.

4 Retention, reset, recurrence and return

Persistence of accessible information, numerical continuity of an organism and occurrence of a current presentation are different claims. The models here isolate the first without assuming the others. Return arguments in the programme (Rodgers, 2026h,i) are used as source-adequacy tests, not as normalizations that determine otherwise unspecified phenomenal assignments.

4.1 Reversible records and finite recurrence

Classical XOR writing $(a, b, m) \mapsto (a, b, m \oplus a \oplus b)$ is a bijection. Applied twice it uncomputes the meter; endpoint identity does not mean absence of intervening dependence. A copy $(x, r) \mapsto (x, r \oplus x)$ with blank r retains a basis value. A feedback latch and a copied archive may then have different later values; resetting scratch while keeping the archive has moved information, not destroyed it. A majority readout can be revised by a later input without revising the original archived token.

For any finite horizon K , an autonomous finite clock can perform integration and archival copy in its first three steps, apply identity padding through time K , and later uncompute on a finite cycle. Embed the program in the permutation $(c, x) \mapsto (c + 1 \bmod N, V_c x)$ with each V_c bijective and a sufficiently long padded cycle. Its output can remain exact for $3 \leq t \leq K$ without being absorbing. Program, blank preparation and clock are part of the apparatus, not free external resources.

Proposition 4.1. *Let F be a permutation of a finite state space, and $\Pi(s)$ a state-local partition of a fixed labelled carrier set. If no class ever splits under one step, there is no strict permanent merger on an orbit.*

Proof. The number of blocks cannot increase along the orbit. Finite recurrence returns to the original state and its original partition, so no strict decrease is possible. The orbit join $\bigvee_r \Pi(F^r s)$ is an invariant least common coarsening, but taking that join is an additional partition construction. $\square$

Open dynamics, changed carrier labels or time-dependent laws do not meet this premise. The proposition is not an objection to a new third relational presentation or to persistence of a person through changing presentations.

For a quantum clock $j = 0, \dots, n$, with controlled data steps V_j , take

$$H = \hbar g \sum_{j=0}^{n-1} \sqrt{(j+1)(n-j)} (|j+1\rangle\langle j| \otimes V_j + |j\rangle\langle j+1| \otimes V_j^*).$$

A clock-conditioned unitary gauge removes the V_j , leaving the spin- $n/2$ matrix $2\hbar g J_x$. Transfer from 0 to n occurs at $T = \pi/(2g)$; at time t the clock probabilities are binomial with parameter $\sin^2(gt)$. This follows by representing spin $n/2$ as the symmetric subspace of n spin-1/2 factors. Padding yields a finite high-success interval. The norm is $n\hbar g$; bounded individual hopping scales require $g = O(1/n)$ and $T = \Omega(n)$. Adjacency of clock indices is not spatial locality of data couplings. This is a standard Hamiltonian-computation/perfect-transfer construction, not a permanent memory mechanism.

The limitation follows more generally from finite-dimensional unitarity. A finite subspace $\mathcal{T}$ invariant under a fixed unitary V is reducing: finite dimension implies $V\mathcal{T} = \mathcal{T}$, hence $\mathcal{T}^\perp$ is invariant too. No state from its complement enters it. The same holds for self-adjoint continuous-time evolution. Approximate storage, open environments and timed decoupling require different contracts.

Parity premeasurement illustrates the same distinction. For $P_A = (I - Z_A)/2, P_B = (I - Z_B)/2$, the Hamiltonian $\hbar g(P_A + P_B) \otimes (I - X_M)$ at $\pi/(2g)$ writes classical parity into a blank meter. A source $|++\rangle$ becomes $(|E\rangle|0\rangle + |O\rangle|1\rangle)/\sqrt{2}$, where $|E\rangle, |O\rangle$ are even/odd Bell combinations. The local meter is maximally mixed; tracing it out removes inter-parity coherence, not selects an outcome. More generally conditional product environments leave overlap $\Gamma = \prod_i \langle e_1^{(i)} | e_0^{(i)} \rangle$. For branch amplitudes α_0, α_1 , the trace distance from branch dephasing is $|\alpha_0 \alpha_1 \Gamma|$, by the eigenvalues of the off-diagonal 2×2 matrix. The product premise is essential; small global overlap does not make every environment fragment a readable record.

4.2 Exact integration–retention access

Consider a parity target written at exponential integration rate γ . Pre-write target contrast decays at rate λ and post-write record contrast at rate μ . Conditional on the first write time, the channels compose independently as specified. The retained contrast at read time t is

$$r(t; \gamma, \lambda, \mu) = \int_0^t \gamma e^{-(\gamma+\lambda)s} e^{-\mu(t-s)} ds = \frac{\gamma(e^{-\mu t} - e^{-(\gamma+\lambda)t})}{\gamma + \lambda - \mu}. \quad (19)$$

At equal denominator rates it is $\gamma t e^{-\mu t}$. Best binary accuracy is $(1+r)/2$. If two independent source bits are represented only by parity, best four-input identification success is $(1+r)/4$; one within-parity bit remains absent.

For $a = \gamma + \lambda$ and $\mu > 0$, differentiation gives the unique peak

$$t_* = \frac{\log(a/\mu)}{a - \mu}, \quad r_* = \frac{\gamma}{a} e^{-\mu t_*}, \quad (20)$$

with $t_* = 1/a$ when $a = \mu$. The acceptable set for threshold $\theta \in (0, 1)$ is empty, one time, or a bounded interval according as $r_* < \theta$, $r_* = \theta$, or $r_* > \theta$. With $\mu = 0$, $r(t) = \gamma(1 - e^{-at})/a$: the limiting value is not attained at finite time. A deadline restricts the maximum to $\min(T, t_*)$ when $\mu > 0$.

With $\mu > 0$, optimized r_* increases strictly with γ when λ, μ are fixed. Set $v = \mu/a$; the factor $e^{-\mu t_*} = v^{v/(1-v)}$ decreases with v because $\partial_v \log[v^{v/(1-v)}] = (\log v + 1 - v)/(1 - v)^2 < 0$, with continuous limit $-1/2$ at 1. Meanwhile γ/a is nondecreasing. Limits as $\gamma \downarrow 0$ and $\gamma \rightarrow \infty$ give 0 and 1, so every strictly intermediate optimized threshold has a unique critical γ . This optimized monotonicity need not hold at a chosen late time: faster writing can expose the record to decay longer.

Theorem 4.2 (A robust saddle). *Let rate uncertainty be a rectangular box with $\gamma_L > 0$, nonnegative loss rates and $\mu_+ > 0$. Put $p_R = (\gamma_L, \lambda_+, \mu_+)$ and let t_R be its peak. Then*

$$\max_{t \geq 0} \min_{p \in \mathcal{B}} r(t; p) = \min_{p \in \mathcal{B}} \sup_{t \geq 0} r(t; p) = r(t_R; p_R).$$

Proof. The integral decreases with each loss rate. Fix their upper values and write $f(s) = e^{-\lambda s - \mu(t-s)}$. Integration by parts gives $r = f(0) - e^{-\gamma t} f(t) + \int_0^t e^{-\gamma s} f'(s) ds$. If $\lambda \geq \mu$, then $f' \leq 0$ and differentiation shows r increases with γ . If $\lambda < \mu$, then

$$e^{\gamma t} \partial_\gamma r = t f(t) - \int_0^t s e^{\gamma(t-s)} f'(s) ds$$

is strictly decreasing in γ , so r has no interior minimum. Its limit as $\gamma \rightarrow \infty$ is $e^{-\mu t}$. Therefore for all $\gamma \geq \gamma_L$, $r(t; \gamma, \lambda, \mu) \geq \min\{r(t; \gamma_L, \lambda, \mu), e^{-\mu t}\}$. At t_R , formula (20) gives $r(t_R; p_R) = \gamma_L(\gamma_L + \lambda_+)^{-1}e^{-\mu + t_R}$, no larger than that limiting value. Every model in the box thus gives at least the claimed score at t_R . Conversely p_R belongs to the box, so no robust time can exceed its peak. The same inequalities give the minimax equality. $\square$

At any fixed time the exact box minimum is the lesser of its two integration endpoint values, at upper loss endpoints; acceptable windows intersect those two windows. With a deadline choose $\min(T, t_R)$: before t_R the lower-rate score is still at most $e^{-\mu + t}$, so the proof continues to apply. A correlated uncertainty set inside the box inherits its guarantee, not necessarily its exact optimum. For $\gamma \in [1.8, 2.2]$, $\lambda \in [.35, .45]$, $\mu \in [.15, .25]$, $t_R = \log 3$, $r_R = (4/5)3^{-1/4}$ and best guaranteed accuracy is approximately .80393427. The model units and threshold are stipulated, not human timescales.

An error certificate at arbitrary fixed t is

$$|r(t) - \hat{r}(t)| \leq t[\delta_\gamma + \max(\delta_\lambda, \delta_\mu)].$$

The γ derivative integrates $e^{-\gamma s}(1 - \gamma s)e^{-\lambda s - \mu(t-s)}$, of absolute integral at most t . Changing loss rates along a line changes the exponent by at most $t \max(\delta_\lambda, \delta_\mu)$, while the remaining integral is at most 1. Triangle inequality proves the result. It certifies a nominated task only if rate/error bounds and channel assumptions have independent warrant.

4.3 Marginals, fixed-time erasure and reset flags

Independent rate- ν flips on two bits and a common rate- ν flip have the same individual contrasts $e^{-2\nu t}$. Their parity contrasts are respectively $e^{-4\nu t}$ and 1: independent error signs multiply, common signs cancel. Marginal memory cannot identify joint relational memory. More generally a first-write density $w(s)$ with pre/post contrasts $c(s), u(t-s)$ gives $r(t) = \int_0^t w(s)c(s)u(t-s)ds$ only under the declared channel composition. Signed contrasts, visible timestamps, correlated stages or extra archives change optimal decoding.

For a finite-state CTMC generator G with maximum exit rate k , full-state distinguishability obeys

$$e^{-2kt}d(0) \leq d(t) = \text{TV}(\rho_0 e^{tG}, \rho_1 e^{tG}) \leq d(0). \quad (21)$$

Contraction gives the upper bound. The inverse matrix e^{-tG} has row-vector ℓ^1 operator norm at most $e^{t\|G\|} = e^{2kt}$; apply it to the output difference to get the lower bound. The inverse need not be a realizable stochastic dynamics. A symmetric binary chain attains the lower bound. This concerns fixed finite time and the nominated full state, not all environmental traces or individual path reset events.

A rate- ν event that replaces a bit by a fresh fair bit erases its initial value exactly at the marked reset stopping time. If the mark is hidden, the visible bit path has the same generator as an ordinary rate- $\nu/2$ flip chain: half of resets leave the bit unchanged. Thus projected trajectories do not identify resets. A copied record can protect the earlier value if locked before reset; a later overwrite with the current reset value need not. The first and last copying conventions supply different lifetimes, and every retained archive belongs in the complete source.

For a quantitative common-mixing limit, if every conditional accessible law $\mathcal{L}(Y | Z = z)$ is within δ of one law π , a uniform m -label decoder from Y has success at most $1/m + \delta$. Couple the joint law within TV δ to $Z \perp Y$ and use the same decision event. For a nonuniform input prior the same proof gives $\max_z \Pr(Z = z) + \delta$, capped at one. The bound also follows when Y is generated from a preceding state by one kernel uniformly within δ of π , regardless of

correlations between that state and Z . All accessible registers belong in Y ; fresh randomness must be independent of (Z, Y) . Independence only from Z is insufficient: a seed correlated as $Z \oplus Y$ can restore the missing label.

4.4 Pair reliability and calibrated field proposals

Three pair reliabilities can be r, r, r^2 under independent channel composition, violating equal-strength transitivity. For a finite symmetric similarity s , its max-min path closure $s^*(i, j) = \max_{\text{paths } i \rightsquigarrow j} \min_{e \text{ on path}} s(e)$ is the least transitive fuzzy majorant. Every transitive majorant bounds each path minimum by its endpoints, proving minimality. Maxima and minima are 1-Lipschitz in sup norm. At a fixed threshold, independent interval boxes preserve the partition iff lower and upper endpoint connectivity partitions coincide: monotonicity suffices; the endpoints themselves prove necessity. Correlated uncertainty is not automatically a full box.

A separate candidate potential illustrates why mechanical integration and a phenomenal assignment must be distinguished. For two scalar fields use

$$V = W + \frac{r}{2}(a^2 + b^2) + \frac{u}{4}(a^4 + b^4) - \kappa ab, \quad u > 0.$$

For $r \geq 0, \kappa \geq 0$, replace a, b by their magnitudes to reduce V . At fixed $a^2 + b^2$, the symmetric aligned choice minimizes the quartic term and maximizes ab . Therefore $a = b = 0$ when $\kappa \leq r$, and $a = b = \pm\sqrt{(\kappa - r)/u}$ when $\kappa > r$, with $V_{\text{eff}} = W - (\kappa - r)_+^2/(2u)$. If r, κ depend on a material coordinate, differentiating this effective potential yields its force and Hessian correction; it is actual backreaction in this proposed model. For $W = Kx^2/2, \kappa = r + gx$, coercivity requires $Ku > g^2$. Finite-temperature noise removes an exact deterministic mean/variance boundary. For already ordered cores $r = -a_0 < 0$, any $\kappa > 0$ makes aligned minima global; anti-aligned stationary points $a = -b$ have squared magnitude $(a_0 - \kappa)/u$ and are stable only for $\kappa < a_0/2$. These follow from the two Hessian eigenvalues. The potential is a candidate mechanics, not an earned physical-to-appearance law.

Another proposed law assigns an output kernel to each *actual* physical history and extends tokenwise mixtures affinely. Then mixture TV cannot increase. Shared physical support cannot carry two different certain kernel values: at an atom of positive mass under both preparations, certainty would require one conditional law to assign probability one to two distinct values. An idle/link mixture of weight η changes any kernel event by at most η ; over N shared-history updates the coupling bound is $1 - (1 - \eta)^N$. It is sharp against the constant idle path when the first nonidle update leaves its initial state. Changing an installed coupling parameter or omitted history is not mixing the same actual histories, so that phenomenal locality proposal cannot be used there without a new premise.

If an independently proposed continuous survival semigroup satisfies $S(0) = 1$, $S(u + v) = S(u)S(v)$, and is nonincreasing, then $S(u) = e^{-cu}$, $c \geq 0$, by the continuous additive equation for $-\log S$. It does not make the occurrence tokens a Poisson process. A stable assay with false-positive rate f and sensitivity $s > f$ gives $r(u) = s - (s - f)e^{-cu}$. At doses $0, x, 2x$, let $d_1 = r(x) - r(0)$, $d_2 = r(2x) - r(0)$. When nondegenerate, $z = d_2/d_1 - 1 \in (0, 1)$, $c = -\log z/x$, and $s = f + d_1/(1 - z)$. A solution also requires $f \in [0, 1]$ and $f < s \leq 1$; decreasing increments alone do not establish probability-compatible parameters. A fourth dose tests geometric successive increments. Flat or instantaneous limits do not identify finite positive c . The assay's common target, calibration and exposure interpretation remain independent assumptions. The initial survival condition concerns a newly nominated relation, not a blank mind or absence of all awareness. A target already present at baseline does not satisfy it. Near-zero increments make the inverse ill-conditioned; sampling, dose error and drift of f, s need separate bounds before estimating a physical or psychophysical rate.

4.5 Alternating dwell constraints

For a stationary alternating renewal model with finite positive dwell means d_P, d_I , a regenerative cycle has one of each dwell and two switches. The renewal reward law gives

$$\pi_I = \frac{d_I}{d_P + d_I}, \quad \nu = \frac{2}{d_P + d_I}.$$

A common time compression scales both means, leaving occupancy unchanged. Selective compression of d_I with d_P fixed instead preserves $\nu/(1 - \pi_I) = 2/d_P$. These joint statistics distinguish two specified dwell/access mechanisms. Multiplying a hazard by r gives survival $S(t)^r$, not generally $S(rt)$ or mean d/r : a Weibull law of shape k gives mean scaling $r^{-1/k}$. Exponential dwell is a special case. Averaging individual ν_i, π_i preserves the ratio only with the further common d_P condition; heterogeneous aggregation, timing error and selective reports require separate control. Occupancy estimates are not early-occurrence detectors.

4.6 Return, padding and retained dependence

If a physical Markov process has unique invariant law ν , extending it by a fixed passive mark with no mark transitions gives invariant laws $\nu \otimes \pi$ for arbitrary mark law π . With finite marks, every invariant law has this form: each mark-conditional physical law is invariant. Physical uniqueness alone does not fix marked occurrence weights.

For a group G of endpoint controls acting on source states and accepted content types, an equivariant anchored map $m(s_0) = c_0$ exists exactly when

$$\text{Stab}_G(s_0) \subseteq \text{Stab}_G(c_0). \quad (22)$$

Necessity is immediate from source returns. For sufficiency set $m(gs_0) = gc_0$: equality $gs_0 = hs_0$ implies $h^{-1}g$ fixes both anchors, so the definition is well defined. It is unique on the orbit. Content control actions and their compositions need independent phenomenal warrant; a response table or isolated generator order does not supply it. An S_3 pairing action with noncommuting adjacent swaps cannot be replaced by a transitive six-state cyclic action that matches orders 3 and 2 but makes their commutator identity. Cardinality and isolated-generator calibration are insufficient.

A protected m -bit path tour swaps a token out and back in $2(m - 1)$ swaps. An initial tour and one after each of N ordinary single-target gates cost $2(m - 1) + N(2m - 1)$ native steps. Intermediate destination records can distinguish the entire initial bank even when the executive cannot read them. Adding k funded otherwise unused tour bits gives 2^{m+k} native predictive points without changing the ordinary executive transcript. Complete predictive-point attribution and complete phenomenal inertness of those active auxiliary values cannot both hold. The inertness premise is not established by unused ordinary readout; the family has genuine clock and resource changes.

Faithful provenance requires the same target episode. If history fidelity, record fidelity and an independently accepted current anchor have failure budgets e_H, e_R, e_A , their joint warranted event has probability at least $1 - e_H - e_R - e_A$. This union bound does not turn a faithful archive into an earlier occurrence anchor. The copula density $1 + \theta \cos 2\pi(u - v)$ on the torus, $|\theta| \leq 1$, has uniform margins, yet $\Pr\{\cos 2\pi(u - v) > 0\} = 1/2 + \theta/\pi$ and TV between parameters is $|\theta - \theta'|/\pi$. Resetting margins need not reset joint dependence. For a common readiness reader with conditional error function in $[0, 1]$, context-law change by TV ρ adds at most ρ to calibration error. Thus calibration error e_{cal} and a further task mismatch e_{task} give total bound $e_{\text{cal}} + \rho + e_{\text{task}}$. With the same target/complete-source kernel and an accepted event anchor ℓ , transport yields the lower bound $\max\{0, \ell - e_{\text{cal}} - \rho - e_{\text{task}}\}$. Omitted readiness/context variables cannot be declared irrelevant by this arithmetic.

4.7 Sealing and preparation equivalence

The following inherited preparation/readout results are proved directly. No publication status is assumed for the supplied source manuscript. For one physical representation and common reader law r , two target laws p_1, p_2 require $\max_i \text{TV}(r, p_i) \geq \text{TV}(p_1, p_2)/2$. The midpoint attains the bound in an unrestricted reader class. Anchor errors reduce the certified gap by their sum. An operational quotient sufficient for allowed tests is only a surrogate for those tests; it need not be a finite-state autonomous physical source. A level- a test's power changes by at most TV .

For a deterministic forward map F , output test t pulls back to $t \circ F$; thus accessible discrimination depends on the actual pullback test class. A bijection with all tests preserves full TV , but restricted tests can lose it. On a finite state permutation, an inverse is a positive power; on an infinite forward shift the forward-only semigroup has no such return. Formal inverse notation is not an available physical operation.

Let $h(\psi) \in [0, 1]$ be a continuous pure-state target in dimension d . If every finite ensemble of a density matrix has the same average target, that average defines an affine functional $r(\rho)$. Hence $r(\rho) = \text{tr}(E\rho)$ with $0 \leq E \leq I$. Conversely an effect has ensemble-independent averages. For outcome events, normalization and additivity give a POVM. Requiring all pure preparations and ensembles is stronger than fitting one preparation list.

Define $\Gamma(h)$ as the maximum absolute difference between h averages of two ensembles with the same density matrix. Then

$$\inf_{A=A^*} \sup_{\psi} |h(\psi) - \langle \psi | A | \psi \rangle| = \Gamma(h)/2. \quad (23)$$

One direction averages an approximation over two equal-density ensembles. For the other, finite uniform approximation LP duality produces a signed measure annihilating Hermitian quadratic forms with total variation norm one. It annihilates the identity, so its positive and negative masses are $1/2$; their normalized barycenters coincide and their objective is at most $\Gamma/2$. Compactness and continuity pass the finite-frame result to all pure states. A finite maximizing frame can be chosen: combine its two ensembles, then a basic feasible maximizer has at most $d^2 + 1$ total nonzero occurrences, since normalization on each side and $d^2 - 1$ trace-free equality constraints have that rank. Compact convex hull representations supply an initial finite frame; the LP preserves optimality.

If d_{eff} restricts A to effects, then $\Gamma/2 \leq d_{\text{eff}} \leq \Gamma$. For the upper bound, a best Hermitian approximation of error $\Gamma/2$ has spectrum in $[-\Gamma/2, 1 + \Gamma/2]$. Spectrally clipping it to $[0, 1]$ adds at most that error. A uniform physical reader of pure-target error ϵ necessarily has $\Gamma \leq 2\epsilon$. Product and Bell decompositions of $I_4/4$ have squared concurrence respectively 0 and 1, so such a target needs $\epsilon \geq 1/2$ under a density-only reader.

Finally two finite output laws of $\text{TV } \delta$ have affinity $B = \sum_x \sqrt{p_x q_x} \leq \sqrt{1 - \delta^2}$. Independent product probes satisfy $\text{TV}(p^{\otimes n}, q^{\otimes n}) \geq 1 - B^n$, because $\min(p, q) \leq \sqrt{pq}$ atomwise. Thus

$$\text{TV}(p^{\otimes n}, q^{\otimes n}) \geq 1 - (1 - \delta^2)^{n/2}.$$

This requires actual independent preparation/reset and permitted repeated access. It does not follow merely from a possible mathematical tensor product.

5 A selected native parity structure and its limits

This module gives a complete finite construction under the definitions of IIT 4.0 ([Albantakis et al., 2023](#)). It serves two purposes. First, high-order purviews can survive state selection,

normalized partition selection and purview exclusion; positivity of a preferred repertoire alone would not establish this. Second, even a selected, extensively related causal structure need not supply a spatial content map. The example is a mathematical native model, not an observation of experience. Earlier IIT parity examples include a self-linked four-element system (Balduzzi and Tononi, 2008); the no-self noisy system below has a different transition matrix and is scored under the later definitions.

5.1 Native model and repertoire convention

Fix four independently preparable binary units $V = \{A, B, C, D\}$ and one synchronous update. For $x \in \{0, 1\}^4$, let

$$Y_j = \bigoplus_{i \neq j} x_i \oplus N_j, \quad \Pr(N_j = 0) = q = 1 - \eta, \quad 2/3 < q \leq 1, \quad (24)$$

where the four output noises are independent conditional on x . Native ports prepare or hold individual units; a global change of coordinates is not a change of native grain. The current state is fixed to 0000 before scoring. Write $L_q = \log_2(2q)$. Over $\mathbb{F}_2$ the noiseless matrix is $T = I + J$, where J is the all-ones matrix. Since $J^2 = 0$ in dimension four, $T^2 = I$. Thus every native preparation has a different noiseless successor.

We follow the unitwise marginalization and product repertoires in Albantakis et al. (2023), Eqs. 28–47. Missing parents are uniformly independently prepared *for each output*; the product is then taken. This is not the observational joint conditional obtained by sharing one missing-parent draw. For a mechanism M and purview Z , intrinsic information uses the specified state probability multiplied by its log likelihood ratio against the unconstrained repertoire. Unconstrained effects average the mechanism-specific *products*, in the order of the primary Eq. 31.

Each fully supplied parity row gives its satisfying output probability q ; missing even one parent gives $1/2$. Every subset of the rows of T is linearly independent. Consequently the unconstrained effect on z units is 2^{-z} , and the unconstrained forward-cause likelihood on m mechanism units is 2^{-m} . For a constant baseline b , $p \log_2(p/b)$ is nonpositive when $p \leq b$ and strictly increasing when $p > b$. State selection can therefore be proved by exact probabilities, rather than floating-point log rankings.

5.2 Typed partitions and selected distinctions

Mechanism and purview copies retain different types even when their unit names coincide. A disintegration partitions their disjoint union into blocks (M_r, Z_r) . The primary Eq. 38 excludes a block with $M_r = M$ and nonempty Z_r ; empty mechanism or purview blocks are otherwise allowed. Its normalization denominator is

$$c = |M||Z| - \sum_r |M_r||Z_r|. \quad (25)$$

It counts *possible slots*, including absent and self slots. It does not count actual native edges. In the present twelve-edge network a value $c = 13$ must not be described as thirteen physically severed edges.

If a partition loses k intact parity constraints, its selected-state ratio is $(2q)^k$. Its raw irreducibility is wkL_q , where w is the backward or forward selected-state weight; the normalized comparison reduces exactly to k/c . Exclusion compares the resulting *raw* scores across purviews.

Proposition 5.1. *For the model (24), the whole mechanism uniquely selects cause and effect purview V , with*

$$\varphi_c(V, V) = \varphi_e(V, V) = 3q^4 L_q.$$

Each triple $M = V \setminus \{j\}$ uniquely selects cause purview V and effect purview $\{j\}$, with

$$\varphi_c(M, V) = q^3 L_q, \quad \varphi_e(M, \{j\}) = q L_q, \quad \varphi_d(M) = q^3 L_q.$$

All mechanisms of size one or two have zero distinction irreducibility. There are exactly five positive distinctions at this nominated grain.

Proof. For a whole-mechanism effect purview of size z , a valid partition can retain at most one fully supplied output. Two retained outputs require either overlapping disjoint three-parent blocks or one block containing all four mechanism units and nonempty purview, which is excluded. Keeping one row requires at least three retained slots. It can attain $k = z - 1, c = 4z - 3$ by placing its three parents with that output and detaching the rest. Losing all rows has $k = z, c \leq 4z$, hence ratio at least $1/4$. Since $(z - 1)/(4z - 3) < 1/4$, the retaining-one partition wins. Raw effect scores for $z = 1, 2, 3, 4$ are respectively

$$0, \quad q^2 L_q, \quad 2q^3 L_q, \quad 3q^4 L_q. \quad (26)$$

For the whole cause, retaining two or three rows is possible by placing all four past units with a proper current block. If $r \geq 2$ rows survive, at least $4r$ slots are retained, so $c \leq 4(4 - r)$ and $(4 - r)/c \geq 1/4$. Retaining none also has ratio at least $1/4$. Retaining one needs at least three slots and attains $(k, c) = (3, 13)$, whose ratio $3/13 < 1/4$ wins. The backward weight is q^4 , giving $3q^4 L_q$. Every proper cause purview is reducible: at most two past units supply no complete row; three past units supply just one row, which can be put with its corresponding current unit while separating the rest.

A triple mechanism has three independent constraints on four past bits. The two satisfying past states tie, each with backward weight $q^3/2$; for $M = ABC$ they are 0000 and 1110. Keeping two rows requires all four past units in one block and has ratio at least $1/4$. Keeping one row attains $(k, c) = (2, 9)$, whereas losing all has ratio at least $1/4$. Thus the raw cause score is $(q^3/2)2L_q = q^3 L_q$. Proper cause purviews are reducible. In the effect direction only the omitted unit has all three parents available. Every valid partition loses that three-input constraint, giving $q L_q$. Appending fair outputs only dilutes its selected-state weight, so the singleton wins. One- and two-unit mechanisms supply no full output parent set.

For the whole effect, $3q^4 > 2q^3$ when $q > 2/3$, and $3q^4 > q^2$ in that range. Thus the whole beats all proper purviews. The constant baseline argument above establishes state maxima; tied triple cause states have identical cut scores. $\square$

At $q = 2/3$ the whole and size-three effect purviews tie; at $q = 3/5$ the latter win. These boundaries are part of the result. A largest-cardinality tie rule is not substituted for the primary procedure: the IIT 4.0 supplementary tie discussion advances state ties to congruence and purview ties to structure information. Current 0000 is congruent with the uniquely selected whole system cause/effect state proved next.

5.3 Native subsystem and complex selection

System selection cannot be inferred from the mechanism scores. We use the primary current-background effect rule and whole-current-conditioned *past*-background cause rule (Eqs. 3–4). Let $S \subseteq V$, $k = |S|$, and $W = V \setminus S$. Effects hold current $W = 0$. Causes average each unit's kernel over the marginal law of past W conditioned on *all four* current units being zero, then

take the product. Replacing that posterior by a pinned past background would change the calculation.

Lemma 5.2. *Proper subsystem cause kernels have parity-of-other-members success*

$$c_k = \frac{1 + (2q - 1)^{k+1}}{2} \quad (k = 1, 2, 3),$$

while the full cause kernel has success $c_4 = q$.

Proof. Put $t = 2q - 1$. The uniform global past prior cancels in Bayes' rule. Since T is invertible, the conditional past can be written $X = TZ$, where the four coordinates of Z are independent with $\Pr(Z_i = 0) = q$. For $w = |W|$,

$$\bigoplus_{i \in W} X_i = \begin{cases} \bigoplus_{i \in W} Z_i, & w \text{ even,} \\ \bigoplus_{i \in S} Z_i, & w \text{ odd.} \end{cases}$$

The parity sign expectation is respectively t^w or t^k . Multiplication by the output noise sign expectation t gives t^{k+1} for $k = 1, 2, 3$. There is no outside parity for $k = 4$. This is a unit-kernel calculation before the required product, not an assertion of independent posterior past bits. $\square$

Write $c_2 = (1 + t^3)/2$, $c_3 = (1 + t^4)/2$. The subsystem scores will be

$$F_1 = 0, \quad F_2 = 2c_2^2 \log_2(2c_2), \quad F_3 = \frac{3c_3^3}{1 + (2c_3 - 1)^3} \log_2(2c_3), \quad F_4 = 4q^4 L_q. \quad (27)$$

Here F_k is system irreducibility, not the total distinction/relation sum.

Lemma 5.3. *Throughout $2/3 < q \leq 1$, the effect maximizing state is zero for every positive subsystem. Cause maximizing states are zero for pairs and the whole, and 000, 111 for triples. Official directional system partitions and their largest-raw normalized-MIP tie rule yield (27).*

Proof. Pair and whole parity maps are invertible. Their unconstrained baselines are uniform, and the zero state's probability is the unique maximum. The function $p \log(p/b)$ argument proves intrinsic selection. A singleton has no internal parent, so its constrained and unconstrained laws coincide.

For a triple, the noiseless image consists of even-parity vectors. With $t = 2q - 1$, the unconstrained effect probability of a state of Hamming weight m is $(1 + (-1)^m t^3)/8$. Its likelihood-ratio classes are

$$r_0 = \frac{(1+t)^3}{1+t^3}, \quad r_1 = \frac{(1+t)^2}{1+t+t^2}, \quad r_2 = \frac{(1+t)(1-t)^2}{1+t^3}, \quad r_3 = \frac{(1-t)^2}{1+t+t^2}.$$

For $0 < t < 1$, $r_0 > r_1 > 1$ and $r_2, r_3 < 1$; these follow by multiplication of the positive denominators. The zero weight q^3 also exceeds the one-flip weight $q^2(1-q)$, so zero maximizes information. At $q = 1$ impossible effects have zero weight. Applying the analogous even-parity likelihood calculation to the cause kernel gives two equal maxima 000, 111, each of posterior weight $c_3^3/[1 + (2c_3 - 1)^3]$; every other input yields a two-flip likelihood ratio below one.

In a directional system cut let a be the number of affected targets and C the number of cut potential slots. An internal parent cut makes its target fair. Selected-state effect and cause ratios are $(2q)^a$ and $(2c_k)^a$. Since $C \leq a(k-1)$, the minimum normalized signature is $a/C = 1/(k-1)$, attained by incoming cuts into singleton blocks. Among these normalized minima the primary system rule chooses the largest raw score, hence $a = k$. This proves (27). Proper pairs have $c_2 < q$ and triples $c_3 < q$ with posterior denominator at least one, so cause is the bottleneck for $q < 1$. At $q = 1$ pair directions tie and the triple cause weight is $1/2$. $\square$

Theorem 5.4. *At the specified native grain, ABCD is the unique selected complex for every $2/3 < q \leq 1$.*

Proof. For $q \in [2/3, 1]$,

$$\frac{7}{6}q^2 - c_2 = 4q(q - 2/3)(9/8 - q) \geq 0, \quad \log_2(2c_2) \leq L_q.$$

Therefore $F_2 \leq (49/18)q^4 L_q < 4q^4 L_q = F_4$. On $[2/3, 3/4]$, $c_3 \leq 17/32$, and

$$F_3 \leq 3(17/32)^3 L_q < 4(2/3)^4 L_q \leq F_4.$$

On $[3/4, 1)$, $c_3 < q$ gives $F_3 < 3q^3 L_q \leq 4q^4 L_q$. At $q = 1$, $F_3 = 3/2 < F_4 = 4$. Singletons have zero score. Native permutation symmetry covers all fourteen proper candidates, proving strict dominance. $\square$

At $q = 31/32$, the scores by size are approximately 0, 1.44234641, 1.18030380, 3.36158879; exact rational logarithmic certificates give full-versus-proper gap greater than 1.91924237. At $q = 1$ the scores are 0, 2, 1.5, 4. These values illustrate the strict dominance established analytically above.

5.4 Spectators and normalization sensitivity

An independent spectator leaves an unchanged (M, Z) pair unchanged. It can nevertheless change a normalized score when explicitly appended to Z . For $r \geq 1$ independent spectator past bits and fair unconstrained current preparations, the padded whole pair has

$$\varphi_e = 3q^4 2^{-r} L_q, \quad k/c = 3/(13 + 4r), \quad \varphi_c = q^4 2^{-r} L_q, \quad k/c = 1/[4(r + 1)].$$

The cause MIP switches: retaining three rows with all original past bits, detaching the fourth row and the spectators gives the latter ratio. Retaining $s = 2, 3$ rows gives $(4 - s)/[4(4 + r - s)]$, minimized at $s = 3$; retaining one gives $3/(13 + 4r)$ and loses for $r \geq 1$. The backward weight is diluted by 2^{-r} . Thus the unpadded cause still wins. Effect dilution likewise preserves its winner.

A constant spectator $E' = 0$ is different: appending its zero effect has selected and unconstrained factor one. The raw effect can tie the original while its possible-slot denominator changes. Past E is still independently preparable and irrelevant, so cause is diluted. This is a nominated ambient purview tie, not a counterexample to full IIT. Any mixed subsystem containing the independently disconnected constant has a directional cut of absent cross influence, preserving every unit kernel and giving zero system loss. Its marginal past remains fair after conditioning on 00000. Core subsystem kernels are unchanged, so Theorem 5.4 excludes the constant before within-complex purviews are selected. No invented causal-footprint pruning is needed. Alternate grains and coupled spectators are not addressed.

5.5 All relations and total structure

Let d_0 be the whole distinction with $a = 3q^4 L_q$, and $d_1, \dots, d_4$ the triples with $b = q^3 L_q$. Every cause purview is V ; effects are V for d_0 and the respective omitted singletons for the triples. All carry zero-valued unit states. Cause/effect *occurrences* retain distinction and side IDs, even if their material sets coincide. A face selects at least two occurrences, covers each involved distinction, and has nonempty congruent intersection. The primary relation purview is the union of its face overlaps, with

$$\varphi_r(\mathcal{D}) = |Z_r| \min_{d \in \mathcal{D}} \frac{\varphi_d}{|Z_c(d) \cup Z_e(d)|}. \quad (28)$$

Congruent material units are counted once in the denominator. Self-relations are included by the primary composition definition.

Proposition 5.5. *The selected complex has 31 positive relations, 309 valid faces, and*

$$\Phi = (6q^4 + 31q^3)L_q.$$

Proof. Each nonempty subset of five distinctions defines a relation. Every subset of at least two has an all-cause face whose overlap is V . Its overlap union is therefore V . It contains a triple, $a > b$, and each distinction's cause/effect union has cardinality four. Equation (28) gives b for all 26 multi-distinction relations. The whole self-overlap gives a , and each triple self-overlap is its effect singleton, giving $b/4$. Relations sum to $a + 27b$; distinctions sum to $a + 4b$. Their total is $2a + 31b = (6q^4 + 31q^3)L_q$.

For completeness, if a multi-distinction subset contains m triples and includes d_0 with indicator h , its valid-face count is $(1 + 2m)3^h$: either no singleton effect is selected or exactly one is selected as effect or both; two different singleton effects cannot intersect. The whole distinction has three side choices. Each singleton distinction subset has one self-face. Counts by relation degree are

Degree	1	2	3	4	5
Relations	5	10	10	5	1
Faces	5	66	118	93	27

Thus there are 31 relations and 309 faces. At $q = 1$, distinction sum is 7, relation sum 30 and $\Phi = 37$. $\square$

5.6 Symmetry does not select a spatial layout

All 24 permutations of native units commute with T and preserve noise, state 0000, selected distinctions and faces. Suppose a *single* four-point metric is determined solely by this native organization and respects these automorphisms. Pair transitivity forces every distinct pair to have the same distance λ . If $\lambda > 0$, the three differences from one Euclidean point have Gram matrix $(\lambda^2/2)(I + J)$, whose determinant is $\lambda^6/2 > 0$. A faithful Euclidean realization needs dimension at least three, attained by a tetrahedron. A pseudometric may instead collapse all points. Likewise an invariant nonempty strict line-betweenness relation is impossible because the group is transitive on ordered distinct triples.

This premise excludes independently specified geometry, asymmetry, state or history that breaks the automorphisms. It does not exclude a symmetric *distribution* over realized asymmetric layouts; such a law has an additional outcome/context input. The exact physical structure consequently establishes neither a line nor a general two-dimensional qualitative map.

5.7 Failed motifs and a weak-link qualification

A contrasting five-unit candidate shows why preferred purviews must be tested against exclusion. Take five native binary units on the line A, B, C, D, E , each reading itself and its neighbors. Interior probabilities of next value 1 at parent-one counts 0,1,2,3 are $(1/10, 3/10, 7/10, 9/10)$; endpoint probabilities at counts 0,1,2 are $(1/10, 1/2, 9/10)$. Conditional next-unit noise is independent. At current 00000, candidate purviews $ABC, CDE, C, ABCDE$ have nontrivial intersection/union relations but do not survive

exclusion for mechanisms B, D, C, BD respectively. Complete unitwise repertoire and typed-partition evaluation gives

Mechanism	Maximum cause purviews	Maximum effect purviews
B	AB, AC, BC	AB, AC
D	CD, CE, DE	CE, DE
C	BC, BD, CD	BC, BD, CD
BD	C	C

The union candidate's effect probability is 8281/50000, its forward-cause likelihood 81/100, and backward selectivity 81/872. Those positive repertoires alone are not selected distinctions. There are 726 admissible typed partitions for $BD, ABCDE$; the reduced $3^5 + 1 = 244$ representative assignments give 54 distinct probability/slot signatures. Empty-mechanism subdivision adds no signature. A cause-MIP tie for BD, C has raw scores $(169/218) \log_2(13/10)$ and twice this value with one and two cut slots; normalized scores agree. C beats the preselected union under either retained tie resolution. The public finite checker supplies the complete exclusion table without using a private largest-cardinality rule.

The overlapping ABC, CDE candidates also give both an effect-to-cause overlap from left to right and from right to left through C . Such overlap is not a strict temporal order. A deterministic-OR variant fails even state selection: for $B = 0$ over ABC , effect 000 has intrinsic score $1/32$, while 011 has $9/32$. Physical neighborhoods alone do not select congruent states.

A continuum obstruction explains why merely retuning a homogeneous singleton family is insufficient. Let each of three units have $\Pr(\text{next} = 0 \mid k \text{ past ones}) = (a, b, 1 - b, 1 - a)$, $1/2 \leq b \leq a \leq 1$, with independent next noise. For one current-zero mechanism, put $u = (a + b + 1)/4$. Singleton disintegration entirely detaches the purview. Positive congruent all-zero pair/triple raw effect scores are $2u^2 \log_2(2u)$ and $3u^3 \log_2(2u)$; corresponding raw causes are $(a + b) \log_2(a + b)/4$ and $a \log_2(2a)/4$. State selection follows by comparing the constrained probabilities and likelihood ratios; zero is maximal, with allowed ties at $a = b$. For a positive triple effect to beat its pair requires $u \geq 2/3$, hence $a + b \geq 5/3$. Its pair cause is then at least $(5/12) \log_2(5/3) > 1/4$, since $5^5 > 2^3 3^5$, while its triple cause is at most $1/4$. Thus no positive congruent triple wins both directions in this family. At $a = b = 1/2$ all scores vanish; that boundary is not a positive distinction. The parity result blocks extrapolation of this restricted obstruction to all multi-unit mechanisms.

A separate five-unit weak-link candidate has, for its specified zero state, whole-effect weight $107653/800000 + (24843/800000)\epsilon$ and forward-cause weight $18/25 + (9/100)\epsilon$. Unitwise partition probabilities are affine in ϵ : attenuate both $C \rightarrow D$ and $D \rightarrow C$ in the five-unit model, transmitting each signal with probability ϵ and otherwise supplying an independent fair bit. Only one relevant marginalized factor changes in each direction. At both endpoints every partition is at most respectively $107653/800000$ and $18/25$, and a common maximizing class is constant there. A common endpoint ceiling over the admissible partition family therefore gives strictly positive specified-state losses for every $\epsilon > 0$. The coefficients $(24843/800000)\epsilon$ and $(9/100)\epsilon$ are *probability losses*, not final IIT φ after state selection, normalization and exclusion. A proposed binary appearance law based only on strict positivity would consequently be discontinuous at zero coupling; a continuous law would need an additional content/weight map. Neither alternative follows from these calculations. The exact selected parity construction supplies the properly qualified positive mechanism result.

6 Spatial response, native equivalence and relational events

Spatially coherent output changes can constrain a physical model without identifying its experiential bearer. The first constructions use reciprocal conductance networks and calibrated distance readers. The second compares complete relative stochastic processes whose native interventions differ. The event construction specifies readings by material clocks rather than coordinate labels. These are complementary realization constraints, not interchangeable consciousness criteria.

6.1 One native edge and all-pair response

Let L be the Laplacian of a connected undirected network of positive conductances on n labelled native ports. Put $P = I - \mathbf{1}\mathbf{1}^T/n$ and $G = L^+$, the inverse on the zero-sum subspace and zero on constants. For $b_{ij} = e_i - e_j$, resistance is $R_{ij} = b_{ij}^T G b_{ij}$. Adding conductance $\delta > 0$ at native edge (a, b) changes L to $L' = L + \delta b_{ab} b_{ab}^T$.

Proposition 6.1.

$$R'_{ij} = R_{ij} - \frac{\delta (b_{ij}^T G b_{ab})^2}{1 + \delta R_{ab}}. \quad (29)$$

Every pair resistance weakly decreases, with equality exactly at zero transfer potential $b_{ij}^T G b_{ab}$.

Proof. Restrict to $\mathbf{1}^\perp$, where L is positive definite. Direct multiplication verifies $G' = G - \delta G b_{ab} b_{ab}^T G / (1 + \delta b_{ab}^T G b_{ab})$ there; both sides vanish on constants. Evaluate its quadratic form on b_{ij} . $\square$

This is the established rank-one resistance formula of [Dörfler and Bullo \(2013, Theorem III.14, Eq. 39\)](#), not a new network theorem. An embedded inverse with one grounded row/column set to zero is not itself G . Its zero-sum bilinear evaluations agree, and double projection gives $P G_{\text{ground}} P = G$. Confusing these operators can corrupt an inverse or covariance calculation.

On a positive-resistance path, R_{ij} is the sum of resistances along the unique interval. Decreasing one edge resistance by κ , less than its original value, decreases every crossing pair by κ and leaves same-side pairs unchanged. For a unit path a coordinate warp $f(i) = i - \kappa \mathbf{1}\{i > e\}$ preserves ordering when $0 < \kappa < 1$ and has exactly these distances. Thus one downstream coordinate reader can realize the same geometry without sharing the proposed network boundary. Represented coordinates are not occurrence times.

For four ordered sites $i < j \leq a < b \leq k < l$, a change in the middle edge contracts $R_{ik}, R_{il}, R_{jk}, R_{jl}$ by the same absolute amount while R_{ij}, R_{kl} stay fixed. Transferring this signature to appearance requires fixed native counterparts and a calibrated linear distance map. A nonlinear reader, cyclic geometry or changed attention can alter it; four equal apparent contractions alone do not identify one neural edge.

For example, suppose each participant has one nonnegative absolute contraction κ_i affecting training separation S_i and outward separation $S_i + d$, with identical participant weights and a fixed linear reader. Their aggregate percentage ratio is a nonnegative weighted average of $S_i/(S_i + d)$, hence lies in

$$\left[\frac{S_{\min}}{S_{\min} + d}, \frac{S_{\max}}{S_{\max} + d} \right].$$

Using $S_i \in [3.2, 5.6]$ degrees and a 7.2% training summary gives lower outward predictions 6.4% at $d = .4$ and 5.76% at $d = .8$. The 4.2% and 3.6% point summaries reported by [Song et al. \(2017\)](#) do not automatically corroborate that restricted equal-absolute-contraction

model. This is not a statistical rejection: fitted optimum selection, uncertain group estimates, nonlinear calibration and graph geometry are outside those assumptions. No neural conductance measurement or raw-data fit is supplied by the comparison.

6.2 An exact inverse native-edge criterion

The full set of pair responses permits an inverse test that a few equal contractions cannot supply. For a symmetric zero-diagonal resistance matrix, $G = -PRP/2$. Indeed $R_{ij} = G_{ii} + G_{jj} - 2G_{ij}$ and $G\mathbf{1} = 0$. Let $D = R - R'$, $B = -PDP/2 = G - G'$ and suppose the baseline L and native labels are independently known.

Theorem 6.2. *A full exact response change is a single added edge (a, b) with positive conductance iff*

$$LBL = cb_{ab}b_{ab}^T, \quad c > 0, \quad cR_{ab} < 1. \quad (30)$$

Its conductance increment is $\delta = c/(1 - cR_{ab})$.

Proof. Necessity follows from Proposition 6.1, with $c = \delta/(1 + \delta R_{ab})$. Conversely B is centered and $GL = LG = P$, so (30) implies $B = cGb_{ab}b_{ab}^TG$. The strict bound makes $G - B$ positive definite on $\mathbf{1}^\perp$. Inverting that rank-one subtraction gives $L' = L + \delta b_{ab}b_{ab}^T$. A symmetric zero-diagonal distance matrix is uniquely determined by its centered Green operator: a centered-zero difference has form $\mathbf{1}u^T + u\mathbf{1}^T$, and its zero diagonal forces $u = 0$. Thus the complete response agrees with the single-edge change. $\square$

Rank-one positive B alone is insufficient. Take a four-port complete baseline with $L = wP$ and a small coefficient for source vector $v = (1, 1, -1, -1)$. Set $B = cGvv^TG$. The inverse change is a multiple-source rank-one term proportional to vv^T ; for sufficiently small coefficient its off-diagonal entries still define a valid positive connected network. It contracts all pair resistances but $LBL = cvv^T$ has four-site support, not the two-site native-edge signature. Known baseline, full responses and native support are consequential hypotheses. Behavioral geometry fitted after the fact does not independently provide them.

6.3 Projected fluctuations and a retention tradeoff

Consider the reciprocal linear field on $\mathbf{1}^\perp$

$$dX = -LX dt + \sqrt{2D_0} P dW.$$

Its stable covariance satisfies $LC + CL = 2D_0P$, uniquely giving $C = D_0G$. Hence $\text{Var}(X_i - X_j) = D_0R_{ij}$. Projection removes a freely diffusing common mode and supplies correlated noise; neither is an innocuous omission in another proposed dynamics. Directed drift or different noise need its own Lyapunov equation.

For two units with conductance w , contrast $Z = X_1 - X_2$ obeys $dZ = -2wZdt + \sqrt{4D_0} dB$. Its mean decays as e^{-2wt} , stationary variance is D_0/w , and deterministic initial contrast gives variance $(D_0/w)(1 - e^{-4wt})$. Initial variance contributes its own e^{-4wt} term. Increasing w both lowers stationary fluctuations and speeds free contrast decay at fixed D_0 . A maintained input or another record need not obey that retention tradeoff; reduced variance does not make each noisy sample contract.

6.4 Equal relative laws, unequal native organizations

Compare three native systems with $n \geq 2$ terminal units: a hidden-hub star, a complete reciprocal network and independent leaky units. Their free drift matrices are respectively

$$L_s = \begin{pmatrix} wI_n & -w\mathbf{1} \\ -w\mathbf{1}^T & nw \end{pmatrix}, \quad L_c = wP_n, \quad L_\ell = wI_n, \quad P_n = I_n - \mathbf{1}\mathbf{1}^T/n.$$

Use projected white noise on connected graph modes and independent white noise for the leaky units, of scale $\sqrt{2D_0}$. Inputs are additive at terminals. Only $Y = P_n X_{\text{term}}$ is observed.

Proposition 6.3. *Matched initial joint laws of Y , independent future innovations and the same prescribed terminal inputs give identical complete joint relative process laws in these three systems. The conclusion also holds for one common well-posed nonanticipating output policy with independent private seed.*

Proof. In the star, $P_n L_s X = w P_n X_{\text{term}}$, since the hub term is common. The same identity holds for the other matrices. Projecting the star's connected-noise covariance onto terminal contrasts gives P_n , as do the other noise laws. Thus all three have the same closed equation

$$dY = -wYdt + P_n u(t)dt + \sqrt{2D_0} P_n d\widetilde{W}.$$

Its explicit convolution solution proves equality for prescribed inputs. Under a common well-posed output policy the same closed controlled equation and seed law give the same process law. Hidden/common variables never enter that equation. $\square$

Gaussian initial laws and deterministic inputs give Gaussian relative processes; arbitrary matched initial laws or nonlinear feedback still give equal laws but need not be Gaussian. In stationarity, pair variance is $2D_0/w$ and normalized time correlation $e^{-w|t-s|}$. Star and complete terminal graph resistances are $2/w$, but a leaky covariance does not thereby become ungrounded resistance of a disconnected terminal graph. Any physical ground must be specified in an expanded network. The hidden star mode $(1, \dots, 1, -n)$ has eigenvalue $(n+1)w$ and is orthogonal to all nominated contrasts. The systems have different native boundaries.

Proposition 6.4. *A native hold of terminal 1 at 1, with all other units initially 0, separates the three deterministic or conditional-mean responses. Unheld star terminals have first derivative 0 and second derivative w^2 at zero; complete-network terminals have first derivative w/n ; independent leaky terminals stay 0. Held star and complete means converge to 1, while unheld leaky means remain 0.*

Proof. Suppress the held terminal's update/noise and use the full physical drift, not a continuously imposed zero-mean constraint. Star symmetry gives an unheld value y and hub h with $y' = w(h - y)$, $h' = w[1 + (n-1)y - nh]$. At zero $h' = w$, $y' = 0$, $y'' = w^2$. Equilibrium is $y = h = 1$, and the dimensionless characteristic polynomial $z^2 + (n+1)z + 1$ has two negative roots. The complete model gives $y' = (w/n)(1 - y)$, hence $y = 1 - e^{-wt/n}$. Independent leaky means solve $y' = -wy$, $y(0) = 0$. $\square$

Brownian sample paths have no such ordinary instantaneous derivatives; the statement is about means or noiseless paths. Positive-noise connected sample differences do not all converge to zero. Holding one unit changes the operator and common mode. It is not an additive input under the old free operator. The example therefore refutes inference of full native equivalence from complete nominated relative-output agreement, without assuming that no larger constructor presents a relational third.

6.5 Material event evaluation

Relational localization is useful independently of phenomenal attribution (Rovelli, 2002). Let $z : I \rightarrow M$ be a material worldline, T a scalar clock and R a scalar register. If $T(z(\lambda)) = \tau$ has a unique root λ_τ , define $O_R(\tau) = R(z(\lambda_\tau))$. Under a whole-package relabelling $z' = \psi \circ z$, $T' = T \circ \psi^{-1}$, $R' = R \circ \psi^{-1}$, this value is unchanged. A strictly monotone bijective reparameterization onto the same worldline image replaces the root by its image and also leaves the evaluation unchanged. Nonscalar registers require event-attached frames carried by the transformation.

A repeated or stalled clock may have several roots. An actual material episode counter/trigger can disambiguate them; a mathematical label is not a physical counter. Otherwise retain the full invariant set of matching events. No root makes the reading undefined, not evidence of absence of experience. For causal order, the metric and time orientation must transform as well: $g'_{\psi p}(\psi_* v, \psi_* w) = g_p(v, w)$. Event localization alone proves neither a local-access law nor a canonical quantum Dirac observable.

Under an independently defended local-causal/nonanticipation contract, two adequate histories agreeing through the selected event have equal earlier register laws under one common kernel (Module 3.1). A complete invariant history is not a mechanism giving every history entry to a local observer. Gauge invariance neither establishes nor excludes a proposed psychophysical dependence on additional inaccessible history.

6.6 Prediction and feasible planning

A family admitting a publicly available exact binary prediction p and a later complementary policy $A = 1 - p$ cannot have a universally correct predictor: $p = A$ would imply $p = 1 - p$. This diagonal argument is limited to the specified feedback policy family. It does not exclude hidden forecasts, probabilistic prediction or some knowable future actions.

Likewise causal constraints do not forbid current multi-time planning. If eating E requires prior baking B , feasible plans are $\{(0,0), (1,0), (1,1)\}$. One current deliberation may choose a feasible plan without independently recombining the impossible $(0,1)$. This limits the independent-recombination inference in agential discussion (Adlam, 2026); it does not explain an agent exercising agency at several events from a timeless epistemically symmetric standpoint. Current plans are not guaranteed knowledge that future actions will occur. The present construction is a classical event/access analysis, not a phenomenal bridge.

6.7 Optical geometry and worldly constituents

An object-involving account of perception must distinguish the identity of what is perceived from its qualitative determination. The following ideal geometry exposes that distinction without assuming an internal image is the bearer. Use a monocular pinhole at the origin and an image plane of focal length one. A frontoparallel planar disc with centre (x, y, z) , $z > 0$, and radius $r > 0$ projects to centre and radius

$$\mathcal{P}(x, y, z, r) = (x/z, y/z, r/z). \quad (31)$$

Indeed a point $(x + a, y + b, z)$ with $a^2 + b^2 \leq r^2$ lies on a ray whose image point is $((x + a)/z, (y + b)/z)$, giving exactly that circular mask.

The concrete two-disc construction is

$$d_L = (-3, 0, 3, 3), \quad d_R = (5, 0, 5, 5), \quad \mathcal{P}(d_L) = (-1, 0, 1), \quad \mathcal{P}(d_R) = (1, 0, 1).$$

Their material radii are three and five, but their projected radii are both one. For independently chosen positive scalars λ, γ ,

$$\mathcal{P}(\lambda d_L) = \mathcal{P}(d_L), \quad \mathcal{P}(\gamma d_R) = \mathcal{P}(d_R), \quad (32)$$

since every numerator and depth has the same factor. Thus the complete labelled two-disc *geometric mask* is unchanged, despite different material radii, depths and separation. The independent scaling is about the pinhole and includes each disc's radius, not just its centre.

The construction excludes binocular, motion, additional depth and occlusion cues and assumes frontoparallel planar surfaces. Illumination, luminance, reflectance and other photometry are not modelled. Equal untextured geometry does not by itself establish equal full retinal signals. This synthetic construction is not a fit or reanalysis of the contextual-disc experiment.

Replacing the two distal material tokens with different tokens in the same projection arrangement also preserves this geometry. An account under which those particular objects partly constitute the current perceptual engagement may therefore distinguish *which things* are perceived without yet determining *how they appear*. A *de re* constituent claim is not a law of qualitative co-presentation. Equal angular extent need not express equal intrinsic radius, and projection alone neither produces appearance nor establishes its jointness. Conversely a retained bounded descriptor can generate a later relational presentation after the original objects are removed; that new third need not be current perception of the absent tokens. Object identity, optical supply, current engagement and qualitative appearance remain distinct targets. The main article's current-act argument supplies its separately defended occurrence and mode-placement warrant rather than deriving them from (31).

7 Empirical application, measurement and temporal scope

The central application concerns an ordinary human comparison of two currently available visual targets. Its evidence has several layers: the experimental arrangement and stored task rule, an appearance-directed response, an interpretation of the current scene and its use, and a separate claim about the act's constitution. Keeping those layers explicit permits a positive current-appearance conclusion without turning a response code into a phenomenal detector. The other experiments below constrain physical processing, temporal interpretation and candidate generalizations. They do not substitute for the constitutive argument.

7.1 Identifying a measurement model without identifying appearance

Multiple indicators can identify a restricted latent measurement model even when their error rates are initially unknown. The binary case supplies an elementary instance of established latent-class identification (Allman et al., 2009); its phenomenal interpretation is a further question.

Let $Z \in \{0, 1\}$ have prevalence $p \in (0, 1)$ and let three binary indicators W_1, W_2, W_3 be mutually independent *conditional on* Z . Set

$$f_j = \mathbb{P}(W_j = 1 \mid Z = 0), \quad s_j = \mathbb{P}(W_j = 1 \mid Z = 1), \quad d_j = s_j - f_j > 0.$$

The positive orientation removes latent-label permutation, but does not give Z an independent phenomenal meaning. Write $m_j = \mathbb{E}W_j$, $C_{jk} = \text{Cov}(W_j, W_k)$, and $T = \mathbb{E} \prod_{j=1}^3 (W_j - m_j)$.

Proposition 7.1 (Three-indicator inversion). *Under these premises,*

$$m_j = f_j + d_j p, \quad C_{jk} = d_j d_k p(1 - p), \quad T = d_1 d_2 d_3 p(1 - p)(1 - 2p).$$

If all three pair covariances are positive, put

$$r = \frac{T}{\sqrt{C_{12}C_{13}C_{23}}}, \quad p = \frac{1}{2} \left(1 - \frac{r}{\sqrt{r^2 + 4}} \right).$$

Then

$$d_1 = \sqrt{\frac{C_{12}C_{13}}{C_{23}p(1-p)}}, \quad d_2 = \sqrt{\frac{C_{12}C_{23}}{C_{13}p(1-p)}}, \quad d_3 = \sqrt{\frac{C_{13}C_{23}}{C_{12}p(1-p)}},$$

and $f_j = m_j - d_j p$, $s_j = f_j + d_j$ uniquely recover the oriented parameters. Recovered endpoints must lie in $[0, 1]$ to be feasible probabilities.

Proof. Write $W_j - m_j = d_j(Z - p) + \epsilon_j$, where $\mathbb{E}(\epsilon_j | Z) = 0$. Conditional independence removes mixed residual terms for distinct indices. The pair and triple centred moments therefore reduce to products of the d_j times $\mathbb{E}(Z - p)^2 = p(1 - p)$ and $\mathbb{E}(Z - p)^3 = p(1 - p)(1 - 2p)$. Hence $r = (1 - 2p)/\sqrt{p(1 - p)}$ and $r/\sqrt{r^2 + 4} = 1 - 2p$, yielding the formulas. The seven nonconstant moments of a binary triple determine its eight-cell joint distribution. Feasible recovered parameters reproduce those moments and thus that distribution. $\square$

The inversion includes $p = 1/2$, where $T = 0$. It is singular at degenerate prevalence or uninformative channels and unstable near those cases. There are seven model parameters and seven observable degrees of freedom. A fit to one triple does not independently validate its conditional-independence or causal interpretation.

Transport across conditions provides additional restrictions only if the conditional channels remain fixed. Define product distributions

$$A(w) = \prod_j f_j^{w_j} (1 - f_j)^{1-w_j}, \quad B(w) = \prod_j s_j^{w_j} (1 - s_j)^{1-w_j}.$$

Then $Q_p = (1 - p)A + pB$. Once a nondegenerate condition identifies A, B , new condition laws must lie on this one segment; a candidate prevalence predicts the whole joint law without new emission parameters. Direct subtraction gives

$$\text{TV}(Q_p, Q_q) = |p - q| \text{TV}(A, B). \quad (33)$$

If each actual conditional emission differs from its frozen version by at most ϵ in total variation, convexity bounds the actual mixture's deviation by ϵ . Two candidate predictions with respective full-channel uncertainty ϵ_1, ϵ_2 have disjoint permitted neighborhoods whenever

$$|p - q| \text{TV}(A, B) > \epsilon_1 + \epsilon_2.$$

Sampling uncertainty is additional. Dependence or omitted-source effects cannot be folded into a small drift bound without independent support. Failure of a transported segment restriction challenges the latent-and-measurement package, not just its proposed manifestation premise.

The common access gate. Consider one fixed physical source with early relational representation E , access/retention gate G , and later available representation $C = EG$, all binary. Generate each W_j independently conditional on C , with the same f_j, s_j . An early manifestation assignment associates appearance with $E = 1$; a later one associates it with $C = 1$. Neither assignment changes the source distribution, readout kernel or noise parameters. Their complete observable laws, and any equally specified physical intervention laws, are identical. Adding further indicators downstream of C does not change that equivalence.

For independent E, G of prevalences e, g , the moment method identifies $p_C = eg$, even under the early assignment whose appearance prevalence is e . Conditioning on early appearance leaves the shared gate:

$$\mathbb{P}(W_j = 1 \mid E = 1) = f_j + d_j g, \quad \text{Cov}(W_i, W_j \mid E = 1) = d_i d_j g(1 - g).$$

Conditioning on C instead removes that gate and gives the declared conditional independence. Independent hardware noise therefore does not imply independence *conditional on actual experience*. Imposing the latter as an unearned appearance-facing premise can silently select the later assignment. Exact latent identification supplies a response/access class; independent target-sensitive warrant is still required to interpret it as occurrence. This construction is synthetic, not a fitted claim about any participant or a denial of early experience.

7.2 The archived Ebbinghaus experiment

Whitwell et al. (2023) compared size judgments, manual estimates and grasps using two centre discs surrounded by annuli of different sizes. The initial semi-formal staircase established each participant’s physical size difference δ at which the differently surrounded discs looked equal. In the public archived sample, δ ranges from 1 to 4 mm. Subsequent displays were of two kinds: physically unequal discs arranged to look equal (the experiment’s S configuration), and physically equal discs arranged to look different (D). These are experimental configuration labels, not independently measured appearance labels for each trial.

The response contingency assigned “same” to one side for each participant; “different” selected the other side. Board orientation varied. A trial illuminated the pair for five seconds, during which the participant sampled the discs and responded. Eye position was sampled at 250 Hz and hand position at 100 Hz. The manual-estimation and grasp blocks measured an aperture for the disc selected by the preceding comparative judgment. The keypress block supplied the comparative judgment without that subsequent aperture. The five-second procedure is the procedure relevant here; an earlier open-loop grasp experiment discussed in the article is a different protocol.

The reanalysis uses the primary article, supplementary methods and public archive. The archived `Project_Files.zip` was recovered from the authors’ OSF view-only link, with SHA256 verified against the retrieved repository metadata. The source link is [the authors’ publicly linked OSF archive](#). The recovered ZIP is 11,463,667 bytes, with SHA256

ceef912e09e79a6e3bccf291faf4a9c54
f743e2a715e82fa878b2864283c73cd.

It contains 19 participant folders. The article reports 24 recruits and the supplement describes four dismissals in the initial staircase; these records do not supply an independently verified explanation of the remaining difference. No missing participant or trial was invented. The archive is an external reproduction input, not a new experiment or a redistributed private research record.

Table 2: The variables used, and what they measure.

Archive component	Variables and interpretation
Condition table	Participant-specific task and trial indices; physical left/right disc and annulus classes; S/D configuration; target and chosen-side metadata; correctness and rejection flags. Trial numbering is local to task.
Response-contingency table	Preassigned same-left/right rule and initial verbal point of subjective equality, in millimetres.
Keypress table	Task, trial, left/right choice and response time from illumination, in milliseconds.
Processed hand records	Final manual aperture or peak grasp aperture, indexed by task and trial. These are selected-target motor measurements.
Eye records	Fixation counts, durations and switches during preparation and execution. They do not directly label covert attention or phenomenal tokens.

7.3 A physical-only nomination and its retrospective status

The nominated application is participant 2nU4ew, keypress task 3, trial 3. Both centre discs have physical diameter 30 mm. The left disc is surrounded by the large annulus and the right by the small annulus. The preassigned rule is same-left. The continuing source acquisition and comparison arrangement, task, trial, physical source columns and pretrial rule qualified the case under the native-human visual predicate $\mathcal{V}$. Current choice, correctness, the S/D label and any current experience predicate were excluded from the selection decision.

A record predicting current relational appearance by comparison uptake was saved before the separately recorded outcome reinspection. Its saved SHA256 is

```
33535f709fc5000c52471cd3c57c3e3e4
ef81ea596e096ea1baab7766715ae59.
```

This records a commitment in the analysis sequence. It is not evidence of blinding: the archive had already been audited, and the parser read the entire condition table, including output columns, before projecting the source-only columns. The selection did not use those columns, but unused is not unread. The application is consequently retrospective, not an untouched holdout, prospective prediction or numerical validation of $\mathcal{V}$.

The application reads three named members under `Project_Files/`: `Condition_Files/2nU4ew_conditions.txt`, `Response_Contingencies_Verbal_2AFC/response_contingencies_and_verbal_2AFC_results.txt`, and `Keypress_RTs_and_Choices/2nU4ew.txt`. In that order their SHA256 values are

```
142df942ef5010db29669e8eea1a8ae1
4d826a621e0f18537944ef12f3730053;
39c6a43f612e7ed4e1a47e4031962ca5
edfb6b35319a83f15268329bf6c91d1f;
6c214d0e5f7d55fcc3a5e13d2093589e
0ec132f5ba9f0d8c840c28331b7a9eab.
```

Reinspection returned a right choice at 2645 ms after illumination. The choice agrees between the condition and keypress records. Under the preassigned rule, its instructed meaning is that

the centre-disc sizes look different. Physical diameters are equal. The observed answer is therefore relevant to comparative appearance, rather than evidence that the participant accurately estimated unequal physical diameters. An incorrect physical-size judgment is compatible with actual appearance; correctness was not an eligibility condition.

The occurrence projection has an independently specified antecedent: a materially continuing human visual acquisition/comparison organization, the optical and apparatus configuration, persistent paired-source availability, preloaded task contingency, and source-dependent sampling and comparison history. The documented sensory-task calibration comprises the initial verbal staircase, varied physical diameters and annuli, and appearance-directed instructions. It supports the sensory comparison interpretation; it is not an independent jointness or basing probe. Earlier trial 2 identifies the retrospective nomination sequence, not a separately measured joint-appearance anchor. Neither “currently seeing” nor “genuine current acquaintance” is used to select this new token. This is a narrow induction to the same native capacity exercise, not a rule for arbitrary machines, every integrated circuit, every physiological state, or every instantaneous phase of a trial.

7.4 From an answer to a current relational appearance

There are three distinct interpretive steps. First, the protocol asks how the discs *look*, and records an answer to that question while the sources remain available. The earlier contextual staircase and source-sensitive task history support the ordinary interpretation of a sensory comparison, rather than an arbitrary motor tag or a calculation of physical diameter.

Second, the minimum relational target is two qualitative apparent-size counterparts presented in a spatial or comparative arrangement. It does not require an additional irreducible “different” sensation, perceptual fusion of the discs, or veridicality. The ordinary current-scene interpretation of a simple paired visual encounter supports this togetherness defeasibly: the subject compares these apparent targets within their supplied spatial layout. The keypress code alone does not entail that interpretation. The experiment did not separately ask whether both counterparts were simultaneously presented.

A concrete serial-only alternative preserves the records: acquire one target’s appearance, retain a bounded magnitude/spatial descriptor, acquire the other, and compare the descriptors while never presenting a qualitative pair together. Ordinary comparisons of separately viewed objects can proceed this way. Its coherent possibility does not establish that it occurred in this simple current-pair setting. Documented serial-only strategy, source bypass with a credible denial of a current pair-scene, or other evidence of inference-only performance would weaken the current-scene interpretation. Serial eye sampling alone would not: later inspection may present a new pair. If it does, that new current field meets the target, even if earlier acquisition was wholly nonphenomenal.

Third, interpreting the comparison as *using* the presented pair is stronger than accepting occurrence. Source-directed instructions, calibration and ordinary task performance support the interpretation of an active visual comparison. They are not a separate intervention demonstrating that the qualitative relation caused the keypress. Passive appearance accompanying an automated answer remains a different challenge from serial-only appearance. The main argument defends the act interpretation and its mode placement separately; this archive provides no direct basing probe or anatomical bearer measurement.

7.5 The deadline is by uptake, not at stimulus onset

Let t_0 be illumination, j the current comparison uptake supporting the answer, and r its recorded response time. Under the ordinary current-acquaintance interpretation, a suitable

relational appearance occurs by j , with $j \leq r$. For the nominated trial, $r - t_0 = 2.645$ s, within the five-second illumination. The measured quantity is the response time. The additional appearance deadline depends on the interpretation of what the subject is doing then.

It follows neither that appearance began at t_0 , nor that it was continuous across eye movements, nor that an earlier neural integration event was its first bearer. A bounded descriptor may be retained and first reconstructed as a qualitative pair at current inspection J . Such delayed construction satisfies the current-third target. A response latency is not an independent clock for phenomenal onset, and the formal finalization bounds elsewhere in the supplement do not change that.

7.6 Exploratory transfer of local reader maps

The archive also permits a restricted comparison between independently nominated observable reader maps. This analysis concerns the relation between selected-disc apertures and later pair judgments, not direct measurement of a phenomenal metric. The original article excludes illusion-inconsistent judgments from its main kinematic/gaze analyses. The transfer analysis retains errors in its test outcomes.

Three schema checks are consequential. Forty-eight incorrect-choice D rows have a stored chosen-size value incompatible with the physical disc on the recorded chosen side: 21 grasp, 12 manual-estimation and 15 keypress rows. Physical classes were reconstructed from side and display columns. The contingency table disagrees with the planned target-side rule for six participants. The primary subset uses the 13 concordant-rule participants, 308 keypress trials; a condition-rule analysis of all 19 is only a sensitivity analysis. One participant's keypress file is malformed and another has a single cross-file left/right disagreement. The stricter cross-file subset contains 283 trials from 12 participants. Errors are retained there too. One participant has 20 rather than 24 keypress records; absent trials are not imputed. The reproduction outputs identify every included case and conflict.

Two simple fixed predictors are informative. Physical equality uses real diameter. The contextual predictor subtracts the earlier staircase δ from the diameter of the large-annulus-surrounded disc, and uses a half- δ equality tolerance. No test keypress response fits this map. In the concordant subset, the contextual map agrees with 282/308 judgments (91.56%), versus 26/308 (8.44%) for physical equality. In the stricter subset it agrees with 259/283 (91.52%). This restricts a context-free diameter-to-equality reader for these appearance-directed answers. It is neither a new discovery of the illusion nor a rejection of physical diameter as a motor-control variable.

For a separate scalar transfer, define four selected-target cell means $\hat{\mu}_{s,k}$ per participant and task, where s indexes real size and k annulus class. Only D aperture trials with available aperture and zero stored rejection flag enter calibration; incorrect judgments are included. Eleven manual and twenty grasp incorrect D source trials remain usable. No S aperture trial, test keypress output or outcome-correctness filter trains these means. Each test display receives the distance

$$d = |\hat{\mu}_{s_L, k_L} - \hat{\mu}_{s_R, k_R}|,$$

and smaller d predicts a same judgment. AUC evaluates the ranking without fitting a test threshold, giving ties half credit. The specified mean-reader hypothesis also predicts an ordering: S distance should be below both D distances. Positive affine recoding preserves this ordering.

The mean paired AUC difference is 0.39255. The checks use pseudorandom seed 20261011, 10,000 participant resamples and then 5,000 nested resamples. Within a nested resample, each selected local cell is resampled with replacement at its original cell count before its mean and

Diagnostic, 13 concordant participants	Manual	Grasp
S distance below both D distances	12	5
S distance above both D distances	1	6
Mixed or tied ordering	0	2
Mean participant AUC	0.842	0.449
Median-calibrated reader AUC	0.771	0.513
Stricter cross-file test subset AUC	0.830	0.482

Table 3: Exploratory transfer to independently recorded pair judgments. Local calibration cells contain only two to four selected observations.

test distance are recomputed. Resampling participants conditional on fixed local means gives a descriptive 95% percentile interval $[0.17985, 0.61691]$. Resampling both participants and their local selected-cell observations instead gives mean bootstrap difference 0.22751 and interval $[-0.03984, 0.48245]$, which includes zero. These intervals are conditional on observed keypress outcomes and judgment-selected calibration cells. Neither repairs selection bias or provides prospective validation.

The selection dependency prevents a stronger interpretation. The global judgment determines which disc supplies the aperture; judgment or a shared retained descriptor can influence the later manual estimate. Source and test blocks are different episodes with different control demands. A physically specified contextual descriptor can drive judgment, target selection and manual aperture, while grasp uses diameter plus a motor margin. A constructor can first present the pair during current inspection. This architecture needs neither a retained movie nor independent local phenomenal calibration. The observed AUC difference thus supports a restricted readout-map transfer, not latent-field identification, same-token passive restriction, or a proof that grasp lacks consciousness.

7.7 A public feature-binding control and a restricted mixture test

Crayen et al. (2024) varied foveal and peripheral motion in a continuous-report paradigm. Participants reported the direction associated with a cued peripheral colour. Coherent central motion produces binding and misbinding conditions; ambiguous central motion provides another control. Connected, disconnected and yellow–blue layouts vary the configuration. Their geometrical comparison also changes eccentricity; it is not an isolated manipulation of continuity.

The public GRO.data release, DOI [10.25625/2RIA04](https://doi.org/10.25625/2RIA04), version 2.0, supplies 162 participant-condition summaries: 18 participants, three layouts and three motion conditions. The recovered `PERFORMANCE.txt` matches its repository checksum and is CC0. It contains mean performance, not trial direction marginals, trial counts, response latencies or histories. Consequently the following is a retrospective participant-level diagnostic, not a trial-level binomial fit or a measured phenomenal-error rate.

Consider a restricted selection model. With probability w , a coherent central direction governs the answer, giving accuracy 1 in binding and 0 in misbinding. Otherwise a common residual route succeeds with probability u . In the ambiguous condition the central route selects the correct direction with probability exactly $1/2$, while w and u remain fixed across the three conditions. Its predictions are

$$b = w + (1 - w)u, \quad m = (1 - w)u, \quad a = \frac{1}{2}w + (1 - w)u = \frac{1}{2}(b + m).$$

The midpoint restriction is therefore testable without treating w as a probability of consciousness. For participant i , set $e_i = a_i - (b_i + m_i)/2$. Paired t diagnostics use 17 degrees of freedom

and Holm adjustment over the three midpoint tests. The estimates are:

Layout	Mean e (percentage points)	$t(17)$	Raw p	Holm p
Connected	-0.9724	-0.6144	0.5471	0.5471
Disconnected	-1.6014	-1.6944	0.1084	0.2169
Yellow-blue	-2.8551	-2.7280	0.0143	0.0429

Table 4: A diagnostic of the exact equal-probability midpoint restriction.

The yellow-blue mean has a 95% t interval of $[-5.0633, -0.6470]$ percentage points. It conflicts with this restricted midpoint account under the participant-summary assumptions. Estimated $w = b - m$ is negative for two individuals in each of the connected and disconnected layouts and four in yellow-blue, another warning against reading each unconstrained estimate as a literal mixture probability. Allowing condition-dependent residual performance, unequal ambiguous selection, carryover or different histories relaxes the midpoint restriction. The result rejects neither every selection account nor bounded reconstruction, and does not locate joint appearance in the measured dynamics.

A second paired diagnostic compares the binding advantage across the two geometrical layouts. For participant i , form

$$k_i = (b_{i,\text{connected}} - m_{i,\text{connected}}) - (b_{i,\text{disconnected}} - m_{i,\text{disconnected}}).$$

Its mean is 9.31673 percentage points, with 95% t interval $[5.55207, 13.08139]$, $t(17) = 5.22135$ and two-sided $p = 0.00006914$. This is a configuration-sensitive performance contrast in the same 18 participant summaries. Since layout and eccentricity covary, it does not isolate continuity or identify a change in phenomenal togetherness.

7.8 Perturbation and sensory construction

Vernier integration and TMS. [Scharnowski et al. \(2009\)](#) presented opposite-offset verniers for 30 ms each at one location. Participants judged the lower bar’s offset relative to the upper bar. Initial sign was randomized and pulse timing blocked and counterbalanced. Early occipital pulses favoured the second offset; later pulses favoured the first, through approximately 370 ms after onset. Single-vernier threshold controls, frontal stimulation and a focal-coil variant restricted particular artifacts and sites. The original experiment involved five participants; the frontal control involved four new participants. Small samples, common phosphenes, threshold sensitivity and connected-tissue effects limit anatomical interpretation. The full primary report and appendices were read; no trial-level TMS data were reanalysed.

The intervention establishes temporal susceptibility of retained relational processing. It does not measure first appearance at the pulse. A compact information restriction makes the distinction precise. Let balanced initial sign $S \in \{-1, +1\}$ influence retained physical state Z ; let exogenous pulse A act through a common downstream response kernel $K_A(Y | Z)$. If the two conditional Z laws coincide, every pulse yields $\Pr(Y = S | \text{do}(A)) = 1/2$. More generally data processing gives

$$\text{TV}(\text{Law}(Z | S = +1), \text{Law}(Z | S = -1)) \geq |2\Pr(Y = S | \text{do}(A)) - 1|.$$

This rules out complete sign erasure under the stated sufficiency and balance premises. It does not require two stored images: retain $Z = S$, one bit, and report $Y = S$ with pulse-dependent probability $p(A)$. Opposite second sign is then already determined. This fixed mechanism can reproduce any sign-dominance profile in this limited response family. No numerical human total-variation bound or fit is claimed.

Sequential neural decoding. Menétrey et al. (2026) released EEG and task material for sequential metacontrast. The repository inventory and selected source code were inspected; small behavioural MAT files were recovered and their table schemas examined, but opaque MATLAB table values were not decoded. Raw EEG, the full multi-gigabyte archive and participant decoding arrays were not downloaded or fitted. The inspected preprocessing includes condition, physical direction, response, correctness, time and reaction-time variables. Published late decoding uses correctness. For signed target S and response Y , correctness SY is not the direction content S or Y ; a classifier may carry agreement, certainty or decision quality. Fixed response mapping also aliases reported direction with motor choice. These are limits on interpretation, not a failed replication. A new direction/error-controlled analysis could test information mechanisms, but cannot distinguish appearance assignments sharing the entire physical law.

Cortical construction. Beauchamp et al. (2020) used sequential electrical stimulation to produce reported forms in sighted and blind participants. Retinotopic receptive-field geometry in sighted participants provided one prediction route; measured phosphene locations provided another. These routes should not be conflated: phosphene calibration already uses experience reports. Spontaneous drawings before letter-label training support a sensory-form interpretation beyond mere learned naming. Dynamic/static comparisons concern the tested stimulation patterns and tasks, not every possible pair of currents or a universal capacity for static fusion.

Bosking et al. (2022) investigated multielectrode percepts and their spatial organization. Patterns containing separate reported phosphenes are relevant to minimum qualitative co-presentation even without fusion into a recognizable shape. Their primary report and relevant pattern methods were inspected, together with the 2020 construction report. A stimulation schedule, retinotopic predictions and reported spatial patterns support causal content production by native visual organization. They do not identify the exact microphysical transition matrix, measure every instant of the reported field, or alone establish that the stimulated supplier is the whole experience-inclusive act. Complete microphysics is not a condition of the main macro-level inference; content supply is nonetheless distinct from constitution.

Parvizi et al. (2012) provides a further specific perturbation: electrical stimulation of human fusiform face-selective regions distorted face perception. Its value here is selective causal involvement in experienced content, not a general detector of relational appearance or proof that the stimulated population exclusively bears it.

7.9 Reports during REM sleep

Konkoly et al. (2021) demonstrated real-time communication with dreamers during physiologically staged REM sleep using prearranged signals and new questions. Arithmetic success establishes contingent communication; it is not by itself the specified sensory relational target. LaBerge et al. (2018) measured smooth tracking of dreamt visual targets, comparing lucid dreaming with waking perception and imagination. A moving single target and pursuit physiology do not by themselves establish two qualitative counterparts co-present in a field. The further inference from an actually presented, spatially resolved target is assessed in Section 10.1; it uses additional appearance testimony rather than pursuit geometry.

Konkoly et al. (2026) used separate sniffing codes for dream visual presence/absence and dream-eye status. Eleven participants produced 150 REM-time signals; an additional signal rater was blind to initial ratings, dream reports and cues. The larger recruited sample was 13. Later narratives include relational scenes, but the online vocabulary encoded visual availability and eye status rather than the particular relations. Relevant methods, signal scoring and

limitations were inspected from the author PDF; supplementary materials were not recovered and raw participant data were not analysed. Healthy-participant data and scripts are request-only; the narcolepsy data cannot be shared.

If a recorded signal completes at b before awakening w , and its initiating judgment j genuinely reports current vision, then some visual appearance occurs by $j \leq b < w$. Presleep meaning, pre-awakening recording and blind signal scoring improve that current-report warrant. They do not separately place the narrative’s fingers/wall or person/cart relation at the binary signal. Nor do they exclude first presentation during dream-time inspection rather than earlier uninspected dream activity. This is a useful deadline for current visual appearance before awakening, not an estimate of first dream-scene onset or a calibrated bearer test.

7.10 Grouping, report-independent accumulation and motor correction

Vogelsang et al. (2024) investigated subjective grouping in sequential metacontrast alongside offset integration. Colour/grouping descriptions were collected around the experiment, with alternating-colour descriptions repeated at its beginning and end; they were not online onset stamps. Subjective segregation can coexist with measured feature integration. Numerical integration, phenomenal grouping and minimum joint presentation are therefore different targets. Two distinct objects may still appear together.

Stockart et al. (2025) compared immediate detection, delayed detection/confidence and passive viewing with intracranial high-gamma measures. Faces embedded for 600 ms produced accumulation-related activity during passive viewing too. Delayed reports occurred at least 1300 ms after face onset. The main methods and relevant results/discussion were inspected; the reported preregistration deviations and alternatives involving sensory encoding, covert decisions and task carryover remain relevant. Such activity cannot be identified exclusively with execution of an immediate keypress. Persistence without that keypress does not establish independence from every decision process or phenomenal onset at a decoder crossing.

The public OSF repository was inventoried before any proposed fitting. Seven small behavioural CSVs from one selected participant/session were recovered and matched repository hashes. Two passive blocks each contained 48 trials, a passive control 12, three delayed blocks 59 each, and an immediate/staircase block 40. Passive fields labelled physical high/low intensity; detection, response and response-time fields were missing and confidence was coded -1 . Delayed blocks contained detection outcomes, confidence and response times. Thus passive “seen/unseen” or hit-like labels are not independent trial-level experience observations. The restored preregistration also records previously collected data and an accidentally deleted earlier file; its restored upload timestamp is not an independently verified original preregistration date. No raw neural arrays or full analysis code were replicated. These checked schemas restrict a proposed analysis, not the authors’ published neural results.

A shared physical accumulator can retain threshold status, a template index and confidence-relevant summary. A constructor can first present content at immediate or delayed inspection. The model needs neither a retained movie nor postponed early computation. If two interpretations share the full measured law, a better accumulator fit cannot choose their phenomenal assignment. Face detection also does not separately measure a specified joint relation between qualitative parts.

Merritt et al. (2017) compared online reach corrections in Parkinson’s disease and controls, with small and large target jumps and a separate displacement-judgment task. Corrections occurred under both access conditions. The judgment task was not a simultaneous trial-specific report of each reach’s scene. This result prevents generic successful online correction from identifying a current experience-inclusive act. An appearance-directed repair would

require independent calibration of the operative comparative error and its role in correction. No such new intervention was performed here.

7.11 Affective counterparts and the limits of modality extension

Quevedo and Coghill (2009) studied synchronized five-second thermal stimulation in 13 participants, with hidden viewed sites, psychophysical calibration, intensity/unpleasantness scales and one/two-disconnected/two-connected pain classifications. The primary methods and relevant filling-in, radiation and connectivity results were inspected. Reported two-site or connected pain patterns support ordinary qualitative spatial testimony; they are not direct measurements of a nominated constitutive neural population. Classification followed overall rating, so it does not establish earliest presentation. Relative site-specific aversive pull, a relation's intrinsic motive and actual relief priority were not measured. The philosophical distinction between unpleasantness, evaluative significance and actual desire matters here (Bain, 2019; Mørch, 2019). Neither a reported pain geometry nor an invented priority controller demonstrates that qualitative relations possess the controller's causal powers.

These affective and dream cases broaden the evidence for native sensory capacities and sharpen temporal questions. They do not extend the physically delimited visual predicate $\mathcal{V}$ to all modalities, sleeping states or artificial implementations. Each extension requires its own independently specified regime and appearance warrant.

7.12 What the combined evidence licenses

The archived case supports, at an ordinary defeasible phenomenological and testimonial level, a currently presented qualitative pair and relation by comparison uptake. Native-kind induction is physically specified and the current-scene interpretation is explicit. The transfer analysis restricts selected observable maps; the binding control rejects an exact restricted midpoint model; interventions and no-report results constrain particular physical processing accounts. None is a direct observation of literal mode placement. That further conclusion rests on the independently defended concrete-performance/mode principle and its actual application in the main paper. Earlier absence followed by a new current J field is compatible with this scoped result. Serial-only presentation, passive accompaniment and exclusive bearer must be assessed at their distinct inferential steps rather than combined into one unspecified alternative.

8 Typed epistemic and constitutive arguments

Grounding, causation, realization and identity license different inferences. This module examines the alternatives that motivated the current-performance account and the positive principle that supports it. Its finite models isolate implications; their qualitative and epistemic interpretations are stated premises, not experiences generated by a calculation. The models concern the attribution of an actual act and the limits of extending that attribution.

Use P for an independently nominated physical performance, A for an experience-inclusive act, and Q for its actual qualitative mode. R is a physically operative reason/control component, V a bodily expression, K a current acquaintance, and K^* a composite knowledge performance. $\mathfrak{B}$ denotes a genuinely exclusive qualitative instantiator outside the proposed mode-bearing P . It is distinct from the programme's unsplit-ground notation U . A numerically distinct property instance of P is not such an exclusive bearer.

8.1 Current grounding and evidential parity

An actual relational presentation can be evidence even when its apparent objects are illusory. External inaccuracy is different from absence of appearance. Equally, a response about a relation need not itself contain the sensory counterparts. The appropriate parity principle is evidential: relational subject matter alone is no reason to disqualify otherwise credible current experiential evidence. It does not assign relational testimony the same error rate as unary-quality testimony. Retention, conceptual load and reconstruction can make relevant differences. Joint accessibility and phenomenal unity must also be distinguished (Bayne and Chalmers, 2003).

Nonfloating epistemic grounding. If K is genuine direct current acquaintance with this Q , then Q participates in its epistemic basis. A matching response generated independently of that basis is not thereby direct acquaintance with it. Under ordinary causal or synchronic constitutive ordering, an appearance wholly after K cannot supply its present basis. The motivation is contact with this actual occurrence rather than an accidentally or inferentially correct proxy. It names no favoured neural stage and permits a newly constructed Q during current comparison. Direct phenomenal concepts and their content-making basis are a substantive constitutional possibility (Chalmers, 2003; Balog, 2012); unchanged physical vehicles do not automatically preserve that basis.

This principle is compatible with noncausal justification. An abstract theorem can justify a belief without being a material part of it. Current qualitative acquaintance instead concerns a concrete instantiated basis, but concreteness does not by itself make that basis physical. A particular judgment also need not be knowledge merely because Q occurs: its classification may be mistaken.

8.2 Anti-luck constraints and their physical antecedent

Safety is an independently motivated necessary condition on knowledge, relative to a belief's basis and relevant alternatives; basis individuation is not settled by the principle (Pritchard, 2012). Let x_0 be an actual episode and $N(x_0)$ a defended local domain. For an assignment law L , let $M_L(x)$ indicate the nominated appearance, and let $B_L(x_0, x)$ mean that an intentional target belief is formed on the epistemically same basis. This relation need not be transitive. Let $Y(x)$ be a physical affirmative vehicle.

Proposition 8.1 (Scoped safety constraint). *Assume: (i) at x_0 the subject knows the current relational appearance obtains; (ii) within $N(x_0)$ every same-target, same-basis belief is true; and (iii) an independently justified physical relation B_* satisfies $B_* \Rightarrow B_L$ for every retained assignment. Then*

$$\{x \in N(x_0) : Y(x) = 1, B_*(x_0, x)\} \subseteq \{x : M_L(x) = 1\}.$$

Proof. The lower relation supplies the relevant same-basis belief. If its target appearance were absent, that belief would be false within the safety domain, contradicting assumption (ii). $\square$

The proof is short because the substantive work lies in B_* . Preserving a circuit, checking disposition or physical string does not establish preservation of an experience-constituted basis. An ancillary variable with no physical effect on the reporting process could still enter a proposed appearance law; excluding its relevance needs a source/basis argument. A transported true occurrence also does not create fresh knowledge at the destination, so the proposition cannot be iterated as a truth-to-acquaintance induction. The explicit three-vertex failure and two repair schemas are in Section 2.12.

Sound positive reports need not locate a bearer. Let $\mathcal{C} = \{(a, b, a \oplus b) : a, b \in \{0, 1\}\}$, and let distinguishable buffers B_1, B_2 each range over $\mathcal{C} \cup \{\perp\}$. Define the common physical report

$$Y(B_1, B_2) = \begin{cases} c, & B_1 = B_2 = c \in \mathcal{C}, \\ \perp, & \text{otherwise.} \end{cases}$$

One assignment associates a relational third with active B_1 ; another with active B_2 . On every positive report both have the reported complete content. Disabling either buffer removes the report, so both physically matter. Yet at $(c, \perp)$ the occurrence assignments differ, and at unequal active values the content/bearer assignments differ. Both abstain publicly. Abstention is not an independently correct negative appearance judgment. This five-by-five model shows why positive soundness, diagonal anchors and difference-making do not provide occurrence completeness or unique carrier selection. Its actual-appearance labels are declarations used to test the inference.

8.3 A finite current scoped-carrier countermodel

Two candidate physical carriers can agree at every accepted current anchor without being physically interchangeable. Fix registers $u, v \in \mathcal{P}_2 = \{0, 1\}^2$, a bodily tag $b \in \{0, 1\}$, and comparison mode $c \in \{0, 1\}$. The registers are denoted u, v here; the checker retains its historical register identifiers. The symbol V denotes bodily expression and $\mathfrak{B}$ denotes the exclusive qualitative bearer. A state is $s = (u, v, b, c)$. There are thirteen native actions: idle ι , two preparations each of b and c , and four preparations each of u and v . Their synchronous transition T_d is

$$u' = \begin{cases} p, & d = C_p^u, \\ u, & \text{otherwise,} \end{cases} \quad v' = \begin{cases} p, & d = V_p, \\ u, & \text{otherwise.} \end{cases}$$

The tag or mode is replaced only by its corresponding preparation. Crucially, ordinary copying into v' uses the *old* u , including during a preparation of u . With $e(p) = \mathbf{1}\{p_1 = p_2\}$, the physical output is $y(s) = (v, e(v))$ when $c = 1$ and $\perp$ otherwise. Both law extensions use this one transition/output process. Their hypothetical appearance assignments are

$$\mathcal{L}_u(s) = \begin{cases} (u, e(u)), & c = 1, \\ \perp, & c = 0, \end{cases} \quad \mathcal{L}_v(s) = \begin{cases} (v, e(v)), & c = 1, \\ \perp, & c = 0. \end{cases}$$

These stipulated charts test an inference; they are not measurements that the registers actually present qualities. Both allow first presentation only during the nominated active current comparison.

Proposition 8.2 (Scoped agreement and off-anchor disagreement). *The model has 64 states and 832 state/action entries. On the eight nominated anchors $u = v, c = 1$, both appearance laws and the output agree. Across the remaining states, the laws disagree on counterparts in 24 states and on equality in 16 states.*

Proof. There are $4 \cdot 4 \cdot 2 \cdot 2 = 64$ states and $64 \cdot 13 = 832$ entries. Four diagonal pairs and two tags give eight active anchors. Of the sixteen ordered (u, v) combinations, twelve have $u \neq v$; with $c = 1$ and two tags these give 24 counterpart disagreements. Each equality class has two pair values. Ordered cross-class choices number $2 \cdot 2 \cdot 2 = 8$, giving 16 equality disagreements after the tag factor. At $c = 0$, both assignments are $\perp$. $\square$

Complementing both bits of both anchored registers, or changing the irrelevant tag, preserves agreement: the checker performs $8 \cdot 2 \cdot 2 = 32$ such checks, with repeated states rather

than thirty-two new observations. Both registers have physical routes to reports. Preparing $v = p$ changes the immediate output to $(p, c(p))$; preparing $u = p$ and then idling changes the later output to that value. Each yields four distinct outputs. This establishes efficacy of physical values, not efficacy of phenomenal properties or genuine acquaintance under every action. At each fixed b , the anchors still contain four counterpart values, so b alone cannot determine their complete content under a fixed intrinsic map. This excludes an isolated tag, not a whole body containing the varying fields.

Let $h(u, v, b, c) = (v, u, b, c)$ and interchange the labels C_p^u, V_p while leaving other actions fixed. For every action, $hT_d(s) = T_{h(d)}h(s)$ holds exactly when $u = v$: for idle/tag/mode actions the two sides copy different old sources off the diagonal; for a register clamp one retained coordinate still differs. Therefore

$$\#\{(s, d) : hT_d(s) \neq T_{h(d)}h(s)\} = 13(64 - 16) = 624. \quad (34)$$

The proposed exchange is not a native interventional isomorphism. Carrier ambiguity here concerns two appearance extensions of common physics; it is not earned by physical symmetry. Off-anchor states have no independently accepted acquaintance metadata, so their differing labels do not establish differing experiences in validated interventions.

The full candidate packages are $\{u, c\}$ and $\{v, c\}$, because changing c changes either complete assignment even at fixed register content. Within an explicitly fixed active- c scope, saying “carrier u ” or “carrier v ” merely treats that mode as background.

Proposition 8.3 (Robust container and shared parts). *For an independently warranted nonempty family $\mathcal{B}$ of complete candidate bearer-part sets, a package Σ contains a complete bearer under every candidate exactly when $\bigcup \mathcal{B} \subseteq \Sigma$. Its smallest robust container is the union. The intersection lists parts common to all candidates but need not be sufficient.*

Proof. The containment claim is $B \subseteq \Sigma$ for every $B \in \mathcal{B}$, equivalent to inclusion of their union. Membership in the intersection says only that a part belongs to every candidate; it does not include each candidate’s remaining parts. $\square$

Here the robust union is $\{u, v, c\}$ and the intersection is $\{c\}$. Mode alone cannot determine the four anchored counterpart contents. The union result makes an inclusive current realization compatible with internal-carrier ambiguity, provided occurrence, candidate completeness and physical realization have independent warrant. It neither makes every union component constitutive nor identifies the container with the experience-inclusive act. An open-ended exclusive-bearer extension is outside this finite family. The whole-act/CMP argument below, rather than set containment or these label stipulations, supplies the paper’s separately defended constitutive attribution. The portable `check_scoped_carrier.py` enumerates the stated physical tables and candidate supports without treating them as consciousness data.

8.4 Causal exclusion does not fix the first stage

A causal argument has four separate commitments: actual qualitative efficacy toward a nominated physical effect; physical causal completeness for that effect; rejection of two ontologically independent sufficient causes systematically overdetermining it; and an interpretation of the remaining dependence as physical grounding, constitution or identity. The first three motivate pressure against an independently extra cause, but do not themselves prove the fourth or reduce qualitative property types. Causal completeness can support physical constitution while leaving reductive and nonreductive views open (Montero and Papineau, 2016).

Even strict event-token identity does not select an earlier stage. Independently fix input pair (a, b) , $c = (a, b, a \oplus b)$, and the physical chain

$$I \longrightarrow M \longrightarrow J \longrightarrow R \longrightarrow V.$$

At increasing clock times it computes, retains, retrieves and copies the tuple. Each of the first four stages has six controls: keep its incoming value, disable it, or prepare one of the four tuples. The memory therefore needs five values, not a sensory movie. In the early identity interpretation, active I is an early relational presentation and active J is a later presentation. In the delayed identity interpretation, I, M are nonphenomenal for this target and active J is its first presentation. Both identify their actual presentations with existing physically efficacious events, use the same transition functions and admit the same current acquaintance at J when R normally copies it. Serial antecedents are not independent overdetermining apparatuses.

There are $4 \cdot 6^4 = 5184$ controlled episodes, with no output disagreement. First-appearance assignments differ whenever I is active, giving $4 \cdot 5 \cdot 6^3 = 4320$ cases. For each input, J is active in $4 \cdot 36 + 29 = 173$ first-three-control combinations: four explicit active retrieval preparations, plus normal retrieval from an active memory; the latter has $4 \cdot 6 + 5 = 29$ cases. Normal copying by R then gives $4 \cdot 173 = 692$ shared current-knowledge interpretations. These counts verify the stipulated finite rules; they neither certify knowledge nor show that the tuple has qualitative counterparts. The important result is that granting current acquaintance, closure, efficacy, no independent overdetermination and even token identity still leaves earlier occurrence open. A delayed third at J meets the main target.

8.5 A reader model and a typed realization failure

A reported change need not be a quantified latent-appearance change without a reader restriction. For example, report occupancies .65 and .46 can coexist with latent occupancy .65 in both conditions: the first reader is accurate, while the second misclassifies a fraction 19/65 of positive cases and no negative cases. Its output is $.65(1 - 19/65) = .46$. Alternatively, accurate readers can track changed latent occupancies. This is an exact illustrative model, not a fit to participants. Adaptation and neural encoding may share the same physical relation variable under either assignment; their correlation does not supply an independently calibrated indicator error. Proposition 2.4 in Section 2.5 cannot intersect *different* feasible assignment maps.

The analogous realization inference is invalid:

$$P \text{ realizes vehicle } V, \quad Q \text{ constitutes the content/basis of } K \quad \not\Rightarrow \quad P \text{ realizes } Q.$$

For a counterinterpretation, set $V = P$, let $\text{content}(K) = f(V, Q)$, and let independently grounded Q contribute the phenomenal dimension. Vehicle realization and content constitution both hold; a material bearer for Q has not been supplied. A valid stronger premise would say that P realizes the *whole* direct acquaintance token through a defended literal-constituent/mode-preserving relation. Giving its output vehicle the name “quotation” does not establish that premise.

Literal current embedding is nonetheless a substantive alternative. A complex can physically include current sensory submodules, a relation operation and a control frame rather than merely referring to missing targets. Live inclusion and a detached snapshot differ under post-loading native interventions. The proposal that such embedding constitutes conscious display is stronger than representational reference (Coleman, 2015). Its independently specified awareness role is still required; an unconscious controller can contain and use actual

material counterparts. The constitution of phenomenal concepts can explain acquaintance while remaining neutral on physical versus nonphysical qualities (Balog, 2012). A new current counterpart token suffices: demanding the original source token would unnecessarily rule out imagery and reconstruction.

8.6 Possessed reasons, operative expression, and a mixed act

Possessing a reason while acting differs from acting because of it (Davidson, 1963). A person can currently apprehend a colour pair while an independent sensor makes their hand emit the same comparison. Truth and reliable agreement need not show which reason operated. The appropriate expression principle requires a suitable causal or constitutive participation relation when an utterance is explained as based on this particular current acquaintance. It does not require every external truth-maker or epistemic condition independently to move the body.

For an exact common-cause construction, fix physical input $x \in \{0, 1\}$ and instructed motor code $c \in \{0, 1\}$:

$$R = x, \quad V = R \oplus c, \quad \text{decode}(V, c) = x.$$

Separately grant actual qualities q_x , genuine current acquaintance with proposition ψ_x , and a fixed law linking them to x . All four lawful rows have truthful decoded reports; physical input changes preserve safety and sensitivity, and code remapping preserves semantic content. If P is their common source, these agreements do not establish a $Q/K \rightarrow V$ edge. A separate source test can exclude a stale record controller: replace $R = x$ with $R = b$, where b is independently variable, and vary b while independently preserving current q_x . The cached controller can be wrong while the current controller remains correct. The lawful common-cause escort passes the current-source test too.

The strongest rival improves on idle parallel knowledge. Grant a genuine contentful reason R , actual qualitative grounding and appropriate cognitive binding, and define

$$K^* = (Q, R, \text{Grounds}(Q, R)), \quad V = f_c(R). \quad (35)$$

R is both a physical component of P and an operative member of this one grounded act. Q is a literal current qualitative constituent, but the exclusive-bearer interpretation assigns it to $\mathfrak{B}$ and denies that it is a mode of P . Whole-through-part attribution can make K^* operative through R without adding a second sufficient physical cause or making every constituent independently efficacious. This is not arbitrary grafting when the actual grounding and binding are granted; those are substantive premises shared with the competing interpretation. It contains one agent and one comparison.

An independent Q override at fixed R may remove factivity or make the report false, but it cuts the strict law linking them. It is not automatically an available native intervention or a nearby same-basis world. Removing Q can leave a belief's effect intact while changing knowledge to mere belief. Conversely, requiring Q itself to form R adds a causal-basing premise; even that relation can be mediated by a distinct bearer. Thus source-based expression improves act nomination but does not by itself identify the complete physical bearer.

Practical source use. Deliberately selecting present apprehension rather than a remembered answer, knowing competent means and executing that undertaking normally can provide prima facie practical knowledge of the operative reason. This is stronger than merely feeling effective and is defeasible by bypass or confabulation. Ordinary task instructions support

such an attribution less directly than an independently grounded practical claim. More importantly, the mixed act in (35) can genuinely use the selected reason through R . Practical source use identifies the actual activity; the claim that its whole qualitative basis is a mode of the physical execution still needs the constitutive rule developed below.

8.7 Categorical assembly and physical inheritance

Russellian approaches motivate using qualitative or protophenomenal nature as the intrinsic ground of physical structure (Alter and Nagasawa, 2012). This promises explanatory integration beyond an arbitrary correlation, but requires separate steps. Local bases b_i , their natures and couplings L may jointly ground component powers and, through composition, a whole native kernel. Grounding composition gives a plural ground; it does not give one presentation. The mental property whose causal role needs explanation must be distinguished from microphysical grounds (Baysan, 2025).

Fix four native units, all local grounds, couplings and intervention kernels. One extension admits a new relational field for each of the six pairs; another admits those fields plus a whole four-member field. Both can be permutation invariant and share one actual pair anchor. They differ in assembly while agreeing on physical power. If pair fields create fresh counterpart tokens, type symmetry cannot transport the same-token anchor. If they reuse the same tokens, every pair can share some field without one field containing all four, as Section 2.2 showed.

There is a positive conditional repair. Let complete assembly-relevant data have automorphism group G , and let each fixed actual token m_i have exactly one maximal owner $o(m_i)$. Assume pointwise covariance of same-owner relations and an anchored pair. Every pair in its G -orbit has equal owner values. If the resulting orbit graph connects all tokens, equality along paths gives one actual owner containing all of them. The proof uses the actual owner function, not existential pairwise transitivity. Complete categorical/material symmetry, fixed-token identification and unique ownership each need independent warrant; abstract native-kernel symmetry alone supplies none of them.

Even a directly proposed macro Q grounding the whole power need not automatically inhere in P . The relations

$$\text{GroundFor}(Q, D(P)) \quad \text{and} \quad \text{Mode}(Q, P, \tau)$$

are different. A distinct $\mathfrak{B}$ could primitively ground that power while denying qualitative inheritance in P . A definition making categorical bases intrinsic properties of their power bearers would exclude this version, but the inheritance premise would then be explicit. Grounding transitivity alone does not establish it.

8.8 Harmony and qualitative powers

Actual qualitative character fixes success conditions for comparison: judging which counterpart appears larger differs from producing whatever bit a controller emits. Unpleasantness supplies an intelligible reason for relief. This fit calls for an explanation. Its normative direction must still be distinguished from actual basing and from a physical causal power. Harmony arguments must also distinguish one global qualitative law from independently redrawn trial labels (Saad, 2022).

Let G be a global appearance-law parameter and Z a physical controller/genotype. Assume a product prior $\mu(G)\nu(Z)$ and physical-history likelihood $L(h \mid Z)$ independent of G . Then

$$\Pr(G \mid h) = \mu(G)$$

for positive-probability histories, because marginalizing Z supplies the same factor for every G . This does not prevent physical selection increasing harmony within an already aligned world. For two genotypes with fitnesses four and one and initial shares $1/3, 2/3$, the first share after t generations is $4^t/(4^t + 2)$ under either law. Initial law/controller correlation or genuinely phenomenal evidence can change the law posterior; product independence is not a consequence of epiphenomenality alone.

For four independently ordered quality levels and one fixed permutation of four source levels, a single ordered-pair constraint leaves twelve of twenty-four bijections; repeating that noiseless pair leaves twelve, two disjoint ordered pairs leave six, and a spanning adjacent chain leaves one. Equality/difference preserves all twenty-four. The number $1/24$ is a declared uniform-prior calculation, not an objective probability of fortuitous consciousness. A purpose-sensitive controller $a = b \operatorname{sign}(j - i)$, with instruction $b = \pm 1$, can act appropriately under one fixed aligned quality law on every pair and both purposes while its physical arguments remain source and instruction. Flexible normative success alone does not identify Q as its power.

A more direct powers proposal. Felt aversiveness makes relief-directed motivation intelligible from its character, rather than from a learned warning code alone. Experienced trying can nevertheless fail, so an intrinsic-power argument should distinguish a motive toward an attempt from successful movement (Mørch, 2019). Competing goals and independently specified enabling conditions matter. The pain-asymbolia objection must distinguish changed affective character from failed implementation; a shared pain label does not establish identical total phenomenology, and defining the relevant quality by withdrawal would beg the question. Seeking painful stimulation can express an opposing motive; unchanged aversiveness with intact enabling conditions, no opposing motive and no avoidance attempt would instead threaten strict necessitation. These are distinct philosophical tests, not clinical findings established here. A felt urge to settle a comparison can be an operative motivational facet without containing the complete sensory pair. Efficacy of that motive does not transfer to every qualitative constituent of the scene; a genuine power of Q toward mental recognition also need not be a physical-report power. Fallible attribution of agency is a further reason to separate felt effort from its successful physical efficacy.

The stronger affective target makes the counterparts themselves aversive. Synchronized thermal-pair reports support jointly felt pain with connected/disconnected spatial content, including radiation at a neutral source location (Quevedo and Coghill, 2009). Those observations concern spatial appearance, not measured comparative aversive pull or relief priority. Felt badness, felt pressure, reason-giving force and implemented priority should not be defined by one another (Bain, 2019). For a proposed comparative-power test, relief alternatives require independently matched expected efficacy, delay, cost and side effects, understood targets and control capacity; the strongest felt pressure is not defined as whatever wins the motor competition.

An exact physical construction exposes the remaining inference. Set

$$w = (a, dab, b), \quad a, b \in \{0, 1, 2\}, \quad d \in \{0, 1\},$$

and let a fixed selector choose the greatest active weight with a fixed tie rule. The central channel has no source there and has mixed difference one over $a, b \in \{1, 2\}$ when $d = 1$, so it is not a sum of separate source functions. At $a = b = 2$, changing d changes $(2, 0, 2)$ to $(2, 4, 2)$ and makes the central target dominant. Source-only fixed motives need current generation to account for that target. Yet even granting genuine physically efficacious qualitative modes to all active channels, an actual jointly presented field can be assigned either to the whole physical

exercise or to exclusive $\mathfrak{B}$, with the same component powers and selector. A generated source-free motive does not prove whole-field inherence. No such gap-target priority was measured in the thermal study.

If the actual relational Q , *in virtue of its qualitative nature*, exercises the very causal power producing a nominated physical comparison effect, closure/exclusion provides additional placement pressure. Mental-only effects, grounds of another power and efficacy of a whole through one proper physical part do not establish that antecedent. The complete-act route avoids demanding a separate effect from every qualitative constituent.

8.9 Whole-act realization and literal mode preservation

Suppose K^* genuinely guides V through R , Q is its literal current constituent or mode, and the *whole* K^* has complete physical constitution. If the realization preserves those literal parts/modes rather than output-equivalent surrogates, a current physical act bears the actual qualitative basis. No separate $Q \rightarrow V$ edge is required. The difficult premise is complete whole-act constitution; physical sufficiency for V realizes less.

The unrestricted rule “every whole with a physical effect is wholly physical” fails. For any effective physical R , a fusion $R + \mathfrak{B}$ can inherit its effect while retaining a distinct constituent. The strongest mixed knowledge act makes $\mathfrak{B}$ genuinely epistemic, so dismissing it as arbitrary grafting begs the question. Restricting to minimal causal support would instead remove real constituents irrelevant to one tested output, losing the route’s purpose.

Immanent organization improves the nomination. Part roles belong to what the organized whole is doing rather than to an observer’s inventory: an input is this activity’s source, a state its reason, and a movement its uptake because of their participation in the maintained exercise. Hylomorphic accounts explicitly treat organization as immanent activity and perceptual engagement as coordinated exercise (Jaworski, 2020). The role description adds participation in the maintained activity to the specification of transitions. An immanently unified hybrid can also have genuine part roles without an external unifier, so a regress against separate unifiers does not establish exhaustive physical constitution.

Three relation types must remain fixed:

$$\begin{aligned} A = P : & \quad \text{token-performance identity,} \\ \text{Constitutes}(M, A) : & \quad \text{constitution, possibly } M \neq A, \\ \text{Mode}(Q, A, \tau) : & \quad \text{literal qualitative mode in a phase.} \end{aligned}$$

From identity, $\text{Mode}(Q, A, \tau)$ entails $\text{Mode}(Q, P, \tau)$ by substitution. Constitution by numerically distinct M does not transfer every predicate to M . Complete physical constitution may make the constituted A a physical bearer, but naming M itself requires performance reidentification or an independently warranted mode-preserving realization relation. Neither identifies instantaneous Q with an entire response window.

8.10 The corrected concrete-performance/mode principle

Process identity and multiple-description event individuation are established philosophical options (Place, 1956; Davidson, 1969). Mere systematic correlation is weaker than identity. Likewise, the stronger economy argument against irreducible psychophysical additions cannot simply be inherited when fundamental qualitative modes are permitted (Smart, 1959). The present principle therefore concerns actual instance placement, not a numerical event-saving proof.

Conservative mode placement. Given an independently established literal mode of a particular actual activity, presumptively assign it to that activity’s positively tracked concrete execution, at a fixed activity/phase grain and with its actual executing contributors included. Revise the attribution when independent evidence or a defended ontology identifies another instantiator, an omitted constitutive contributor, a merely supplied ground or a different activity. Descriptive vocabulary and irreducible property type alone do not establish a numerically different bearer.

The rule has three admission conditions. First, the mode is an actual way the activity is undergone or constituted, rather than only an external truth making a result correct. Second, the nominee is tracked through actor, source use, operations, uptake and participation history rather than output agreement. Third, the nomination respects known execution/phase counterexamples. These are grounds for a defeasible identity conclusion. “Complete experience-inclusive execution” must not be inserted into the physical premise.

Its positive warrant is continuity of a tracked instance across descriptions. A concrete property is a way an independently identified activity is; introducing a new property vocabulary need not introduce another performance. Positive execution paths distinguish this locus from its indicator, supplier or copy. At the same time, literal modes must not be transferred to every containing system. Consider the following corrections:

1. A client’s input/output history does not execute remote multiplication. If multiplication is delegated, the remote processor belongs to the calculation; if it merely supplies an operand, it need not be part of a subsequent local calculation.
2. A local signature can be the signing execution while protocol authorization additionally requires an actual remote verifier/ledger operation. Abstract validity rules are not automatically concrete parts; an actual completion operation is different.
3. Biological control does not close the boundary of a prosthetic grasp or instrumental performance. Include the actual jaws/contact or instrument when the selected act requires them.
4. Simultaneous saying and writing the same word can share actor, source, purpose and time while one vocal execution is only a member of the spoken-and-written whole. A continuously tracked single inscription instead supports bodily/intentional reidentification through actual stroke/mark participation.
5. A promise now is not its fulfillment tomorrow. Shared actor and intentional content do not erase the change of temporal grain.
6. A thermometer or copied inscription can track the same value/content without sharing the measured state’s instantiator or original execution. Common ownership and accuracy do not supply token identity.

These cases prevent selecting a desired bearer solely by actor, role or time. They supply constraints on the general rule rather than analogies proving qualitative reduction. In the main application, physically specified native sensory/comparison participation and independently ordinary joint-appearance/activity grounding converge on one current exercise. CMP supports reidentifying that experience-inclusive act with its organized physical engagement at the stated grain. That is the substantive, contestable extension; it is neither observed in a neural measurement nor a restatement that the desired stage appears.

A fair exclusive-bearer alternative. The rival can retain one agent, one well-bound K^* , actual Q , physical R and one simple generic content law. It denies that Q is a mode of the nominated P . It need not add another complete comparator, physical force or separately fitted law for every trial. If the agreed observation laws coincide, their likelihood ratio is one; an independently defended instance principle can still supply a rational preference, but

another fit of shared data cannot supply experimental ontology selection.

A copy or view paired bijectively with each performance token may merely redescribe that token. An ontically distinct qualitative trope u with $\text{Instantiates}(P, u)$ likewise permits P as bearer. The genuine rival adds $\text{Bearer}(\mathfrak{B}, Q)$ and $\neg \text{Mode}(Q, P, \tau)$, or an equivalent nonlifting constitution denial. That substantive placement needs its own individuation/grounding rationale. The immanent account also owes occurrence/content and extension laws; calling its primitive mode free would prejudice the comparison. Raw event or symbol counts depend on the ontology/coding language and do not settle these debts.

The rule can have modest actual warrant without eliminating every coherent rival. Its preference combines independent actual mode, positive role-sensitive execution nomination and a general placement discipline with correction cases. Absence of evidence for $\mathfrak{B}$ alone would be insufficient. An independently supported sensory executor outside the nomination, a bypassed reason, a distinct phase or a defended instantiator ontology can defeat or refine it.

8.11 Ownership, phase, and the broader programme

Identifying the ordinary experiencer with an animal identified through biological criteria can support literal ownership of current appearance (Olson, 2003). It does not establish which current organized event constitutes that appearance. A sole thinking-subsystem account can avoid duplicate subjects too. Moreover, strict current subject–animal identity has diachronic implications when the animal persists. The existing A3 perspective-continuation account treats a genuine qualification gap as ending a numerical experiential subject episode while biological/person continuity may remain (Rodgers, 2026e). These are different identity types. A subject-role or episodic-viewpoint claim is weaker than strict animal identity and must be named accordingly. Current CMP adopts neither a universal animalist persistence rule nor an equivalence with A3.

World involvement is also open at the correct grain. An external object need not itself perform the native comparison to be a constituent of the perceptual activity. Actual input, coupling and context should be explicit; the conclusion is not internal-only supervenience. Conversely, material source locations and represented locations are not the bearer. Direct cortical and neutral-site pain appearances constrain source-location shortcuts without fixing a unique current field.

The scaffold insight has a legitimate narrower role. Retained results can change future relevance, selection and interpretation; directed reconciliation of an actionable represented discrepancy differs from the mere existence of a physical difference. Thought produces a constrained representation rather than the source itself, and a successful local reconciliation can introduce new differences. This recursive development does not imply that every discrepancy controller has subjective will, that two communicating agents share one field, or that operational information is already qualitative (Rodgers, 2026c,a). It situates the present act within development while preserving the independently required occurrence/constitution distinction.

8.12 How the current connection differs from the conditional routes

The main inference separates occurrence projection from constitutive placement. Within the narrow physically nominated human regime, ordinary sensory experience, source-directed comparative practice and material continuity support projecting another current presentation. Prior task participation and sensory matching do not themselves provide dedicated measurements of jointness or basing. Present Q , seeing, current acquaintance and answer correctness are not eligibility predicates. The projected target is tethered to source-directed inspection/comparison, not just Q somewhere in a task window. Biological/operational con-

tinuity and current participation are partly ordinary inferences, not complete neural measurements.

CMP then supports the actual activity’s reidentification and literal mode placement. It does not create the occurrence predicted by the first rule. A current-Q interpretation may subsequently support the prediction, but cannot retroactively select the eligible class. An eligible mistaken answer can coexist with joint appearance; a credible field-free eligible case counts against projection.

The three strongest objections therefore have different targets. A serial-only sequence with only a relation proposition challenges jointness. A passive current field accompanying an independently automated answer challenges the activity tether and nomination of the answer-producing operation; split or narrow the activities instead of widening a containing time-window. An exclusive- $\mathfrak{B}$ hybrid can grant jointness and tether while challenging CMP. A delayed account that first presents both counterparts and their relation at current uptake J satisfies the target and need not be defeated. Keeping these alternatives separate yields a positive current-act connection without asserting first sensory onset, universal machine admission, exact anatomy or reduction of qualitative types.

9 Presented form, content signatures and current sensory basing

The current-act argument distinguishes what is presented, how its content is constrained, and what makes that presentation the basis of a particular act. Three developments sharpen those distinctions. A presented spatial form can supply the minimum relational target without two external objects. A finite symmetry calculation identifies exactly which additional distinctions a specified content law would need. Finally, current sensory basing can be defended without first identifying a physical content vehicle as the appearance’s bearer. These contributions have different kinds of warrant: phenomenological and constitutive argument, a conditional mathematical theorem, and a defeasible epistemic principle, respectively. None replaces the positive performance-identification argument in Module 8.

9.1 Relational aspects of one presented form

The minimum target requires qualitative counterparts and their relation together in an actual presentation. It does not require two independently existing objects, two original subjects, two input channels, or an overt comparison answer. One visibly extended patch can already have differently situated aspects; a visibly bent contour can have differently directed arms. Those aspects need not be numerically separate experiences or ontological parts of the bearer.

Principle 9.1 (Finite spatial aspects). If a current presentation genuinely has spatially extended or differentiated qualitative character, with sufficient presented resolution for at least two apparent localities or directions, then their spatial arrangement is an aspect of that presentation’s character.

The support for this principle is the distinction between presenting extent and merely signifying it. A nonspatial signal can mean “extended”, support a shape name, or control an accurate drawing. Those achievements do not make the signal itself visibly extended. What distinguishes the proposed antecedent is an apparent spatial organisation, rather than a label that refers to an organisation elsewhere. At the stated finite grain, differently located or directed features and their arrangement belong to how this one form appears. This is

an account of presented character, not an inference from the geometry of a stimulus or an encoding.

The presented-resolution restriction does real work. An unresolved point, an undifferentiated shape-associated quality, or a sequence of separately experienced positions followed by an inferred shape need not satisfy it. Accurate recognition alone does not establish resolved aspects. A critic can also deny that apparent form has the proposed aspect structure; behavioral success does not decide that phenomenological disagreement. The principle does not infer a phenomenal token for every mathematical point, an infinite-resolution continuum, or the simultaneous appearance of every detail later accessible by shifting attention.

Once the principle is accepted for an independently warranted form token a , the target extraction is elementary. Let

$$W = (a, F, i, j, q_i, q_j, r_{ij})$$

record its actual form character F , two genuinely given aspects q_i, q_j and their given arrangement r_{ij} . Then

$$W \mapsto (a; q_i, q_j, r_{ij})$$

retains a witness to minimum relational appearance in the very same presentation. No inference combines separately anchored experiences into a new common field. This record already contains the relevant aspects; the projection is a certificate of their common witness, not a reconstruction algorithm that discovers jointness. The argumentative advance is the spatial-aspect justification for obtaining that witness from a form anchor.

This removes an *evidential requirement* for a two-object comparison answer. It does not establish that comparison, attention, drawing or covert inspection can be physically abolished while the same appearance survives. That causal preservation claim would require further evidence. A new form first constructed at current uptake J can supply the witness: earlier sensory tokens need neither persist nor fuse. The spatial content also does not require a spatially congruent physical bearer. An exclusive qualitative bearer $\mathfrak{B}$ could instantiate precisely this form. Aspect structure therefore clarifies jointness while leaving the distinct bearer argument intact.

9.2 The exact covariance contract for a content law

Let a finite group G act on a set X of physical descriptions and a set C of candidate complete contents. Write gx and gc for the actions. An anchor supplies a particular $x \in X$ and $c \in C$. In a phenomenal application, the warrant that c actually occurs, its subject, its phase and its relation to an activity must be supplied independently. Merely writing c beside x supplies no such warrant.

A deterministic law F is *equivariant* on the physical orbit Gx when

$$F(gy) = gF(y) \quad (g \in G, y \in Gx).$$

The action has two importantly different interpretations. Under a passive change of coordinates, it redescribes one token; covariance is consistency between descriptions once token identity and the content chart are fixed. Under active replacement, permutation of components, or transition to another token, covariance is a substantive transport premise. An isomorphism of controlled physical kernels does not independently establish transport of actual experience. Only compositions of the specified G -actions are covered here. An additional intervention outside that family requires a new compatibility check.

For x and c , define their stabilizers

$$H = \text{Stab}_G(x), \quad G_c = \text{Stab}_G(c).$$

Thus H consists of the transformations that leave the nominated physical description unchanged. The relevant obstruction is a member of H that changes the *particular anchored content*; physical symmetry by itself is not an obstruction to every content law.

Theorem 9.2 (Anchored orbit law). *An equivariant map $F : Gx \rightarrow C$ with $F(x) = c$ exists if and only if $H \subseteq G_c$. When it exists, it is uniquely determined on Gx by*

$$F(gx) = gc.$$

Proof. If $h \in H$, equivariance gives $hc = F(hx) = F(x) = c$, proving necessity. Conversely, $gx = g'x$ implies $g'^{-1}g \in H \subseteq G_c$, so $gc = g'c$. The formula is well defined. Associativity proves equivariance, and the anchor and equivariance determine every orbit value. No assertion follows about a different physical orbit. $\square$

This elementary group-action result is useful because it makes a proposed content law answerable to a precise contract. It does not assume that equal observable likelihoods decide phenomenal identity, and it supplies neither the anchor nor the active transport premise.

9.3 An attained minimum content signature

Suppose the physical description omits distinctions needed for the anchored target. At the fixed base x , add a finite signature z with an H -action and an H -equivariant recovery map taking z to c . Put

$$K = \text{Stab}_H(c) = H \cap G_c.$$

Theorem 9.3 (Target-specific signature). *Every such signature satisfies*

$$\text{Stab}_H(z) \subseteq K, \quad |Hz| \geq [H : K] = |Hc|.$$

The bound is attained by H/K . A compatible augmentation over the entire physical orbit is

$$G/K \longrightarrow G/H, \quad gK \longmapsto gH,$$

with recovery $gK \mapsto gc$. Each physical base has exactly $[H : K]$ signature values.

Proof. A transformation fixing z must fix its recovered value c , giving the stabilizer inclusion. Orbit–stabilizer then gives the inequality. On H/K , the map $hK \mapsto hc$ is well defined and equivariant, and attains the bound. Since $K \subseteq H$, the displayed map from G/K to G/H is well defined; since $K \subseteq G_c$, so is recovery. Left multiplication commutes with both maps. The fibre above gH is $\{ghK : h \in H\}$ and has $[H : K]$ members. Neither subgroup needs to be normal: these are coset sets with group actions, not quotient groups. $\square$

The count concerns distinguishable admissible signature states. It is not a count of neurons, material parts or measured memory bits. A fixed-width binary code would need at least $\lceil \log_2 [H : K] \rceil$ bits, but actual geometry, history, boundary conditions or existing omitted variables might already supply the distinctions. The abstract construction does not show that a particular device can physically realize all its signature states. A proposed law that instead uses additional nonphysical inputs owes an account of those inputs; the theorem does not rule it out by definition.

If the target is coarsened by an equivariant map $\rho : C \rightarrow T$, use $t = \rho(c)$. Every transformation fixing c fixes t , so $K \subseteq K_t = H \cap \text{Stab}_G(t)$. Consequently

$$[H : K_t] \leq [H : K].$$

Recovery of the coarser target can require fewer distinctions than recovery of complete content. It retains the group action, the anchor and the appropriate coset signature, rather than reconstructing a physical microstate or a finer phenomenal description.

Four interchangeable labels. Consider an abstract physical base fixed by all permutations of four labels, so $G = H = S_4$. Candidate contents are labeled relations on those four individuals. These are mathematical candidates, not claims that a four-port machine has experience.

Target	$ K $	$[H : K]$
Strict line betweenness, unchanged by reversal	2	12
Unoriented four-cycle adjacency	8	3
Equal-distance complete four-point relation	24	1
Field occurrence alone, without geometry	24	1

A strict order has 24 labelings, but reversing it preserves betweenness; there are $24/2 = 12$ distinct betweenness relations. A four-cycle has four rotations and four reflections, leaving $24/8 = 3$ adjacency relations. The complete equal-distance relation is unchanged by every permutation. Thus a line target needs twelve residual distinctions under this contract, whereas the square target needs three. Insisting on a complete oriented order would retain distinctions unnecessary for betweenness.

The invariant last row prevents a mistaken occurrence inference. Both the constant-present law and the constant-absent law are equivariant. A symmetry calculation therefore selects neither. An actual anchor together with independently warranted active transport would constrain occurrence on that transport orbit; the group calculation does not supply those premises. Nor does a signature's physical carrier automatically become the bearer of the recovered appearance.

A nontrivial physical orbit. For a separate check, let S_3 act on the unordered physical pair $x = \{0, 1\}$, while the anchored target is the ordered pair $c = (0, 1)$. Here $|H| = 2$ and K is trivial. There are three physical bases, six augmented ordered pairs, and two signature values above each base. Coarsening back to the unordered pair needs one. This example checks the construction when the physical base itself changes, rather than only at an S_4 -fixed base.

9.4 Stochastic content and limited observations

A stochastic equivariant law at an H -fixed base has an H -invariant distribution. On a finite transitive content orbit Hc of size m , every member has equal probability, conditional on that orbit. This follows because any two orbit members are related by an H -action, which preserves their probabilities. The conditional entropy is $\log_2 m$. Different orbits may receive different total masses; uniformity across them does not follow. An intrinsically stochastic law can therefore have asymmetric realized outcomes without choosing a fixed preferred orientation. A deterministic description of the realized outcome would have to include its distinguishing draw, context or history.

For an unaugmented deterministic choice c at an H -fixed base, covariance holds for exactly $|K|$ of the $|H|$ transformations. Its mismatch fraction under uniform enumeration is therefore $1 - 1/m$. For the line and square examples this is $11/12$ and $2/3$, respectively. These are symmetry-test fractions, not behavioral error rates.

Proposition 9.4 (Limited observation of a uniform content orbit). *Let a random content Q be uniform on an m -member orbit, and let an observation Z take at most k values. For any observation channel and any decoder d ,*

$$\Pr\{d(Z) = Q\} \leq \min(1, k/m), \quad H(Q | Z) \geq \max(0, \log_2 m - \log_2 k).$$

The success bound is attainable.

Proof. The best deterministic decoder has success $\sum_z \max_q \Pr(Q = q, Z = z)$. Each summand is at most $1/m$, and there are at most k summands. Randomized decoding cannot improve this linear objective. For $k \leq m$, partition the contents into k nonempty cells, reveal the cell, and choose one representative per cell: exactly k contents are correctly decoded, giving k/m . For $k \geq m$, reveal the content itself. Finally, mutual information is at most $H(Z) \leq \log_2 k$, so $H(Q | Z) = \log_2 m - I(Q; Z)$ gives the entropy bound, together with nonnegativity. Attainability of the success bound does not assert that the entropy bound is attained for every m, k . $\square$

Thus a two-valued observation cannot decode a uniform twelve-way line target with success above $1/6$, or a uniform three-way square target above $2/3$. These limits concern the stipulated information architecture. An uncounted analogue variable or history violates its observation-cardinality premise. The proposition does not identify experienced content with a decoded symbol, measure human memory, or select a phenomenal bearer.

9.5 Current basing without physical-port constitution

Current basing asks whether a particular actual relational presentation is the operative sensory basis of a nominated comparison, not merely an appearance accompanying a correct output. Let $B_{\text{cur}}(Q, A)$ express that Q 's relational aspect is such a basis of the current activity A . This differs from identifying A with an independently nominated physical performance P , or making a physical content vehicle a literal constituent of Q . Those latter questions concern constitution and bearer placement.

Four inputs keep the basing inference assessable:

1. An independently credible phenomenal anchor warrants a current Q_J and its presented relational aspect ρ . Source geometry, a relation bit and answer correctness do not supply this alone.
2. Genuine current acquaintance K_J addresses ρ of *this presentation*. An equal-valued memory or another field is not the same source merely because its content agrees.
3. A nominated reason vehicle R receives that comparative content nondeviantly, preserving its source and epistemic role. A start signal from K_J followed by a cached answer is not such conveyance.
4. The nominated activity is the agent's current exercise of that apprehension, with R serving its authored comparative role. Ordinary source-specific practical knowledge, source selection, instruction-dependent retasking and checks for bypasses can support this application. Causal efficacy or acquaintance considered separately does not establish it.

These inputs separate phenomenal evidence, addressed epistemic contact, transmission history and practical use. Their conjunction is not established by defining the symbols. In particular the fourth input retains a substantive current-activity commitment; it cannot be inferred merely from a downstream controller's success.

The proposed transmission warrant is ordinary and defeasible: when an agent genuinely apprehends a present relation, its content is conveyed without source substitution, and the agent knowingly exercises that apprehension in this current comparison, the relation remains an operative qualitative basis of the activity. The positive reason is source-guided execution, rather than accidental agreement between an output and a concurrent field. Failed source selection, misunderstood content, substitution or loss of the current exercise can defeat the

inference. It is neither a theorem about physical bits nor a claim that every truth-maker must efficiently cause the action.

This warrant does not require R to constitute Q . An explicit consistent countercase has one agent, an actual Q_J borne exclusively by $\mathfrak{B}$, genuine K_J , faithful delivery to physical R , and a current psychophysical comparison A that uses this very apprehension. Then $B_{\text{cur}}(Q_J, A)$ can hold even though Q_J is not a mode of R or of physical P . The rival expressly denies the transfer of the qualitative mode to P ; merely assigning the name $\mathfrak{B}$ to a property instance of P would not make it exclusive. Identification of A with P remains the separate CMP argument (Section 8.10). This countercase establishes nonnecessity of port constitution for current basing. It does not show that every complete contract using port constitution is logically stronger than every contract using addressed transmission: their other requirements can differ.

Two substitutions that matter. A cached-answer route lets genuine K_J trigger an action while a different record supplies its comparative value. This defeats faithful comparative conveyance. A different countermodel preserves genuine ancestry:

$$Q_a/K_a \longrightarrow M \longrightarrow Q_b/K_b \longrightarrow R_b \longrightarrow \text{action}.$$

Here M faithfully conveys the relation apprehended in Q_a , but a newly constructed Q_b supplies the action's current sensory basis. Both fields may genuinely occur and agree in content. Content fidelity and causal ancestry do not establish $B_{\text{cur}}(Q_a, A)$. If Q_b first appears at current uptake J , it may itself satisfy the target. The correct repair is to anchor and nominate that current field, not to demand persistence of an earlier one.

9.6 What a selective physical route contrast establishes

A physical contrast can strengthen content-provenance evidence while leaving the epistemic application explicit. Suppose a pre-gate code $r \in \{-1, +1\}$ has been nominated for a relational source. An outgoing gate either transmits r or replaces it by a fair independent bit k . Let ξ include all relevant pre-gate context and retained alternative routes. Conditional on ξ , the output has a stable mean $f_\xi(k)$. Gate assignment must average over the same conditional law of ξ at fixed r ; replacement must be independent of that context; and no gate flag, collateral timing change or feedback may reach the output except through k .

Under precisely this exclusion contract,

$$\mu_{\text{live}} - \mu_{\text{repl}} = r \mathbb{E} \left[\frac{f_\xi(+1) - f_\xi(-1)}{2} \mid r \right]. \quad (36)$$

For each ξ , replacement gives $[f_\xi(+1) + f_\xi(-1)]/2$; subtracting this from $f_\xi(r)$ proves the identity, after averaging over the common context law. Thus a direct-route controller with mean ηk , $0 < \eta < 1$, has contrast ηr . A controller that ignores k and recomputes the same relation from a retained source has zero contrast, despite identical natural outputs. All output probabilities can remain positive.

The identity identifies a signed *physical route contribution*. It requires no reconstruction of the whole context. It does not identify a qualitative source, prove authorship, establish current basing, or label every individual episode in a heterogeneous ensemble. A gate inserted between M and Q_b in the preceding countermodel can affect the action even though Q_a is not its current basis. Conversely, if K_a is already independently warranted as the current comparison's acquaintance, a gate after that uptake tests downstream expression; it does not discover the earlier basing. If the gate precedes field formation, separate anchors in the two arms can support separate ordinary applications, but not transport of one fixed pre-gate field.

The archival comparison in Module 7 contains no such selective outgoing gate. Its initial sensory calibration and appearance-directed instructions support the ordinary current-scene inference at their stated strength; jointness and basing were not measured by dedicated probes. Separating basing from port constitution therefore repairs an unnecessary premise without inventing additional validation. Epistemic ancestry, operative current basis and downstream expression remain distinct, as do ordinary warrant, physical intervention algebra and constitutive bearer attribution.

10 Presented form, empirical tests and the limits of transfer

The distinction between a mode's occurrence and its placement in a physical performance has empirical consequences. Evidence can support an actual visual form without identifying its smallest bearer; a physically well-specified predictor can fail without undermining the testimony on which the form was identified. This section brings those cases together. Its purpose is to establish what the additional evidence contributes to the argument, rather than to count positive studies as independent confirmations of one metaphysical conclusion.

10.1 From an extensive form to a modest native application

The presented-form argument concerns the qualitative organisation of an actual presentation. A sufficiently resolved patch can have differently situated aspects within one apparent extent. A location code, an unresolved point, a remembered shape label and an accurate drawing need not have that organisation. The empirical question is therefore whether the record gives reason to accept the extensive presentation, rather than merely a spatially competent response. The subsequent aspect inference and the concrete-performance/mode principle remain separate steps.

Cortically induced extent. In [Beauchamp et al. \(2020\)](#), phosphene mapping included appearance-directed outline, size and location matching. For the acquired-blind participant 03–281, the single-electrode calibration reports apparent enlargement after brightness saturation. This is positive ordinary evidence for some extensive visual instances: it concerns how the patch appeared, beyond which location or letter was selected. The 120 Hz calibration and the separate 60 Hz current-steering experiment must remain distinct. The latter's ellipses summarise variability in reported location; they do not measure individual phosphene extent or jointness. Neither protocol supplies a dedicated finite-aspect probe or a trialwise jointness rate. The supported inference concerns the calibrated native sensory regime and its extensive instances, rather than every commanded pulse.

This application removes an intact retinal input and an overt two-object comparison as necessary conditions of the minimum target. It does not remove native sensory processing or identify the stimulating electrode with the whole activity. A physically nominated sensory exercise can include a downstream current constructor. A newly formed extensive presentation at uptake J meets the minimum without requiring an earlier image to survive unchanged.

A surface with historical and current suppliers. [van Lier et al. \(2009\)](#) report that, following adaptation to coloured regions around a grey centre, subsequent achromatic outlines determine differently coloured afterimages extending through the outlined area. Their appearance-directed account and centre-colour matching give modest ordinary warrant for an actual filled surface. The illustration of appearance is explanatory, rather than a photograph of a field. Matching alone would not establish spread. The inspected main report leaves the

detailed adjustment-display chronology, gaze history and dedicated extent or basing probes unavailable.

Here a later boundary is a possible supplier of the current form. Its presence defeats an inference that the earlier retained state was already a filled field, but need not defeat the positive interpretation of the later surface. The activity to nominate is the history-sensitive current sensory engagement, including its relevant suppliers and inspection, rather than the old adaptor alone. Acceptance of that sensory interpretation permits the spatial-aspect argument; it does not locate first appearance within either 500 ms outline phase, identify a unique circuit, or supply an independent proof of physical inherence.

An endogenous form during REM sleep. LaBerge et al. (2018) combine physiologically staged REM, prearranged eye-movement signals bracketing a tracking task, and subsequent descriptions of following a perceived dream thumb or nail. The sensory testimony gives modest retrospective warrant for some extensive dream-target instances, although less directly than an explicit enlargement or contour probe. Pursuit geometry alone would not do so. The published sensory descriptions and duration/success criteria select the analysed records; their reported success fraction is not an all-attempt relational-occurrence rate. The supplementary narratives were not recovered for this assessment.

A single actually extensive target can meet the minimum without a second dream object or a simultaneously visible motion path. This revises what the evidence must establish, rather than adding an observation to the study. Its time reference remains retrospective: the physiology nominates a sleep engagement, while testimony attributes the visual form to that engagement. First formation at a current dream-time J is compatible with the inference. Assigning all form only to the waking interview instead challenges the accepted retrospective reference; it does not preserve that reference while merely choosing a later phase. Neither interpretation is settled by eye movements alone.

These examples support separately delimited native applications at ordinary phenomenological strength. They do not silently enlarge the original visual predicate $\mathcal{V}$ to every sleeper, implanted system or artificial implementation. For each, the appearance evidence, sensory-activity tether, physical nomination, time reference and constitutive placement must be assessed in their own right. The strongest exclusive-bearer alternative can grant all three actual forms and their genuine acquaintance while reserving qualitative inherence to $\mathfrak{B}$. The additional applications therefore extend the reach of the defended current-act reasoning without becoming independent experimental proofs of its bearer principle.

10.2 What the basing repair changes in the original archive

Separating current sensory basing from physical-port constitution avoids requiring the empirical archive to settle a metaphysical identity before its comparison can count as appearance-directed. It does not add a missing measurement. In Sections 7.2–7.4, the initial looked-equal staircase, source and annulus variation, and appearance-directed same/different instructions support the ordinary sensory interpretation of the comparison. Joint presentation and the relation’s operative sensory role require the further ordinary current-scene interpretation. Neither was independently measured by a dedicated probe. Agreement between a key and its assigned meaning establishes instructed response semantics and record custody, rather than phenomenal fidelity of an independently isolated transmission channel.

The archive’s prior exposure, retrospective nomination and consistency screening remain as recorded. Trial 2 retains its documented role in nomination history; it supplies no new observation of jointness or basing. Cached-answer and fresh current-uptake alternatives therefore

retain their original force. The positive inference remains defeasible current sensory comparison by uptake, followed by the separately defended placement argument. It has acquired a clearer division of obligations, rather than a stronger empirical calibration.

10.3 A fixed physical/report assay that failed its primary criterion

A retrospective analysis of one deposited no-cue EEG sequence provides a useful test of a more specific physical prediction. The source is OpenNeuro `ds006171`, version 1.0.0, mirrored as NEMAR `on006171` (Melcón et al., 2025). It contains near-threshold visual stimulus annotations, subjective seen/unseen responses and EEG. The analysis retained all 400 physical attempts and the original chronological split of 266 training and 134 test attempts. Its primary present-stimulus cohorts were 239 training and 121 test attempts; 27 and 13 catch attempts remained separately accounted for. The reports label a report endpoint. They are not independently calibrated probabilities of actual appearance.

The fixed neural operator used raw ports A15 and A28, each referenced to raw A1, with their nominal standard-cap locations O1, O2 and Cz. Individual wiring and local cortical-generator identity were not established by these names. For each electronic stimulus marker with zero-based sample index n , it used the 1024 samples in $[n - 1152, n - 128)$ at 1024 Hz: one second of data ending 125 ms before the marker. After mean removal and a symmetric Hann taper, the one-sided periodogram was summed over the fixed 8–14 Hz integer bins. Write its two referenced powers P_L, P_R and put

$$D = \frac{P_R - P_L}{P_R + P_L}, \quad G = \log \left(1 + \frac{P_R + P_L}{1 \mu V^2} \right).$$

Exactly zero bilateral energy uses $D = 0$ with a separate indicator; no row in the actual sequence had zero energy. Common additive voltage cancels before power calculation, but channel-specific artifacts, reference physiology and unequal mixing do not. The statistic is available at the buffer’s closing cut; it is not an instantaneous phase estimate or a phenomenal clock.

The candidate addition was source alignment $K = HD$, where $H = -1$ for a left and $H = +1$ for a right present stimulus. The 21-column baseline dictionary contained an intercept, training-standardised current contrast c and global power g, c^2, g^2, D, D^2, H , orientation, linear trial position, Hc, Hg , the zero-energy indicator, the preceding contrast on each side with availability indicators, and the preceding four present-attempt report means on each side with available counts divided by four. Only histories delivered before the current buffer cut were available. Test histories could advance from preceding test responses; fitted coefficients did not update. This accommodates specified adaptive-history proxies rather than recovering the original complete contrast-assignment law.

Training least squares used the minimum-norm SVD solution with singular values retained above 10^{-12} times the largest. With training design matrix X , let $\beta_0 = X^+Y$, $\gamma = X^+K$, and $v = K - X\gamma$. For nondegenerate v , the added coefficient is $\theta = v^\top Y / (v^\top v)$. The two probabilities before common clipping to $[0, 1]$ are

$$p_0(x) = x\beta_0, \quad p_1(x, k) = x\beta_0 + \theta(k - x\gamma).$$

This is partial regression in a declared finite predictive family. It is not a nonparametric rejection of every global-state or response-criterion account. Bands, ports, sign, window, split and model were fixed before analog-feature inspection. Prior source and outcome exposure nevertheless make this a retrospective computational holdout, not a blinded prospective test.

On the common 121 present test attempts, the primary mean Brier losses were

$$\overline{(p_0 - Y)^2} = 0.2854130516503272, \quad \overline{(p_1 - Y)^2} = 0.29835706393830547.$$

The added-minus-baseline difference was +0.012944012287978259: the neural addition was worse on its declared primary criterion. Secondary seen-positive AUC increased from 0.5398907103825137 to 0.5637978142076503; that does not reverse the primary outcome. Three test probabilities of the added model were clipped, and 30 test contrasts lay outside the training range; both diagnostics were retained without post-score exclusions. A preceding contrast-only isotonic forecast had also failed: Brier 0.3077816495 versus its constant baseline 0.2507254066 on the same 121 present suffix attempts. These are different fitted comparisons and must not exchange their baselines.

The full recording's byte identity, all 400 nominated electronic code entries, fixed prefixes, and the subsequent matrix/prediction/score calculations were checked during the analysis. Separate implementations verified selected direct Fourier calculations and all present design rows and scores. These are computational checks, not independent human review. During preparation of version 1.1, the small released derived table was refitted and the recorded scores were recomputed; complete recording extraction was not rerun. Versions 1.2, 1.3 and 1.4 retain those results without another fit or extraction. The accompanying reproducibility archive supplies the derived table, fixed predictions, portable refit/score and optional raw-prefix checking code, raw-input acquisition instructions and expected hashes.

The failed addition rejects the precise improvement claim tested. It establishes neither absence of seeing nor irrelevance of neural alpha, and it does not undermine the ordinary native current-act argument. One exposed sequence, adaptive contrast, drift, model mis-specification and possible sensory/attention/ criterion alternatives restrict extrapolation. No independent-person count, iid interval, permutation significance or causal effect is inferred. Even an improved score would not, by itself, identify same-field sensory basing, exclude first presentation at J , or select physical inheritance against $\mathfrak{B}$.

10.4 A felt act and its bodily execution

[Desmurget et al. \(2009\)](#) supply a pertinent boundary on inferring execution from experience of acting. In seven awake neurosurgical patients, posterior stimulation could elicit reported urge without observed movement or detected activity in the monitored muscles; stronger stimulation could elicit illusory movement reports. Premotor stimulation could elicit movement without reported awareness of it. Responsive-site selection, different clinical cohorts, limited muscle monitoring and the absence here of the detailed supporting protocol restrict the comparison. It is not an all-trigger randomized double dissociation or a measurement of global phenomenal absence.

A genuine feeling of execution can thus misrepresent whether the nominated bodily movement occurred. This does not make the feeling unreal, remove its physical induction, or show that felt motives never contribute to action. Likewise, movement without reported awareness of that movement does not imply an entirely experience-free subject. What the current-act argument must track is the actual sensory or comparative activity, with its operative connection to any further execution independently warranted. The represented act, its present qualitative character and the peripheral bodily result cannot simply be identified. The study supplies a concrete limit on that transfer, rather than a new relational-minimum instance, mode-preserving intervention or bearer test.

10.5 What the additional evidence warrants

The new empirical integration is selective. Extensive-form testimony supports bounded actual native applications of the aspect argument. A failed fixed predictor and a causal execution dissociation discipline the proposed connections between those appearances and physical records.

Neither positive testimony nor negative prediction is assigned authority over every other inferential step. The resulting position remains positive at the defended grain: actual native sensory performances can be warranted as having current relational modes, and the concrete-performance/mode argument supports their physical attribution. Broader occurrence conditions, fine phase identification, dedicated same-field basing and stronger material constitution retain their separate outstanding obligations.

Reproduction and verification limits

The separate archive `Relational_Awareness_Reproducibility_v1_4.zip` contains scripts, permitted supporting records, comparison outputs and instructions. Eleven checks can run directly: the eight inherited finite checks, the content-signature checker, the reduced neural-table refit/score check, and an added information/error checker for Section 3.5. Only that last, changed checker was newly executed for version 1.2, including from a fresh package extraction. It tests the large error-budget counterexample, clipped Fano range, actual-average-error readers and erasure endpoints. The other ten checks retain their successful version 1.1 execution records; they were not rerun in version 1.2. Versions 1.3 and 1.4 retain all eleven records without another scientific execution. Version 1.4 changes notation and three brief passages; its checks concern affected notation, references, rendered pages and compilation warnings.

Three inherited empirical analyses require separately obtained Crayen or Ebbinghaus data. Optional raw-prefix verification of the neural feature requires the separately acquired recording. Those analyses, the earlier contrast-only forecast and full neural extraction were not rerun in this revision. Their recorded outputs retain the earlier verification scope.

The archive README specifies commands, external acquisition routes, filenames, schemas, available hashes and licence conditions. Synthetic or derived comparison records are not additional independent data. The minimal neural table is derived from the CC0 source deposit and retains that attribution. Third-party raw datasets and papers are not included. The computational package as a whole is therefore not self-contained.

The editable sources for both documents are provided in `Relational_Awareness_LaTeX_Sources_v1_4.zip`. They use relative inputs and one shared BibTeX database and can be built in Overleaf or by a standard local LaTeX/BibTeX workflow. The computational archive is a separate deliverable; empirical input acquisition remains an external dependency.

General theorems rest on their proofs and hypotheses; finite grids corroborate selected cases. The recorded outputs support comparison with reconstructed calculations, while bootstrap intervals remain conditional on the stated sampling and selection procedure. Mode placement and native occurrence projection retain the philosophical and empirical warrant defended in the main paper. Executing a calculation does not supply an additional observation of appearance or independent human review.

References

- Emily Adlam. How Do We Observe Relational Observables? *Journal for General Philosophy of Science*, 57(2):285–309, 2026. doi: 10.1007/s10838-024-09703-7. URL <https://doi.org/10.1007/s10838-024-09703-7>. Published online 28 March 2025.
- Larissa Albantakis, Leonardo Barbosa, Graham Findlay, Matteo Grasso, Andrew M. Haun, William Marshall, William G. P. Mayner, Alireza Zaeemzadeh, Melanie Boly, Bjørn E. Juel, Shuntaro Sasai, Keiko Fujii, Isaac David, Jeremiah Hendren, Jonathan P. Lang, and Giulio

- Tononi. Integrated information theory (IIT) 4.0: Formulating the properties of phenomenal existence in physical terms. *PLOS Computational Biology*, 19(10):e1011465, 2023. doi: 10.1371/journal.pcbi.1011465. URL <https://doi.org/10.1371/journal.pcbi.1011465>.
- Elizabeth S. Allman, Catherine Matias, and John A. Rhodes. Identifiability of parameters in latent structure models with many observed variables. *The Annals of Statistics*, 37(6A): 3099–3132, 2009. doi: 10.1214/09-aos689. URL <https://doi.org/10.1214/09-aos689>.
- Torin Alter and Yujin Nagasawa. What is Russellian Monism? *Journal of Consciousness Studies*, 19(9–10):67–95, 2012. URL https://www.philosophy.prof/_files/ugd/6d4b8e_7d31512f440c46d5983dfca86171195a.pdf.
- David Bain. Why Take Painkillers? *Noûs*, 53(2):462–490, 2019. doi: 10.1111/nous.12228. URL <https://doi.org/10.1111/nous.12228>.
- David Balduzzi and Giulio Tononi. Integrated Information in Discrete Dynamical Systems: Motivation and Theoretical Framework. *PLoS Computational Biology*, 4(6):e1000091, 2008. doi: 10.1371/journal.pcbi.1000091. URL <https://doi.org/10.1371/journal.pcbi.1000091>.
- Katalin Balog. Acquaintance and the mind–body problem. In Simone Gozzano and Christopher S. Hill, editors, *New Perspectives on Type Identity: The Mental and the Physical*, pages 16–42. Cambridge University Press, 2012. doi: 10.1017/cbo9780511687068.002. URL <https://doi.org/10.1017/cbo9780511687068.002>.
- Tim Bayne and David J. Chalmers. What is the unity of consciousness? In Axel Cleeremans, editor, *The Unity of Consciousness: Binding, Integration, and Dissociation*, pages 23–58. Oxford University Press, 2003. doi: 10.1093/acprof:oso/9780198508571.003.0002. URL <https://doi.org/10.1093/acprof:oso/9780198508571.003.0002>.
- Umut Baysan. Does Panpsychism Explain Mental Causation? *Erkenntnis*, 90(6):2437–2453, 2025. doi: 10.1007/s10670-024-00816-5. URL <https://doi.org/10.1007/s10670-024-00816-5>. Published online 5 May 2024.
- Michael S. Beauchamp, Denise Oswalt, Ping Sun, Brett L. Foster, John F. Magnotti, Soroush Niketeghad, Nader Pouratian, William H. Bosking, and Daniel Yoshor. Dynamic Stimulation of Visual Cortex Produces Form Vision in Sighted and Blind Humans. *Cell*, 181(4): 774–783.e5, 2020. doi: 10.1016/j.cell.2020.04.033. URL <https://doi.org/10.1016/j.cell.2020.04.033>.
- William H. Bosking, Denise N. Oswalt, Brett L. Foster, Ping Sun, Michael S. Beauchamp, and Daniel Yoshor. Percepts evoked by multi-electrode stimulation of human visual cortex. *Brain Stimulation*, 15(5):1163–1177, 2022. doi: 10.1016/j.brs.2022.08.007. URL <https://doi.org/10.1016/j.brs.2022.08.007>.
- David J. Chalmers. Absent Qualia, Fading Qualia, Dancing Qualia. In Thomas Metzinger, editor, *Conscious Experience*, pages 309–328. Imprint Academic, 1995. URL <https://consc.net/papers/qualia.html>.
- David J. Chalmers. The Content and Epistemology of Phenomenal Belief. In Quentin Smith and Aleksandar Jokić, editors, *Consciousness: New Philosophical Perspectives*, pages 220–272. Oxford University Press, 2003. doi: 10.1093/oso/9780199241286.003.0009. URL <https://consc.net/papers/belief.html>.
- Sam Coleman. Quotational higher-order thought theory. *Philosophical Studies*, 172(10):2705–2733, 2015. doi: 10.1007/s11098-015-0441-1. URL <https://doi.org/10.1007/s11098-015-0441-1>.

- Max Arwed Crayen, Stefan Treue, and Moein Esghaei. Interactions between the fovea and the periphery shape misbinding of visual features in a continuous report paradigm. *Scientific Reports*, 14(1):28381, 2024. doi: 10.1038/s41598-024-78867-5. URL <https://doi.org/10.1038/s41598-024-78867-5>.
- Donald Davidson. Actions, Reasons, and Causes. *The Journal of Philosophy*, 60(23):685–700, 1963. doi: 10.2307/2023177. URL <https://bibliotecamathom.wordpress.com/wp-content/uploads/2012/09/actions-reasons-and-causes.pdf>.
- Donald Davidson. The Individuation of Events. In Nicholas Rescher, editor, *Essays in Honor of Carl G. Hempel*, pages 216–234. D. Reidel, 1969. doi: 10.1007/978-94-017-1466-2_11. URL https://fitelson.org/125/Davidson_individuation_of_events.pdf.
- Michel Desmurget, Karen T. Reilly, Nathalie Richard, Alexandru Szathmari, Carmine Mottolese, and Angela Sirigu. Movement Intention After Parietal Cortex Stimulation in Humans. *Science*, 324(5928):811–813, 2009. doi: 10.1126/science.1169896. URL <https://doi.org/10.1126/science.1169896>.
- Florian Dörfler and Francesco Bullo. Kron Reduction of Graphs with Applications to Electrical Networks. *IEEE Transactions on Circuits and Systems I: Regular Papers*, 60(1):150–163, 2013. doi: 10.1109/TCSI.2012.2215780. URL <https://motion.me.ucsb.edu/pdf/2011d-db.pdf>.
- William Jaworski. Hylomorphism and the Construct of Consciousness. *Topoi*, 39(5):1125–1139, 2020. doi: 10.1007/s11245-018-9610-0. URL <https://doi.org/10.1007/s11245-018-9610-0>. Published online 1 November 2018.
- Karen R. Konkoly, Kristoffer Appel, Emma Chabani, Anastasia Mangiaruga, Jarrod Gott, Remington Mallett, Bruce Caughran, Sarah Witkowski, Nathan W. Whitmore, Christopher Y. Mazurek, Jonathan B. Berent, Frederik D. Weber, Başak Türker, Smaranda Leu-Semenescu, Jean-Baptiste Maranci, Gordon Pipa, Isabelle Arnulf, Delphine Oudiette, Martin Dresler, and Ken A. Paller. Real-time dialogue between experimenters and dreamers during REM sleep. *Current Biology*, 31(7):1417–1427.e6, 2021. doi: 10.1016/j.cub.2021.01.026. URL <https://doi.org/10.1016/j.cub.2021.01.026>.
- Karen R. Konkoly, Saba Al-Youssef, Christopher Y. Mazurek, Remington Mallett, Daniel J. Morris, Ana Gales, Isabelle Arnulf, Delphine Oudiette, and Ken A. Paller. Using Real-time Reporting to Investigate Visual Experiences in Dreams. *Journal of Cognitive Neuroscience*, 38(2):365–380, 2026. doi: 10.1162/jocn.a.107. URL <https://doi.org/10.1162/jocn.a.107>.
- Stephen LaBerge, Benjamin Baird, and Philip G. Zimbardo. Smooth tracking of visual targets distinguishes lucid REM sleep dreaming and waking perception from imagination. *Nature Communications*, 9(1):3298, 2018. doi: 10.1038/s41467-018-05547-0. URL <https://doi.org/10.1038/s41467-018-05547-0>.
- Zoe Lee-Youngzie, Naotsugu Tsuchiya, Michael Robinson, Donna Dietz, and Martin M. Monti. Towards a Mathematical Structure of Global Phenomenal Consciousness. *Entropy*, 28(6): 615, 2026. doi: 10.3390/e28060615. URL <https://doi.org/10.3390/e28060615>.
- Anuran Makur and Japneet Singh. Doeblin Coefficients and Related Measures. *IEEE Transactions on Information Theory*, 70(7):4667–4692, 2024. doi: 10.1109/TIT.2024.3367856. URL <https://arxiv.org/html/2309.08475v2>.

- María Melcón, Enrique Stern, Lydia Arana, and Almudena Capilla. EEG data during three near-threshold visual detection tasks: a no-cue task, a noninformative cue task (50% validity), and an informative cue task (100% validity). OpenNeuro dataset ds006171, 2025. URL <https://openneuro.org/datasets/ds006171/versions/1.0.0>. Version 1.0.0; DOI: <https://doi.org/10.18112/openneuro.ds006171.v1.0.0>.
- Maëlan Q. Menétrey, Michael H. Herzog, and David Pascucci. Sequential neural dynamics underlie unconscious integration and conscious perception of visual stimuli. *PLOS Biology*, 24(7):e3003894, 2026. doi: 10.1371/journal.pbio.3003894. URL <https://doi.org/10.1371/journal.pbio.3003894>.
- Kate E. Merritt, Ken N. Seergobin, Daniel A. Mendonça, Mary E. Jenkins, Melvyn A. Goodale, and Penny A. MacDonald. Automatic Online Motor Control Is Intact in Parkinson’s Disease With and Without Perceptual Awareness. *eNeuro*, 4(5):ENEURO.0215–17.2017, 2017. doi: 10.1523/eneuro.0215-17.2017. URL <https://doi.org/10.1523/eneuro.0215-17.2017>.
- Barbara Gail Montero and David Papineau. Naturalism and Physicalism. In Kelly James Clark, editor, *The Blackwell Companion to Naturalism*, pages 182–195. Wiley, 2016. doi: 10.1002/9781118657775.ch13. URL https://www.davidpapineau.co.uk/uploads/1/8/5/5/18551740/naturalism_and_physicalism_w_b_montero.pdf.
- Hedda Hassel Mørch. The Argument for Panpsychism from Experience of Causation. In William Seager, editor, *The Routledge Handbook of Panpsychism*, pages 269–284. Routledge, 2019. URL <https://www.routledge.com/The-Routledge-Handbook-of-Panpsychism/Seager/p/book/9781138817135>.
- Eric T. Olson. An Argument for Animalism. In Raymond Martin and John Barresi, editors, *Personal Identity*, pages 318–334. Blackwell, 2003. URL https://eprints.whiterose.ac.uk/id/eprint/734/4/Argument_animalism_fixed.pdf.
- Josef Parvizi, Corentin Jacques, Brett L. Foster, Nathan Withoft, Vinitha Rangarajan, Kevin S. Weiner, and Kalanit Grill-Spector. Electrical Stimulation of Human Fusiform Face-Selective Regions Distorts Face Perception. *The Journal of Neuroscience*, 32(43):14915–14920, 2012. doi: 10.1523/jneurosci.2609-12.2012. URL <https://doi.org/10.1523/jneurosci.2609-12.2012>.
- U. T. Place. Is Consciousness a Brain Process? *British Journal of Psychology*, 47(1):44–50, 1956. doi: 10.1111/j.2044-8295.1956.tb00560.x. URL <https://doi.org/10.1111/j.2044-8295.1956.tb00560.x>.
- Duncan Pritchard. In defence of modest anti-luck epistemology. In Kelly Becker and Tim Black, editors, *The Sensitivity Principle in Epistemology*, pages 173–192. Cambridge University Press, 2012. doi: 10.1017/cbo9780511783630.014. URL <https://doi.org/10.1017/cbo9780511783630.014>.
- Alexandre S. Quevedo and Robert C. Coghill. Filling-In, Spatial Summation, and Radiation of Pain: Evidence for a Neural Population Code in the Nociceptive System. *Journal of Neurophysiology*, 102(6):3544–3553, 2009. doi: 10.1152/jn.91350.2008. URL <https://doi.org/10.1152/jn.91350.2008>.
- Jeremy Rodgers. Bounded Agency and Reflective Freedom: Evaluative Revision, Information Limits, and Faithful Realization. Author-published research preprint, 2026a. URL <https://doi.org/10.5281/zenodo.23202999>. Manuscript version 2.0, 6 October 2026; Zenodo issued 7 October 2026.

- Jeremy Rodgers. Reflective Alignment and AI Consciousness: Awareness, Agency and Recursive Cognitive Scaffolding. Author-published research preprint, 2026b. URL <https://doi.org/10.5281/zenodo.23294465>. Version 2.1, 11 October 2026; preprint.
- Jeremy Rodgers. Relational Development and Conscious Scaffolding: Conceptual Foundations, Strengthened Results, and Research Commitments. Author-published research preprint, 2026c. URL <https://doi.org/10.5281/zenodo.23190711>. Revised preprint, 6 October 2026; Zenodo record version v1.
- Jeremy Rodgers. Experience as Recollective Interpretation: Awareness, Scaffolding and the Question of Machine Experience. Unpublished draft internally dated 12 October 2026; supplied edition, no formal version number or DOI asserted, 2026d.
- Jeremy Rodgers. Shadow Theory and Consciousness: Awareness, Perspectival Realization, and the Source-to-Experience Problem. Author-published research preprint, 2026e. URL <https://doi.org/10.5281/zenodo.22853774>. Version 2, 20 September 2026; monograph preprint.
- Jeremy Rodgers. Identifying Binary Realizations from Intervention Laws: Certificates, Recoding Obstructions, and a Bounded SPC-2/IIT Comparison. Author-published research preprint, 2026h. URL <https://doi.org/10.5281/zenodo.23075828>. Manuscript version 1.1-RC1, 30 September 2026; Zenodo issued 1 October 2026; release candidate, no independent human mathematical review.
- Jeremy Rodgers. Bounded Agency and Reversible Control: Information, Compact Interfaces, and the Limits of Deterministic Refinement. Research monograph draft, 2026i. Version 2.0, 4 October 2026; supplied manuscript, no verified standalone deposit identifier.
- Jeremy Rodgers. Agency and the constructed self. Author-published article, 2026j. URL <https://www.everythingequation.com/articles/agency-and-the-constructed-self>. 6 October 2026; includes recursively closed observer hypothesis; not a separate RCO-only publication.
- Carlo Rovelli. Partial observables. *Physical Review D*, 65(12):124013, 2002. doi: 10.1103/physrevd.65.124013. URL <https://doi.org/10.1103/physrevd.65.124013>.
- Bradford Saad. Harmony in a panpsychist world. *Synthese*, 200(6):497, 2022. doi: 10.1007/s11229-022-03974-7. URL <https://doi.org/10.1007/s11229-022-03974-7>.
- F. Scharnowski, J. Ruter, J. Jolij, F. Hermens, T. Kammer, and M. H. Herzog. Long-lasting modulation of feature integration by transcranial magnetic stimulation. *Journal of Vision*, 9(6):1–10, 2009. doi: 10.1167/9.6.1. URL <https://doi.org/10.1167/9.6.1>.
- J. J. C. Smart. Sensations and Brain Processes. *The Philosophical Review*, 68(2):141–156, 1959. doi: 10.2307/2182164. URL <https://doi.org/10.2307/2182164>.
- Chen Song, Andrew M. Haun, and Giulio Tononi. Plasticity in the Structure of Visual Space. *eNeuro*, 4(3):ENEURO.0080–17.2017, 2017. doi: 10.1523/eneuro.0080-17.2017. URL <https://doi.org/10.1523/eneuro.0080-17.2017>.
- François Stockart, Ramla Msheik, Alexis Robin, Lenka Jurkovičová, Dorian Goueytes, Martin Rouy, Radek Mareček, Dominique Hoffmann, Liad Mudrik, Robert Roman, Milan Brázdil, Lorella Minotti, Philippe Kahane, Michael Pereira, and Nathan Faivre. Cortical evidence accumulation for visual perception occurs irrespective of reports. *Nature Communications*, 16(1):8458, 2025. doi: 10.1038/s41467-025-63255-y. URL <https://doi.org/10.1038/s41467-025-63255-y>.

- Rob van Lier, Mark Vergeer, and Stuart Anstis. Filling-in afterimage colors between the lines. *Current Biology*, 19(8):R323–R324, 2009. doi: 10.1016/j.cub.2009.03.010. URL <https://doi.org/10.1016/j.cub.2009.03.010>.
- Lukas Vogelsang, Maëlan Q. Menétrey, Leila Drissi-Daoudi, and Michael H. Herzog. Investigating the relationship between subjective perception and unconscious feature integration. *Journal of Vision*, 24(12):1, 2024. doi: 10.1167/jov.24.12.1. URL <https://doi.org/10.1167/jov.24.12.1>.
- Robert L. Whitwell, Mehul A. Garach, Melvyn A. Goodale, and Irene Sperandio. Looking at the Ebbinghaus illusion: differences in neurocomputational requirements, not gaze-mediated attention, explain a classic perception-action dissociation. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 378(1869):20210459, 2023. doi: 10.1098/rstb.2021.0459. URL <https://doi.org/10.1098/rstb.2021.0459>. Published online 13 December 2022.