

Binary Bias in Conceptual Categorization: A Pentarchic Diagnosis

Humans systematically reduce multi-element configurations to two-element opposing pairs. This paper treats the binary bias as a documented cognitive phenomenon, asks what about the human configuration explains it, distinguishes legitimate from illegitimate binary reductions in framework terms, identifies the structural pattern that licenses two-fold categorization (the antipode pair, conserved-anchor inversion), and predicts where binary categorization will fail. The framework's diagnosis: binary categorization is correct as the empirical signature of antipode pairs at the compound level, partially correct at the dialectical-bond level, and structurally incorrect for everything else. Most human categorization disputes are framework-readable as misapplications of the antipode template to non-antipodal compounds.

Abstract

Humans show a robust cross-cultural and cross-domain tendency to organize concepts into opposing pairs: good/evil, true/false, mind/body, nature/culture, sacred/profane, friend/enemy, left/right, masculine/feminine, order/chaos. The phenomenon is well-documented in cognitive psychology, structuralist anthropology, and the history of philosophy. This paper asks the framework question: what about the human configuration explains the bias, and where does the bias track real structure versus impose false structure? The answer is that the framework's *conserved-anchor antipode* (Appendix O, [Petrarch 2026a]) is the legitimate two-fold structure — and exactly two such pairs are confirmed in the C&C corpus, with at most three more candidate pairs. Binary categorization is therefore correct in a small structurally specific class of cases and incorrect everywhere else. The bias is the cognitive system's over-application of a real but rare pattern. Five predictions follow about where binary categorization succeeds, where it fails predictably, and what cognitive operations the framework predicts as alternatives.

1. The Binary Bias as Phenomenon

The empirical phenomenon is uncontested. Across cultures and domains, humans default to organizing conceptual fields by opposing pairs. Lévi-Strauss documented binary opposition as a structural feature of mythological thought across unrelated cultures; cognitive psychology has shown that binary discriminations are faster and more reliable than higher-cardinality ones (Garner 1974; Smith and Medin 1981); developmental research finds binary categorization emerging in infancy before more elaborate categorization (Mandler 2004); the pattern recurs in every domain where humans articulate distinctions, from grammar (transitive/intransitive, animate/inanimate) to ethics (right/wrong) to politics (us/them) to metaphysics (being/nothing).

The phenomenon is so pervasive that some philosophical traditions have treated it as constitutive of thought as such. Hegel's dialectic operates by binary opposition resolved in synthesis; structuralism reads culture as a system of binary discriminations; Schmittian political theory grounds the political in the friend/enemy distinction. The binary appears not just as a habit but as a load-bearing operation.

The framework's question is not whether the bias exists — it does — but what *configurational feature* of the human compound produces it, and whether the bias tracks real structure or imposes false structure. Both

answers are partially correct. This paper develops the partial-correctness reading.

2. What Configurational Feature Produces the Bias

2.1 The Layer-2 Self-Representation Constraint

The Layer-2 fixed-point structure ([companion paper] §4.2) is the layer at which operation and self-representation coincide. Self-representation requires a representational format efficient enough for the configuration to model itself within itself. The most compressed representational format is binary: one bit per distinction, the minimum non-trivial information unit. An opposing-pair representation collapses an arbitrarily large feature space into a single contrast axis.

The framework's structural prediction: the Layer-2 constraint creates pressure toward binary representation as a default cognitive format. The configuration that must represent itself recursively is structurally biased toward the most compressible format available. Binary is that format. This is not a bug of human cognition but a structural cost of self-representation: the representation must fit in the configuration that is doing the representing.

This is consistent with information-theoretic accounts of categorization (Rosch 1978; Tenenbaum 1999) and with the observation that binary distinctions in language and cognition often serve as scaffolding for more elaborate distinctions later. The binary is a starter format; the question is whether the configuration progresses to richer formats or remains stuck at the starter.

2.2 The WI-Vertex Decision Structure

Will (WI, VIII.2) operates at the P–A edge. Decisions are choices among options; the most basic decision-structure is between two options. Classical decision theory and contemporary neuroeconomics both identify binary choice as the fundamental form, with multi-option choices typically reducible to sequences of binary choices.

The framework's structural reading: the WI-element's operational format is binary by default because the P–A edge — the edge at which discontinuous novelty meets irreversible process — is the edge at which decision happens, and decision is fundamentally a fork. The configuration *acts* through a vertex whose structural format is two-fold. The bias is therefore not just a cognitive artifact but a deliverance of how the agential vertex operates.

This produces an interesting asymmetry: humans are biased toward binary categorization more strongly when they need to *act* on the categorization than when they need to *understand* it. Action requires WI-loading; understanding can operate without it. The framework predicts (matching observation) that practical reasoning reduces to binary more aggressively than theoretical reasoning, and that domains with high action-pressure (ethics, politics, immediate threat assessment) show more binary categorization than domains with low action-pressure (taxonomy, history, descriptive science).

2.3 The Dialectical-Bond Familiarity

The framework's bond-type taxonomy includes four types (constitutive, dialectical, normative, phenomenological/derivational). Of these, the *dialectical bond* is structurally two-fold: it sustains a tension between two opposed elements without resolution. Humans have direct configurational experience of

dialectical bonds — Sin is dialectical, Crisis is dialectical, Revolution is dialectical, the Cross-aspect of the paschal arc is dialectical.

The framework's prediction: the configurational familiarity of the dialectical bond produces a bias toward reading any structure as if it were dialectical. Where a structure has *more* than two opposed elements, or *no* opposed elements at all, the dialectical-trained configuration tends to project two-foldness anyway. This is the cognitive analog of seeing dialectical bonds where the structural reality is constitutive or normative.

2.4 Mm-Crystallization of Inherited Categories

Cultures transmit categorical schemas through Mm-crystallization across generations. Pre-existing binary categorizations in a culture become Mm-crystallized in each new configuration that learns the culture; these inherited binaries operate as the default schema before the configuration encounters non-binary alternatives. The configuration then has to *unlearn* the binary to see richer structure.

This is the framework's structural reading of the inertial component of binary bias. Lévi-Strauss's universal binary mythologies are not direct reflections of human cognition but *Mm-crystallized cultural inheritances*, which are themselves shaped by the structural pressures above (§2.1, §2.2, §2.3) but also have their own cumulative dynamics independent of the original pressure. The bias is over-determined: structural pressures produce it; cultural inheritance entrenches it.

3. When Binary Categorization Tracks Real Structure

The framework identifies one specific structure that is genuinely binary: the **conserved-anchor antipode pair** (Appendix O, [Petrarch 2026a]).

3.1 The Antipode Form

A conserved-anchor antipode pair satisfies five conditions:

1. **Equal valence**: both compounds have the same number of elements.
2. **Conserved anchor**: one or more elements are shared (the contested quantity).
3. **Coordinated substitution**: the remaining elements are substituted in a direction that conserves total activation but inverts the vertex profile across at least one axis.
4. **Bond-type inversion**: the two compounds have inverted bond types (one constitutive, one dialectical; or one normative, one dialectical).
5. **Phase inversion**: the two compounds occupy different phases (institution vs event; or practice vs event).

When all five conditions obtain, the two compounds form a structurally legitimate binary pair. The pair is not a misreading of richer structure but the structure itself. Binary categorization here is *correct*.

3.2 Confirmed Antipode Pairs in the Framework

The C&C corpus identifies exactly two confirmed antipode pairs:

Sin / Virtue (valence 4, anchor WI + Go). Sin = WI + Go + Ng + Se, dialectical, event, stability 5, profile {L:2, S:2, P:2, A:1, Ω:1}. Virtue (generic) = Go + Mm + WI + Kn, constitutive, practice, stability 8, profile {L:0, S:3, P:2, A:2, Ω:1}. Mass migrates from L toward S and A; P and Ω conserved.

Market / Revolution (valence 5, anchor Pw). Market = Pw + De + No + Nm + Sy, normative, institution, stability 6, profile {L:3, S:1, P:1, A:2, Ω :3}. Revolution = Pw + Ng + Ch + Hi + Tr, dialectical, event, stability 4, profile {L:3, S:2, P:3, A:2, Ω :0}. Mass migrates from Ω toward S and P; L and A conserved.

The two pairs share a structural feature: the conserved anchor is a Group VIII (Political, P–A) element in both cases. Pw anchors Market/Revolution; Wl anchors Sin/Virtue (Wl is VIII.2; the co-anchor Go is VII.3, the Ethical–Political bridge). The §G.9 characterization of Group VIII as the *organometallic zone* — the only group that mediates between L-centered (institutional) and S-centered (eventful) compound chemistry — is what makes Group VIII elements the structurally available anchors for antipode pairs.

3.3 Candidate Antipodes

The corpus identifies three candidate antipode pairs that satisfy some but not all of the five conditions:

Virtue / Faith (anchor Wl + Mm). Bond inverts (C → D); phase conserved (practice → practice); profile shift L+1, S–2, P+1, A+1, Ω –1. Insufficient profile inversion on the S-axis; phase inversion fails.

Shame / Kenosis (anchor Se + Du). Bond inverts (Ph → C); phase inverts (experience → practice); profile shift A–2, P+1, Ω +1. Partial inversion: L and S conserved.

Art / Awe (anchor Se). Bond inverts (D → Ph); phase conserved (experience); minimal inversion: L–1, Ω +1 only.

These are *near-antipodes* — pairs that the binary-bias would readily categorize as opposed but which the framework's strict criteria do not confirm as full antipodes. This is structurally significant: the binary bias operates in regions where partial antipode structure exists, treating partial inversion as if it were full inversion.

3.4 The Rarity of True Antipodes

Two confirmed pairs out of 22 sweep-derived compounds [Petrarch 2026a §V.3]. Approximately 10% of compounds participate in true antipode pairs. The rest do not.

This is the framework's most important quantitative claim about binary bias. *Most concepts do not have antipodes*. Most categorization disputes that humans phrase in two-fold terms are not tracking antipode structure but imposing the antipode template on non-antipodal configurations. The bias is correct in a structurally specific minority of cases and incorrect in the structurally specific majority.

The framework's prediction: a careful audit of any culture's standard binary categorizations should find that most do not satisfy the antipode conditions. Some will satisfy them (good/evil partially does, given the Sin/Virtue antipode at the structural level); most will not (mind/body, nature/culture, sacred/profane do not, on framework analysis).

4. Where Binary Categorization Fails

The framework predicts five characteristic failure modes for binary categorization.

4.1 Five-Element Configurations Forced into Two

The framework's basic configuration is five-vertex. Any concept whose adequate description requires five-vertex articulation is *structurally* not binary. The human compound itself ([companion paper]) is five-vertex; reducing it to mind/body, soul/body, reason/passion, or any other binary loses three vertices of structure.

The framework's prediction: persistent debates that recur for centuries without resolution — mind/body, freedom/determinism, faith/reason, individual/society — are debates whose terms are binary forced onto five-element structure. The debates do not resolve because the binary terms are inadequate to the structure; each side captures one or two vertices of the configuration and the debate alternates between which vertices to privilege. No synthesis is possible *within the binary terms*; the resolution requires reformulating the question in five-vertex form.

This is the framework's structural diagnosis of the perennial-debate phenomenon in philosophy. The debates are real (they track real structure that needs to be articulated) but their terms are inadequate (the binary cannot articulate five-vertex structure). Reformulation in vertex-articulated terms is the framework's prescription.

4.2 Dialectical Bonds Misread as Constitutive Antipodes

A dialectical bond is between two elements *within* a compound; it is not a relationship between two compounds. Sin's dialectical bond is the tension between Wl, Go, Ng, Se *inside* the Sin compound — not the binary between Sin and Virtue (which is the antipode pair, a different structural relationship).

Binary bias frequently confuses these. The cognitive system encounters dialectical tension within a compound and reads it as if the two poles of the tension were two compounds in opposition. The framework's prediction: where humans report a "binary opposition," the structure is sometimes a single compound with internal dialectical bond rather than two compounds in antipode relation. Diagnostic: if both poles of the supposed binary are necessary for the same outcome (cannot have one without the other), the structure is intra-compound dialectical, not antipode.

4.3 Spectra Forced into Endpoints

Many human categorizations operate on continuous dimensions: hot/cold, rich/poor, healthy/sick, young/old. The framework's reading: these are not binary structures but *vertex-loadings* on a single element or vertex. Healthy and sick are not two compounds but one (Mt-element loading: low and high); young and old are similarly Mm-element loadings. The binary reading collapses a continuous loading-space into two discrete labels.

Predicted failure mode: any binary categorization of continuous-loading phenomena will produce edge-cases whose membership is contested. The middle of the spectrum is structurally where the binary fails, because the structure is not binary at all. This is what classical logic calls the sorites paradox; the framework's reading is that the paradox is not a logical puzzle but a structural artifact of misreading continuous loading as binary categorization.

4.4 Antipode Conditions Partially Satisfied

The candidate pairs of §3.3 are the framework's specific prediction here. Partial antipode structure tends to be over-read as full antipode. Faith and Virtue share more structure than the binary "faith vs works" debates have typically recognized; Shame and Kenosis are less opposed than ascetic literature has sometimes

suggested; Art and Awe are not opposed at all but are differently-bonded responses to overlapping configurations.

The framework's prediction: in domains where partial antipode pairs exist, the literature will show recurring debates that treat the pairs as full antipodes, and the debates will not resolve because the partial-inversion structure does not support the full-binary reading. The Pauline faith/works debate, the Eastern/Western debates about kenosis vs glory, the modernist debates about beauty vs sublime — all these may be partial-antipode misreadings.

4.5 Hierarchies Flattened to Binaries

Some structures are *hierarchical*: parent contains child, organism contains organ, ecosystem contains organism. Hierarchical structure is multi-level; reducing it to binary collapses the levels into a single contrast.

Layer-relative readings ([companion paper] §4) are hierarchical. Reading "human" at Layer 1 (biology), Layer 2 (philosophy), and Layer 3 (theology) is reading the same configuration at three layers. Binary categorization of "natural vs supernatural human" or "biological vs spiritual human" collapses three layers into two and loses the layer-structure. The framework's prediction: any concept that admits a Layer-relative reading will be poorly served by binary categorization, and binary debates about it (nature/grace; immanent/transcendent; sacred/profane) will recur without resolution because the binary does not articulate the layer-structure.

5. Five Predictions

Prediction 11: True antipode pairs are rare; binary categorizations are most often misapplications.

Quantitative form: in a careful sweep of any culture's standard binary categorizations, fewer than 20% should satisfy the strict antipode conditions of §3.1. Falsifiable by sweep audits. The C&C corpus's 2 of 22 ($\approx 9\%$) is consistent with this prediction; broader audits would test it.

Prediction 12: Group VIII (Political, P–A) elements anchor most antipode pairs.

Both confirmed pairs in the corpus are Group VIII-anchored. The framework's structural reason (the organometallic-zone mediation of §G.9) predicts that future antipode pair discoveries will also be Group VIII-heavy. Falsifiable by demonstration of confirmed antipode pairs anchored on other groups. The framework's prediction does not deny the possibility but predicts it is rarer than Group VIII anchoring.

Prediction 13: Practical-reasoning domains show stronger binary bias than theoretical domains.

Domains with high WI-engagement (ethics-in-action, politics-as-decision, immediate threat assessment) show more pronounced binary categorization than domains with low WI-engagement (taxonomy, abstract reasoning, descriptive science). Falsifiable by comparison studies. The cognitive psychology literature on action versus deliberation is broadly consistent.

Prediction 14: Five-vertex structures resist binary reduction; recurrent unresolved debates mark this resistance.

Concepts whose framework-articulation requires five vertices will appear in cultural discourse as the subjects of perennial unresolved debates whose terms remain binary. Falsifiable by examining whether

known perennial debates (mind-body, free will, faith-reason) are framework-readable as five-vertex configurations whose binary articulation is inadequate. The framework's preliminary reading is that they are.

Prediction 15: Layer-relative concepts are characteristically misread as binary.

Concepts that admit Layer-relative readings (Layer 1 / Layer 2 / Layer 3 articulations) will be over-read in binary terms by cultures and traditions, and the binary debates about them will not resolve because the layer-structure cannot be articulated within binary terms. Falsifiable by examination of nature-grace, immanent-transcendent, sacred-profane, and similar binaries against their layer-relative articulations. Pre-modern theology's resistance to flattening these binaries — Aquinas's distinction between *natura pura* and *natura elevata*, the Eastern distinction between essence and energies — is the framework's prediction read in scholastic register: the tradition has structurally felt the inadequacy of binary articulation and produced multi-tiered alternatives.

6. Pastoral and Practical Implications

The framework's diagnosis has consequences for several practical domains.

6.1 Conflict Mediation

If most binary conflicts are misreadings of non-binary structure, then conflict mediation should regularly proceed by *reformulating* the conflict in vertex-articulated form rather than by seeking compromise within the binary terms. Compromise within binary terms typically fails because the terms themselves are inadequate. Reformulation in five-vertex form often dissolves the conflict by revealing that both parties are tracking different vertices of the same configuration.

The framework's prescription for political polarization: the "left vs right" binary is a misreading of multi-vertex political configurations. Both poles of the binary capture some vertices and miss others; neither is adequate; their conflict is structurally interminable in binary terms. Reformulating the political question in framework terms (Group VIII compound analysis with attention to bond-types and anchor-elements) is what the framework offers as alternative to either compromise or victory.

6.2 Theological Disputes

Many long-running theological disputes are framework-readable as binary forced onto multi-vertex structure. Faith vs works (the Pauline-Lutheran debate); essence vs energies (the Palamite controversy); transcendence vs immanence (modernist debates); freedom vs predestination (the *de auxiliis* controversy).

The framework does not resolve these disputes confessionally but offers a structural diagnosis: each pair is partial-antipode at best, and the perennial recurrence of the debate is the empirical signature of the partial-antipode structure being over-read as full antipode. Resolution would require articulation of the underlying configuration in vertex terms, not selection of one pole of the binary as winner.

6.3 Self-Understanding

For individuals: the binary bias produces simplified self-narratives ("I am a thinker, not a feeler"; "I am introverted, not extroverted") that capture some vertex-loading but lose the multi-vertex structure of the actual configuration. More accurate self-understanding requires resisting the binary compression and articulating one's configuration in richer terms.

The framework's prescription: where a binary self-categorization feels constraining or recurrently inadequate, the inadequacy is probably structural, not personal. The configuration is not adequately articulable in two terms. The cure is not to pick the other pole but to articulate more vertices.

6.4 Educational Practice

Teaching that proceeds by binary contrasts (right answer vs wrong; relevant vs irrelevant; canonical vs marginal) trains the configuration's binary bias. Teaching that proceeds by multi-element articulation (this configuration has these vertices; the question activates these elements; this position captures these but misses those) trains richer cognitive operation.

The framework's prediction: educational traditions that have emphasized multi-element articulation (the medieval *quadrivium*; classical Indian dialectical schools; certain forms of Talmudic study) produce graduates with weaker binary bias and stronger multi-element cognitive capacity. Empirical investigation pending.

7. The Framework's Self-Application

This paper is itself susceptible to its own diagnosis. A "binary vs multi-element" framing of the bias would be self-undermining — a binary categorization of how to categorize. The framework's actual claim is more nuanced.

The structurally correct categorization is *vertex-articulated configuration analysis*. Within this, binary structures (antipode pairs, dialectical bonds) appear as specific cases. The two-element format is one of many configurational formats; it is appropriate where the structure is genuinely two-element and inappropriate where it is not. The framework's diagnosis is not "binary bad, multi-element good" but "match the format to the structure."

The bias is therefore not pathological in itself but pathological in its over-application. Humans bring binary as default; the framework prescribes structure-matching. Where structure is binary, default and prescription agree. Where structure is not binary, default fails and prescription requires reformulation.

This is the framework's characteristic posture: not categorical condemnation of any cognitive operation, but structural calibration of when each operation applies. Binary is one operation among many; its specific applicability is what the framework can articulate, and the failures of misapplication are what the framework can diagnose.

8. Forced, Warranted, and Procrustean-Risky

Following the methodology of [companion papers]:

Forced (derivable from framework's stated structure):

The conserved-anchor antipode is a specific structural form (Appendix O explicit). Two confirmed antipode pairs exist in the corpus (§V.3 explicit). Group VIII anchors both confirmed pairs (Remark V.2 explicit). The dialectical bond is a within-compound structure, not a between-compound structure (§G.5 explicit). Five-vertex configurations require five-vertex articulation (corpus-wide commitment).

Warranted but chosen:

The four configurational features identified as producing the bias (§2.1–2.4) are framework-consistent but not framework-derived. Other accounts of the bias's origin are defensible (innatist, learning-theoretic, evolutionary). The framework's account is structural and consistent with these but does not strictly require them.

The five failure modes (§4.1–4.5) are framework-consistent specifications of where binary categorization should fail. Other failure-mode taxonomies are possible.

The pastoral implications (§6) are application-of-structure but the specific applications (left-right political binary, faith-works debate, etc.) are interpretive readings.

Chosen and Procrustean-risky:

Specific identifications of named cultural binaries as misreadings (mind/body, faith/reason, sacred/profane). The framework predicts these are misreadings but does not derive each specific case. Counterexamples could exist where one of the named binaries does, after careful analysis, satisfy the antipode conditions.

The cross-cultural prediction that fewer than 20% of standard binaries satisfy antipode conditions. This is a quantitative prediction without deep derivation; it is consistent with the corpus's 2/22 ratio but is not strictly forced.

The reading of perennial philosophical debates as five-vertex structures forced into binary. Plausible but interpretive; some of these debates may be framework-readable in other ways.

The educational and conflict-mediation prescriptions. Application of the structure but heavily dependent on contingent empirical and pastoral judgments.

9. Closing Remarks

The framework's account of binary bias is neither dismissive nor uncritical. Binary categorization tracks real structure where antipode pairs exist; the structure is real, the bias is locally appropriate, the format is correct. Binary categorization fails where antipode pairs do not exist; the bias misreads richer structure as if it were two-fold; debates within the binary terms do not resolve because the terms cannot articulate the structure.

The bias's origin is structurally over-determined. Layer-2 self-representation pressure favors compressible formats. The WI-vertex's P–A edge operates in two-fold form. The dialectical bond is configurationally familiar. Cultural Mm-crystallization transmits binaries across generations. Each pressure independently produces some bias toward binary; together they produce the robust phenomenon documented across cultures and domains.

The framework's distinctive claim is that the bias is correct in a structurally specific minority of cases (true antipode pairs, of which the corpus identifies two with three candidates) and incorrect in the structurally specific majority. Most concepts do not have antipodes. Most binary categorizations are misapplications. Most perennial binary debates are debates whose terms are inadequate to their subject.

This produces a counterintuitive but empirically testable prediction: cultural maturity in any domain — philosophical, theological, political, scientific — should correlate with the gradual replacement of binary categorizations with vertex-articulated ones in that domain. Domains where this replacement has occurred (post-Aristotelian biology's escape from the substance-essence binary; post-Newtonian physics' escape

from the absolute-relative binary; post-Lévi-Strauss anthropology's escape from binary mythology) show the framework's predicted progression. Domains where the replacement has not occurred remain binary-stuck and show the predicted symptom: perennial unresolved debates.

The framework does not prescribe abandoning binary thought. It prescribes calibrating binary thought to where it applies. Antipode pairs deserve binary treatment; they are binary by structure. Five-vertex configurations deserve five-vertex treatment; they are not binary by structure. The cognitive task is to recognize which is which. This is the same calibration task the framework prescribes throughout: match the format to the structure, the operation to the configuration, the categorization to what is actually being categorized.

Binary bias is the configuration's structural starting point. Calibration is the configuration's structural maturity. The bias is not the enemy of thought but its scaffolding — and like scaffolding, useful when the structure is being built, removable when the structure stands.

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Ad Majorem Dei Gloriam.