Fourfold Vision: William Blake, Buckminster Fuller, and the Geometry of Omnirational Seeing

A qualified structural analogy among Blakean perception, Fullerian Synergetics, Quadray geometry, and executable provenance

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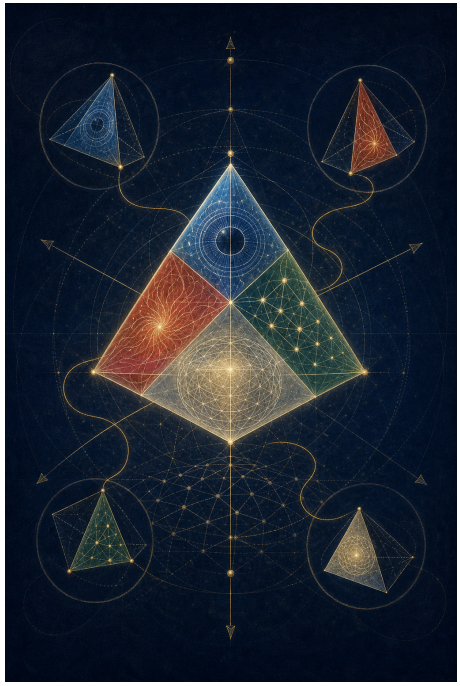

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1 Abstract: A Whole Preserved Across Partial Views

Published by Synergetics University on 14 July 2026, *The Fuller Conjecture* asks whether "there exists a line of reasoning that presents Fuller's synergetic vision as a philosophical system." This paper tests one qualified route through that problem. It places William Blake's fourfold vision beside Buckminster Fuller's *Synergetics* without claiming shared vocabulary, historical influence, or Blakean anticipation of Quadray: Blake supplies a historically situated problem of plural seeing, while Quadray and tetrahedral geometry supply a reproducible model of relational aspects, partial views, and reconstruction. The formal result is exact: for any non-degenerate convex tetrahedron observed by a strictly exterior camera, one frame exposes 1, 2, or 3 faces, never 4; an atlas can preserve all 4 across successive views. The project combines an argument graph, exact rational geometry, deterministic visualizations, a rights-aware corpus ledger, and a dependency-free viewer. "Synchronous omni-rational form" names this operational integration—a relational whole retained across partial views, sequences, source boundaries, and explicit limits—not a historical Blakean or Fullerian doctrine.

2 Graphical Abstract: The Golden Thread Around a Tetrahedral Whole

Figure 1: RIGHTS — Original cover artwork: a complete luminous tetrahedron connected to 4 partial orthographic-style views by a continuous gold thread. It is editorial artwork, not historical Blake evidence.

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The cover is an original editorial graphical abstract, not a Blake source image. It stages the paper's central distinction: a local view can be partial while a versioned atlas can preserve the relations among 4 aspects. Typography is typeset here rather than embedded in the generated artwork so that the title, metadata, and accessibility text remain searchable and revisable.

3 Introduction: How to Present a Whole Without Closing It

3.1 The Presentational Problem: How a Whole Becomes a Sequence

The Fuller Conjecture begins from a presentational difficulty [Synergetics University, 2026a]. Synergetics University formulates it as the question whether "there exists a line of reasoning that presents Fuller's synergetic vision as a philosophical system" [Synergetics University, 2026a]. Fuller's *Synergetics* radiates, recurs, and acquires meaning through relations among centers rather than through a straight line of exposition. A sequential paper can therefore make a relational system look like a list of independent propositions. This paper treats exposition as an epistemic operation: every sequence foregrounds some relations and leaves others latent.

3.2 Question, Contribution, and Boundary

The question is not whether Blake secretly possessed a twentieth-century coordinate system, but whether a constrained model can make a shared problem inspectable: how can a finite viewpoint participate in a relational whole without being mistaken for that whole? Primary Blake evidence establishes the historical vocabulary; Quadray supplies a testable model of partial observation; the graph and provenance surface retain branches, source status, and limits.

The contribution is methodological as much as comparative: a disciplined interface among literary evidence, formal invariants, executable software, and rights-aware publication—not a new Blake edition, a complete Synergetics reconstruction, or a theorem about imagination.

3.3 Lineages of the Problem: Blake, Fuller, Urner, and Reproducibility

The paper's comparative wager sits between several traditions that should not be collapsed. Blake scholarship supplies the historical problem of vision as a plural, embodied, and materially mediated practice. Calè's account of the "practical antiquary" is especially important because it locates fourfold vision in the work of changing viewpoints and reconstructing appearances, rather than in an abstract multi-part doctrine [Calè, 2022]. Groves's study of Blake, Thomas Boston, and fourfold vision supplies a more specific historical vocabulary for treating "fourfold" as an interpretive term with its own theological and intellectual history [Groves, 1986]. These sources are stronger warrants for Blake than any symmetry in the present figures.

Fuller scholarship and reception provide a different problem: how to present a relational system whose concepts move among geometry, design, cosmology, education, and rhetoric. The *Fuller Conjecture* names that presentational problem; the Buckminster Fuller Institute supplies institutional context; Edmondson supplies a mathematically literate translation of Fuller's geometry; and Fuller's *Synergetics* remains the primary corpus against which any modern reconstruction must be checked [Synergetics University, 2026a, Buckminster Fuller Institute, 2022, Edmondson, 1987, Fuller, 1975]. The related Synergetics University articles extend the reception history through figure/ground, media ecology, historical context, great circles, tension/integrity, and material afterlife. They are treated here as contemporary interpretive scholarship, not as unmediated Fuller evidence.

Kirby Urner supplies the most direct technical genealogy for the computational side. His early essays move from four tetrahedral rays to coordinate addresses, from coordinates to relational shape tables, and from those tables to volume and combinatorial constructions [Urner, 1997a,d,b,c, 2000]. The pedagogical point is as important as the mathematics: Quadray becomes a language game for making relationships manipulable, comparable, and teachable. Urner's work therefore supports the atlas as a computational continuation of a Fullerian educational practice, while its explicit scale/orientation conventions also warn against claiming that all tetrahedral representations share one unit system.

The Blake background is likewise triangulated rather than represented by a single quotation. Ault reads Blake's response to Newton as an active, systemic reversal rather than a simple rejection [Ault, 1974]; Davies reopens the relation among science, poetry, imagination, and progress [Davies, 2024]. Erdman's edited corpus is the manuscript-facing textual control for poems, letters, and prose, with edition and line/page locators retained where available [Erdman, 1988]. These works support historical interpretation; they do not turn the later formal model into a Blakean discovery.

The present project adds a fourth literature: reproducible and rights-aware research infrastructure. The Blake corpus ledger, source diagnostics, and Mapping William Blake make provenance part of interpretation [Friedman, 2026c,f]. In this paper, a source graph,

a formal model, and a release gate are not ancillary engineering. They are the conditions under which a claim about comprehensivity can be criticized without becoming another unexamined totality.

3.4 What Is Being Compared—and What Is Not

The unit of comparison is the relation between a partial view and a maintained relational state, not a shared vocabulary or historical influence. The scope is therefore explicit:

Layer	Included	Excluded
Blake	1802 letter, selected poems/manuscripts, images, and prior Blake scholarship	Claim that Blake anticipated Quadray or Fuller's later terminology
Fuller	Published *Synergetics*, the Fuller Conjecture, and rights-safe private metadata	Public reproduction of the private corpus or a complete Fuller exegesis
Formal model	Quadray coordinates, tetrahedral visibility, atlas coverage, exact invariants	Proof that a mathematical structure determines literary meaning
Software	Pinned adapters, deterministic figures, viewer, ledgers, and release checks	Vendoring or reproducing the full QuadCraft engine

The technical background is also historical in the modest sense that methods have lineages. Kirby Urner's late-1990s Quadray essays show how Fullerian tetrahedral thinking was translated into web pedagogy: four rays become coordinates, coordinates become relational shape records, and those records become volume and combinatorial exercises [Urner, 1997a,b,c, 2000]. The present project inherits that computational impulse while adding explicit camera state, evidence status, and rights metadata. This matters to the introduction because the atlas is a deliberately bounded continuation of a technical practice that has long treated geometry as something to compute, teach, and inspect.

This project calls the solution a golden thread: a selected path through a larger argument graph. The graph retains branching, tensions, and reciprocal edges. The path gives a reader a stable route from problem to formal model to qualified conclusion. The distinction matters because the linear path is an interface to the system, not the system's exhaustive ontology.

3.5 Blake's Anti-Closure Vocabulary

The prior Blake portfolio supplies the argument's working vocabulary. The Blake–Fuller paper establishes the comprehensivity problem [Friedman, 2023]; MathArt supplies fourfold and tetrahedral mnemonics [Friedman, 2024]; Doors of Perception supplies predictive thresholds [Friedman, 2026e]; Before Pragmatism supplies fourfold hierarchy and Fuller's pragmatic geometry [Friedman, 2026a]; BlakeJiang supplies a negative case of cognitive closure [Friedman, 2026d]; Bimetalism extends reduction into material valuation [Friedman, 2026b]; and Mapping William Blake supplies corpus, audit, and rights discipline [Friedman, 2026f]. *Agent and Niche* adds the important ecological constraint that observer and niche co-specify what can be seen [Friedman, 2025b].

The method fonds make the graph and pipeline explicit: *Graphspeak* supplies relation and handshake vocabulary [Djuwidja and Friedman, 2025], *TemporalDepth* supports integration across temporal scales [Friedman et al., 2025], and *SystemsProcesses* supplies a process-philosophical bridge to Active Inference [Friedman, 2025a].

The present paper synthesizes those threads but adds a stricter boundary. The fourfold mapping developed in the chapters that follow is a project model, not a claim that Blake named the 4 channels in the same terms as Fuller or Quadray. The mapping is useful only if each interpretive link remains inspectable and if formal computation is not mistaken for historical proof.

3.6 Five Kinds of Warrant

The project keeps 5 warrant classes separate: historical, formal, interpretive, software, and rights-related.

1. claims about Blake, Fuller, and their texts
2. claims proved or checked by the geometry implementation
3. analogies connecting the two domains
4. claims about reproducibility, provenance, and visualization
5. claims about redistribution and metadata-only boundaries

This is the paper's first defense against single vision: a diagram does not become historical evidence through symmetry, and resonance does not become a theorem through coordinates.

The graph preserves 4 off-thread branches alongside its golden thread: historical tension, value-fracture, camera-space qualification, and the rights gate for private Fuller records. The selected path is a navigational interface to a larger system, not a claim that every relation is sequential.

4 The Fuller Conjecture: From Radiating Centres to a Philosophical System

4.1 Radiating Centres, Sequential Pages

Synergetics University's *The Fuller Conjecture* states the problem precisely: "there exists a line of reasoning that presents Fuller's synergetic vision as a philosophical system" [Synergetics University, 2026a]. This is a conjecture about presentation, not a claim that the article or this paper has already proved the whole of *Synergetics*. "Presents" is the operative word: a formal and rhetorical architecture can make relations inspectable without replacing *Synergetics*. The article is contemporary reception scholarship and the golden-thread prompt; Fuller's 1975 book remains the primary Fullerian warrant, and the private Synergetics fonds are used only through rights-cleared metadata [Fuller, 1975, 1979].

Fuller's geometry repeatedly asks the reader to reason from relations, transformations, and scale rather than isolated objects [Fuller, 1975]. This paper takes that as a reading strategy, not as a reduction of Fuller's vocabulary to graph theory. The golden thread walks the graph while preserving it as a separate object.

The Blake comparison becomes more than juxtaposition because it shares this problem of comprehensivity: how can thought remain open to relation without becoming an unchecked totalizing metaphor [Friedman, 2023]? The project answers with explicit constraints: relations have sources or rules, views disclose latent structure, and releases disclose what cannot be redistributed. A source warrants history; a test warrants software; neither silently warrants the other.

4.2 What the Conjecture Actually Claims

The source text deserves closer treatment than a single epigraph. It opens with Hugh Kenner's diagnosis that "The vision that possesses [Fuller] eludes linearity" [Synergetics University, 2026a]. Kenner's formulation makes linearity a technical problem rather than a mere stylistic preference: Fuller's local centers shift scale, recur, and connect by "radiating instead of linear patterns." A successful presentation must therefore add a path without pretending that the path was already present as a conventional sequence.

The article then deliberately calls its answer a *conjecture*. It does not claim a proved or unique reconstruction. A design manual, mythic poem, theory of cultural evolution, or philosophical system could each be a different path through Fuller's radiating centers [Synergetics University, 2026a]. This paper selects a structural-operational path: it asks what can be made testable about partial views, retained relations, and a readable traversal. "Omni-rational" therefore names a design requirement for the representation, not a license to declare that every interpretation has been integrated.

The puzzle metaphor in the article adds a second condition: a system requires both a set of facts and rules connecting them. That is close to the present project's separation of evidence and formalism. Primary texts and article claims supply facts with provenance; equations, graph edges, and rights rules supply connective constraints. The resulting system is criticizable because a reader can challenge a source, a relation, a normalization choice, or a release decision without having to reject the whole structure at once. In other words, the paper does not confuse a rich inventory with an explanatory system: a fact becomes operational only when the rule that connects it to another fact is declared, testable, and open to revision.

The article also introduces a productive tension around contradiction. Fuller's claim that no generalized principle contradicts another, and that such principles are mutually inter-accommodating, expresses a strong ideal of systemic coherence; the phrasing here follows the Synergetics University reading of *Synergetics* rather than a verbatim transcription of Fuller's text [Synergetics University, 2026a, Fuller, 1975]. The article's own discussion of paraconsistency complicates that ideal: a philosophical system may need to preserve tensions long enough for criticism and revision to operate. This is where the comparison with Blake becomes intellectually useful. Blake's contraries are not equivalent to paraconsistent logic, but they warn against confusing harmony with the elimination of difference. The present graph keeps a historical-gap edge and a value-fracture branch for the same reason: a system that hides its conflicts is less comprehensive than one that can expose and qualify them.

Blake's own poetry adds a warning to this conjecture. In *Jerusalem*, the figure Los declares, "I must Create a System, or be enslav'd by another Mans" [Blake, 1820]. The line is spoken by a character, not asserted in Blake's own voice; it does not make Blake a proto-Fuller, and it does not settle what a philosophical system is. It does, however, name the political and perceptual stakes of the problem. A system can be an instrument for making relations visible, or it can become an imposed closure that dictates in advance what counts as real. The Fuller Conjecture and the Blake corpus meet here as diagnostics of construction: both make it

necessary to ask who supplies the rules, what remains outside the frame, and whether a system can expose the conditions of its own seeing. The paper's source, geometry, and rights gates are practical answers to those questions, not evidence that the two authors shared a doctrine.

4.3 Three Routes Through a Synergetic System

The Fuller Conjecture's proposed routes—naturalism, structural realism, and psychohistoricism—should be read as candidate paths, not settled labels. Naturalism emphasizes Fuller's attempt to derive generalizations from nature; structural realism emphasizes the persistence of relations across changing descriptions; psychohistoricism joins mathematical form to the historical and psychological conditions of discovery [Synergetics University, 2026a]. The present paper leans toward structural realism while borrowing from the other routes. Its tetrahedron is a formal structure, its Blake comparison is historically situated, and its visual atlas is a psychological/epistemic model of what a frame can and cannot disclose. None of these routes is allowed to stand in for the others.

4.4 Why "Philosophical System" Remains a Question

The institutional Fuller literature gives the Conjecture a useful external check. The Buckminster Fuller Institute describes *Synergetics* as the name Fuller gave to lifelong philosophical explorations, published as *Synergetics* and *Synergetics 2* with E. J. Applewhite, while also noting that the work's genre is difficult to classify [Buckminster Fuller Institute, 2022, Fuller, 1979]. Edmondson's *A Fuller Explanation* is a useful secondary control because it translates Synergetic geometry into conventional mathematics while preserving the design-science ambition of a non-linear image language [Edmondson, 1987]. Neither source proves that Fuller's system is philosophically adequate, nor does either resolve the article's conjectural problem. They do show why "philosophical system" is not an arbitrary label invented by this paper: it is a historically situated description that still requires a defensible presentation.

The distinction between *being* a system and *being presentable as* a system is central. Fuller's own claims may be broad, recursive, and heterogeneous; the Conjecture asks whether their relations can be made criticizable without flattening them. The present graph, atlas, and evidence ledgers are therefore not proposed as a reconstruction of all of *Synergetics*. They are a test case for one presentation criterion: a route must make its sources, transformations, invariants, and exclusions inspectable.

4.5 The Substack Conversation as Reception History

The surrounding Synergetics University articles make the Conjecture a living research conversation rather than a solitary prompt. The following articles are used as related scholarship and explicitly assigned roles:

Article	Contribution to this paper
An Open Letter to Daniel Ari Friedman	Connects Fuller's Self-experiment to Active Inference, revisits Blake's "Newton's sleep," and warns that knowledge can produce its own blindness [Diotallevi, 2026a].
Spelling Synergetics, Parts 1–3	Develops the abacus, figure/ground, indexical signs, and media ecology as a way to move between visual diagrams and dynamic processes [Diotallevi, 2026b,c,d].
Synergetics and its Historical Context	Places Fuller among Bauersfeld, Bell, Coxeter, Loeb, Kepler, Fludd, and other precedents, strengthening attributional caution [Synergetics University, 2025].
Great Circles in Synergetics	Recasts systems as finite, partially overlapping events connected by economical paths; this informs the graph/atlas analogy without being imported as a physical law [Synergetics University, 2026c].
Tension and Integrity	Keeps Snelson, Johansons, and the ethics of attribution inside the Synergetics story rather than treating Fuller as an isolated inventor [Synergetics University, 2026d].

Article	Contribution to this paper
Buckminsterfullerene (C60)	Shows how later material science became a reception surface for Fuller's geodesic claims, without making the later discovery a retroactive proof [Synergetics University, 2026b].

Each entry in the matrix does argumentative work. *An Open Letter* supplies a reception-level account of self-experiment, knowledge blindness, and the return of "Newton's sleep"; it is therefore used to connect the Fullerian problem to the Blake chapter, not to establish a Blake fact. *Spelling Synergetics I* treats the abacus as an operational inscription: the paper uses that idea when it makes the ledger and coordinate state executable. Part II turns figure/ground into a reading problem, which motivates visible versus latent faces. Part III makes media ecology explicit, which motivates the browser viewer as part of the argument rather than a transparent window onto it. *Synergetics and its Historical Context* supplies attributional friction: Fuller's system has precedents and collaborators, so the graph must retain lineages rather than narrate a lone inventor. *Great Circles in Synergetics* offers an economy-of-paths reading that helps explain why a golden thread can be selective without being arbitrary. *Tension and Integrity* keeps structural achievement and attributional tension together. Finally, *Buckminsterfullerene (C60)* is a material afterlife: a later object may refract a Fullerian vocabulary without retroactively validating every claim.

The article-role matrix in fig. 2 records these jobs, their manuscript reach, and their claim locators. It is a citation ledger, not a private corpus export.

Synergetics University reception cluster: source roles and manuscript reach

article	role	sections	claims
The Fuller Conjecture	anchor	3	2
An Open Letter	reception scholarship	4	2
Spelling Synergetics I	technical interpretation	2	1
Spelling Synergetics II	technical interpretation	3	1
Spelling Synergetics III	reception scholarship	3	1
Historical Context	historical context	3	2
Great Circles	technical interpretation	3	1
Tension and Integrity	historical context	3	1
Buckminsterfullerene	material afterlife	2	1

The matrix records reception and citation pathways; it does not disclose private Fuller corpus text.

Figure 2: HISTORICAL — Article-role matrix for the Synergetics University reception cluster. The Fuller Conjecture is the anchor; the surrounding articles are citation-only related scholarship assigned distinct interpretive, technical, historical, and material-afterlife roles.

The Open Letter's claim that "knowledge produces its own blindness" offers a particularly sharp bridge to Blake: Blake's closed perceptive organs and the article's media-induced closure describe related risks, but not the same theory. *Spelling Synergetics Part*

2 provides the complementary semiotic rule that "Indexes are figures that carry us into their ground" [Diotallevi, 2026c]. The visual atlas adopts that rule as an interpretive heuristic: each colored face draws attention to a formal object while the pale faces mark the ground of what the current frame does not expose. The figure is therefore a prompt to inspect hidden relations, not evidence that the historical authors shared one semiotic vocabulary.

4.6 The Golden String: A Traversal Through Centres

Blake gives this paper its most exact image of a path through a difficult whole: "I give you the end of a golden string; / Only wind it into a ball, / It will lead you in at Heaven's gate, / Built in Jerusalem's wall" (*Jerusalem*, plate 77; Erdman 231) [Blake, 1820, Erdman, 1988]. The passage is not a technical description of a graph, and it does not authorize a claim that Blake anticipated Fuller or Quadray. It supplies a historically situated metaphor of guided traversal: a reader receives an end, winds continuity into a portable form, and follows it without mistaking the thread for the wall or the city it helps disclose.

This project adopts Blake's golden string as the qualified name for its selected path, and uses "golden thread" as the visual shorthand for that string. The Fuller Conjecture poses precisely the presentational problem the image helps articulate: Fuller's centers radiate rather than arrange themselves as a single linear proof, while a paper still needs a route that a reader can inspect, challenge, and rewind. The string is therefore an interface between a non-linear argument graph and a sequential manuscript. It is Blakean in image, Fullerian in problem-space, and computational in its audit surface; the registers are connected by analogy, not collapsed into one historical doctrine.

The graph has 2 complementary outputs. `extract_golden_thread` returns the declared ordered path of 10 nodes and 9 transitions; `validate_argument_graph` checks source provenance, node identity, edge existence, edge typing, and the path's declared transitions. The current hydrated path is `problem` → `fourfold` → `methods` → `tetrahedron` → `atlas` → `fonds` → `golden_string` → `system` → `release` → `limits`. The validator does not prove that this is the only or best interpretation of *Synergetics*. It proves something smaller and useful: the route printed by the manuscript is actually present in the source-backed graph, and a reader can compare it with the branches that the route leaves latent.

The path is not a disguised chronology of Fuller's life or a claim that the sources naturally form a straight line. It is a reading instrument whose stages answer different evidentiary questions:

String segment	Work done in the presentation	Representative warrant
`problem` → `fourfold`	Moves from the Synergetics University question to Blake's historically situated critique of perceptual closure	Fuller Conjecture; Butts letter; Groves; Calè [Synergetics University, 2026a, Blake, 1968, Groves, 1986, Calè, 2022]
`fourfold` → `methods` → `tetrahedron`	Converts plural seeing into a bounded formal comparison without turning Blake into a mathematician	Ault; Davies; Urner; QuadMath; Symergetics [Ault, 1974, Davies, 2024, Urner, 1997a, Friedman, 2025d,e]
`tetrahedron` → `atlas` → `fonds`	Tests partiality, then attaches the result to source and rights infrastructure	QuadCraft; Blake corpus; Mapping William Blake [Friedman, 2026g,c,f]
`fonds` → `golden_string` → `system`	Names the selected route with Blake's image while asking whether Fuller's relations can be presented as a philosophical system	*Jerusalem*, plate 77; Fuller's *Synergetics*; *Great Circles in Synergetics* [Blake, 1820, Fuller, 1975, Synergetics University, 2026c]
`system` → `release` → `limits`	Makes reproducibility and non-identity part of the conclusion rather than a disclaimer appended after it	release manifest; rights matrix; historical-gap node [Friedman, 2026h,f, 2023]

This is why the golden string is not merely an attractive label for a graph edge. It is a discipline of selection. It carries a reader from question to formal test to qualified system claim, but it also makes the untraversed branches visible. The string gives sequence to Synergetics without pretending that sequence is Synergetics' ontology; it gives Blake's image a technical afterlife without claiming that Blake supplied the software model.

Formally, let $G = (N, E, \sigma, \rho)$ be the source-backed graph, where N is the node set, E the typed edge set, σ the epistemic status attached to each node, and ρ its source-and-rights record. The string is a declared path $P = (n_0, \ldots, n_k)$ such that every adjacent pair is an edge in E. Its selection rule is deliberately modest: the path must begin with the presentational problem, pass through the formal and evidentiary bridges, and end with a qualified system claim and its limits; it may not manufacture an edge, erase a branch, or upgrade a status. `extract_golden_thread` exposes that path. `validate_argument_graph` audits the conditions that make it a legitimate traversal. Neither function establishes philosophical truth; they make the paper's chosen route inspectable and revisable.

That distinction is the point of the visual system. The graph figure shows the string as a luminous traversal while retaining alternate edges; the companion golden-string/tetrahedron figure places the same path beside a bounded formal object. The string does not pass through an empty abstract space: it touches claims about Blake, Fuller, Quadray, the atlas, the fonds, and release limits. But neither does the thread absorb those claims into a single substance. Each node keeps its source keys, epistemic status, and warrant type. A historical node remains historical; a formal node remains formal; a rights gate remains a condition on access rather than evidence for a philosophical conclusion.

The graph retains 4 off-thread branches, including historical tension, reductive valuation, camera-space qualification, and the private boundary. These branches are not failures of exposition. They are the unwound remainder that prevents a readable path from masquerading as a total system. In Blake's terms, the string guides entry; in the project's terms, the graph preserves what the string does not traverse.

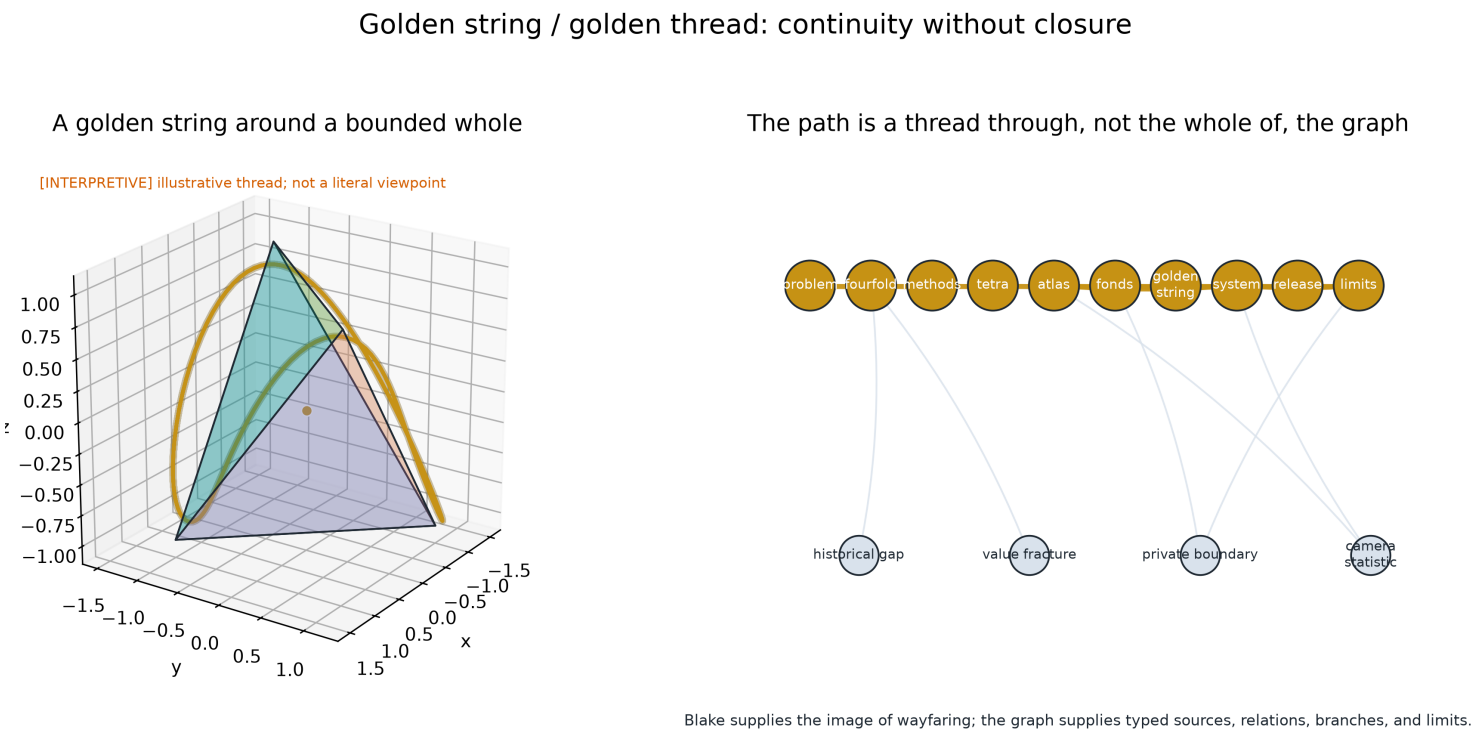

Figure 3: INTERPRETIVE — Blake's golden-string image is adapted as a qualified traversal metaphor. The golden line winds around a bounded tetrahedral model while the adjacent path remains a selected route through, not an exhaustive replacement for, the source-backed graph. The panel is generated project artwork invoking Blake's golden-string metaphor; it incorporates no Blake primary imagery and is not historical Blake evidence.

The graph/path distinction is compatible with the process orientation of *SystemsProcesses*, which treats systems as organized transformations rather than static inventories [Friedman, 2025a]. It also aligns with the handshake idea in *Graphspeak*: understanding

occurs in a relation that can be traced, not merely in a node that can be quoted [Djuwidja and Friedman, 2025].

5 Blake's Fourfold Vision: Against Newton's Sleep

5.1 Newton's Sleep and the Problem of Closure

Blake's fourfold vocabulary is not imported as a hidden coordinate system. It is treated as a problem of perceptual closure. The MathArt Blake work makes the association between fourfold vision, tetrahedral mnemonic form, and the limits of Newtonian single vision explicit [Friedman, 2024]. *The Doors of Perception are the Threshold of Prediction* extends this into a hierarchical account of seeing in which an aperture is also a model-dependent threshold [Friedman, 2026e]. Ault's *Visionary Physics* is a useful scholarly counterweight to a simplistic Blake-versus-science story: its chapter architecture treats Blake's response as an active reworking of Newtonian coherence, identity, universality, and optics [Ault, 1974]. Davies similarly frames "Newton's sleep" as a question about science, poetry, imagination, and progress rather than as an invitation to discard science [Davies, 2024]. The project therefore reads single vision as a closure mechanism, not as a synonym for empirical method.

The present paper formalizes only the relation among partiality, latent structure, and reconstruction. Its `FourfoldState` keeps 4 labeled channels—Vision, Imagination, Relation, and Totality—alongside their source keys and epistemic status. The labels are a project construct. They do not assert that Blake's poems, images, or *Four Zoas* are reducible to 4 numerical components.

5.2 The Butts Letter: A Primary Anchor

The strongest historical anchor is not a geometric passage in *Jerusalem* but Blake's letter-poem to Thomas Butts from November 1802. In the closing lines, Blake writes:

> Now I a fourfold vision see / And a fourfold vision is given to me / Tis fourfold in my supreme delight / And three fold in soft Beulahs night / And twofold Always. May God us keep / From Single vision & Newtons sleep

The passage establishes a graded vocabulary of vision and a rhetorical opposition to "single vision"; it does not specify four Cartesian coordinates, four tetrahedral faces, or a general theory of observation. The manuscript text is cited through Erdman's edited corpus, while the letter's historical argument is triangulated with Groves and the Newton scholarship rather than treated as a freestanding epigraph [Erdman, 1988, Groves, 1986, Ault, 1974, Davies, 2024]. Groves's discussion places the letter within Blake's recurring use of "fourfold," while also warning against treating the phrase as a free-floating technical term. This distinction is decisive for the paper's method: the quotation supplies historical evidence, the tetrahedron supplies a formal analogy, and the bridge between them remains interpretive.

5.3 Changing Viewpoints, Reconstructing Appearances

Luisa Calè adds a crucial dimension that a purely verbal reading would miss. Her account connects Blake's apprenticeship as a draftsman and engraver with the problem of representing a three-dimensional monument on a flat page from changing points of view [Calè, 2022]. Fourfold vision consequently need not be imagined as a supernatural camera that simply receives more data. It can also be understood as a practice of moving among views, carrying orientation and material technique across them, and reconstructing a volume from appearances that are each locally incomplete.

This is the strongest scholarly bridge to the present atlas, but it remains a bridge rather than an identity. Calè's object is Blake's physiological, artisanal, and prophetic aesthetics; the software object is a regular tetrahedron with declared basis vectors, face normals, and camera states. The formal atlas therefore models one narrow operation—registration of partial views—while leaving Blake's historical media, bodily practice, biblical imagery, and poetic transformation intact. The analogy becomes more precise by becoming smaller: it concerns reconstructive plurality, not the meaning of Blake's vision as a whole.

5.4 Poems, Images, and Plural Seeing

The primary Blake records in this project include *The Marriage of Heaven and Hell*, *Vala, or The Four Zoas*, *Jerusalem*, *Milton*, and the prose account of *A Vision of the Last Judgment* [Blake, 1793, 1797, 1820, 1810, 1988, Erdman, 1988]. They are used as historical and literary evidence for a vocabulary of vision, imagination, contraries, and perceptual transformation, not as proof of a modern mathematical anticipation. The *Four Zoas* is especially important as an unfinished, revision-rich manuscript surface;

its fourfold mythic structure must not be converted into a clean four-variable schema by editorial fiat. *Before Pragmatism Had a Name* contributes a further account of anticipation and fourfold hierarchy [Friedman, 2026a]. Blake's *Jerusalem* supplies a different but complementary image: "I give you the end of a golden string" and ask the reader to wind it into a ball before following it to the gate (plate 77; Erdman 231) [Blake, 1820, Erdman, 1988]. The image is not a hidden geometry of four variables. It is a model of guided continuity through a difficult poetic and prophetic structure; this paper borrows that function for the argument graph while keeping the historical source, formal model, and interpretive bridge distinct.

The eighth portfolio work, *Synthesis of Agent and Niche*, matters because it changes the unit of analysis. Seeing is not only an observer's internal completion; it is a relation between an agent and the niche that affords or resists its predictions [Friedman, 2025b]. This supports a qualified analogy to an atlas: each view is situated, and a broader state is constructed by retaining the relations among situated views.

The analogy remains historically asymmetric. Blake's "fourfold" language is poetic, theological, and visual; Quadray's four coordinates are formal and computational. Their structural resonance is a question for modeling, not a claim of influence.

6 The Tetrahedral Atlas: Quadray, Partiality, and Fourfold Form

6.1 Four Faces, Four Aspects, One Qualified Analogy

The tetrahedron is the smallest regular polyhedron with 4 faces and 4 vertices. In the implementation, the 4 vertices are the 4 Quadray basis vectors; the 4 *faces* are indexed opposite those vertices. The distinction between basis directions and faces matters: the paper's "4 aspects" are not 4 independently observed objects. A camera observes a subset of faces according to outward face normals; the remaining faces are latent for that frame. This makes the analogy operational without pretending that a metaphor is already a measurement.

The 4-channel interpretive mapping is stored in `data/mappings/fourfold_channels.yaml`. Its labels are Vision, Imagination, Relation, and Totality. They are deliberately not hard-coded into the geometry class. The geometry knows 4 indexed faces; the evidence layer records why a particular Blake or Fuller concept has been associated with a channel.

6.2 Four Rays, One Cartesian Space

Let $\mathbf{b}_1, \ldots, \mathbf{b}_4$ be the tetrahedral basis. A Quadray point is represented as:

$$\mathbf{x} = \sum_{i=1}^{4} q_i \mathbf{b}_i. \tag{1}$$

Because the 4 basis vectors sum to zero, adding a common scalar to all components leaves the Cartesian point unchanged. The implementation therefore normalizes by subtracting the minimum component while retaining exact rational values. The normalization is a gauge choice for representation, not an additional physical or semantic dimension. It is a computational restatement of coordinate redundancy, not a claim about the semantic meaning of Blake's fourfold vision.

The exact-volume implementation uses a determinant divided by six. The default model has positive volume and 4 faces, and the test suite checks those invariants directly. The mathematical and computational precedents are documented by QuadMath and Symergetics [Friedman, 2025d,e]. These invariants establish that the model is internally coherent; they do not establish that tetrahedral geometry is Blake's intended ontology.

6.3 Units First: Why 8/3 Is Not 1

The project's local basis is deliberately simple rather than silently interchangeable with every upstream unit convention. Its 4 vectors are the even-parity sign combinations of unit Cartesian components, so the default Cartesian tetrahedron has exact volume 8/3. Urner's Quadray discussions emphasize that scale and orientation must be declared when converting to XYZ [Urner, 1997d]. Symergetics instead reports normalized Isotropic Vector Matrix (IVM) volumes in which a unit tetrahedron is 1, an octahedron is 4, and a cuboctahedron is 20 [Friedman, 2025e]. QuadCraft's browser conventions also introduce their own normalization constants [Friedman, 2026g].

These are compatible coordinate *families*, not identical numerical units. If all vertices are rescaled by s, face visibility is unchanged while volume scales as s^3:

$$V(sM) = s^3 V(M), \qquad V(M) > 0. \tag{2}$$

Accordingly, this paper uses the local rational basis for exact round-trip and observability tests, and quotes upstream IVM values only in their declared normalized units. The bridge is invariant structure plus an audited conversion boundary, not an assertion that 8/3 and 1 are the same volume. This small distinction is essential: without it, numerical agreement could be produced by unit drift rather than by a genuine invariant.

Coordinate conventions: related structures, declared units

surface	basis / normalization	volume convention	role in this paper
local exact model	four sign vectors (unit scale)	$V = 8/3$ (Cartesian)	round-trip + visibility
Symergetics	IVM normalized coordinates	tetra = 1; ratio 1:4:20	polyhedral precedent
QuadCraft	browser Quadray scale constants	identity-suite conventions	projection reference

Scale law: visibility is unchanged by s; volume transforms as $V(sM) = s^3 V(M)$. Ratios travel across conventions only when the normalization is declared.

Figure 4: FORMAL — Declared coordinate and volume conventions across the local exact model, Symergetics, and the QuadCraft browser reference. The table makes the scale boundary visible before any ratio or identity is compared.

6.4 The Cardinality of a View: One, Two, or Three

For a camera at position $\mathbf{c}$, a face is visible when its outward normal has positive dot product with the direction from the face centroid to $\mathbf{c}$. The admissible domain is the strictly exterior region of the tetrahedron: interior points, the centroid, and points on the closed hull are rejected by `TetrahedronModel.is_exterior_camera`. Each accepted frame is therefore partial. 4 deterministic camera positions produce the atlas in fig. 6. The maximum number of visible faces in a frame is 3, while the atlas contains all 4 faces.

The strict inequality is intentional. A camera lying exactly on a face's supporting plane produces a tangent or degenerate boundary case; that face is not counted as visible in this discrete model. A camera at the tetrahedron's center is rejected because it does not define an oriented observation. These choices are formal conventions for a reproducible classifier, not claims about the phenomenology of human sight.

Let $F = \{0, \ldots, 3\}$ be the indexed face set, $\mathbf{g}_f$ the centroid of face f, and $\mathbf{n}_f$ its outward unit normal. For a camera position $\mathbf{c}$, the visible and latent sets are defined by:

$$V(\mathbf{c}) = \{f \in F : \mathbf{n}_f \cdot (\mathbf{c} - \mathbf{g}_f) > 0\}, \qquad L(\mathbf{c}) = F \setminus V(\mathbf{c}). \tag{3}$$

For an exterior camera of a convex tetrahedron, the cardinality proposition used by the project is:

$$1 \leq |V(\mathbf{c})| \leq 3, \qquad \mathbf{c} \in \mathrm{Ext}(M). \tag{4}$$

The 3 canonical fixtures make the bound constructive. A face-on camera placed along one face normal exposes exactly one face; a camera oriented toward an edge exposes exactly two; and a camera directed toward a vertex exposes exactly three. A frame exposing all 4 faces is not a frame-level possibility in this model. The sequence is shown in fig. 7. It matters that the one-face case is included: looking straight at one face is not an error or an exception, but the minimal valid exterior observation.

6.5 The Cardinality Proposition: A Proof by Face-Plane Dependence

The result does not depend on the regularity of the default model. Let M be any non-degenerate tetrahedron, let $A_f > 0$ be the area of face f, let $\mathbf{n}_f$ be its outward unit normal, and let $h_f = \mathbf{n}_f \cdot \mathbf{g}_f$ be the oriented face-plane constant. Define $d_f(\mathbf{c}) = \mathbf{n}_f \cdot \mathbf{c} - h_f$. The convex half-space description gives the closed tetrahedron as $d_f(\mathbf{c}) \leq 0$ for every f. Thus a strict exterior point has at least one positive d_f: if all 4 were non-positive, the point would lie in the closed hull. The implementation rejects the hull boundary itself, and treats a zero distance as tangent/latent rather than visible.

The 4 outward face normals satisfy the area-weighted dependence

$$\sum_{f=0}^{3} A_f \mathbf{n}_f = \mathbf{0}.$$

This is the closed-surface flux identity for a constant vector field, and it is also the force-balance identity of a polyhedron. Applying the divergence theorem to the position field gives

$$\sum_{f=0}^{3} A_f h_f = \sum_{f} A_f \mathbf{n}_f \cdot \mathbf{g}_f = 3\,\mathrm{Vol}(M) > 0.$$

Consequently, for every camera position,

$$\sum_{f} A_f d_f(\mathbf{c}) = \mathbf{c} \cdot \sum_{f} A_f \mathbf{n}_f - \sum_{f} A_f h_f = -(3\,\mathrm{Vol}(M)) < 0.$$

Because every A_f is positive, the 4 distances cannot all be positive simultaneously. An exterior camera has at least one positive distance, and the weighted identity rules out all 4 distances being positive at once — that is, all 4 faces being visible. Therefore

$$1 \leq |V(\mathbf{c})| \leq 3.$$

This is the general proposition behind the classifier, not an empirical claim about the 720-direction sample. Translation leaves the distances invariant, uniform scaling multiplies them by a positive scalar, and reflection changes the orientation bookkeeping but not the cardinality. The tests exercise these families as well as the canonical model. A camera at the centroid or anywhere strictly inside has no positive distance and is rejected; a camera on the hull has all distances non-positive with at least one zero and is rejected; a remote camera is accepted; an exterior tangent to a non-hull face plane is accepted, but the zero-distance face remains latent under the strict visibility rule.

For an atlas $A = \{\mathbf{c}_1, \ldots, \mathbf{c}_m\}$, completeness is a coverage condition, not a claim of 4-face visibility in any one frame:

$$\bigcup_{i=1}^{m} V(\mathbf{c}_i) = F, \qquad 1 \leq |V(\mathbf{c}_i)| \leq 3 \quad \text{for every accepted } i. \tag{5}$$

The atlas is the crucial qualification. It does not make every face visible at once. It preserves the object across coordinated observations, much as a systematic account can preserve relations that no single proposition contains. That is the precise sense in which the project uses "seeing all 4 sides." The phrase refers to an atlas, invariant representation, or synchronous model; it never labels a single camera frame as 4-face visibility.

The visibility matrix makes the negative control explicit: `1` means visible in a particular frame and `0` means latent. The column-wise union is complete, but no row is allowed to become a 4-face perspective. The companion channel figure shows the project's 4 interpretive labels—Vision, Imagination, Relation, and Totality—without collapsing them into the face indices.

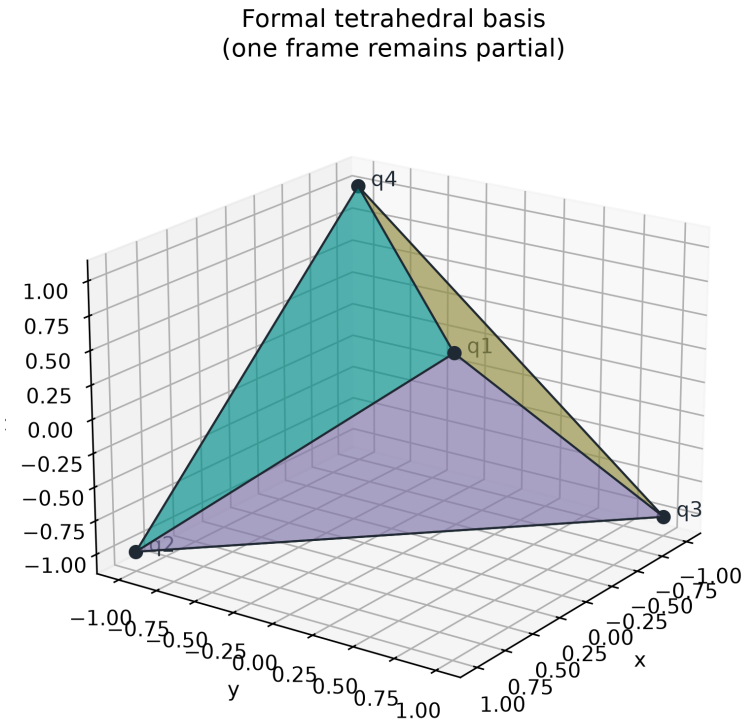

Figure 5: FORMAL — Formal tetrahedral model: 4 indexed faces, with color used as a computational identifier rather than a Blakean category. The model preserves the distinction between a 4-part state and any single perspective on it.

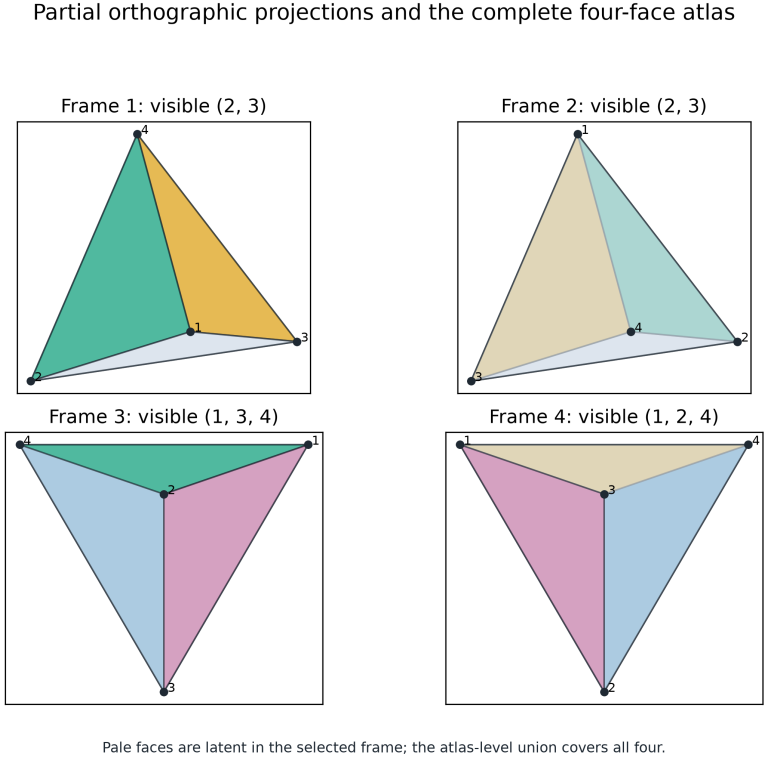

Figure 6: FORMAL — 4 deterministic orthographic projection frames. Saturated faces are classified as visible and pale faces are latent in each selected frame; the coordinated union, rather than any one view, covers all 4 faces.

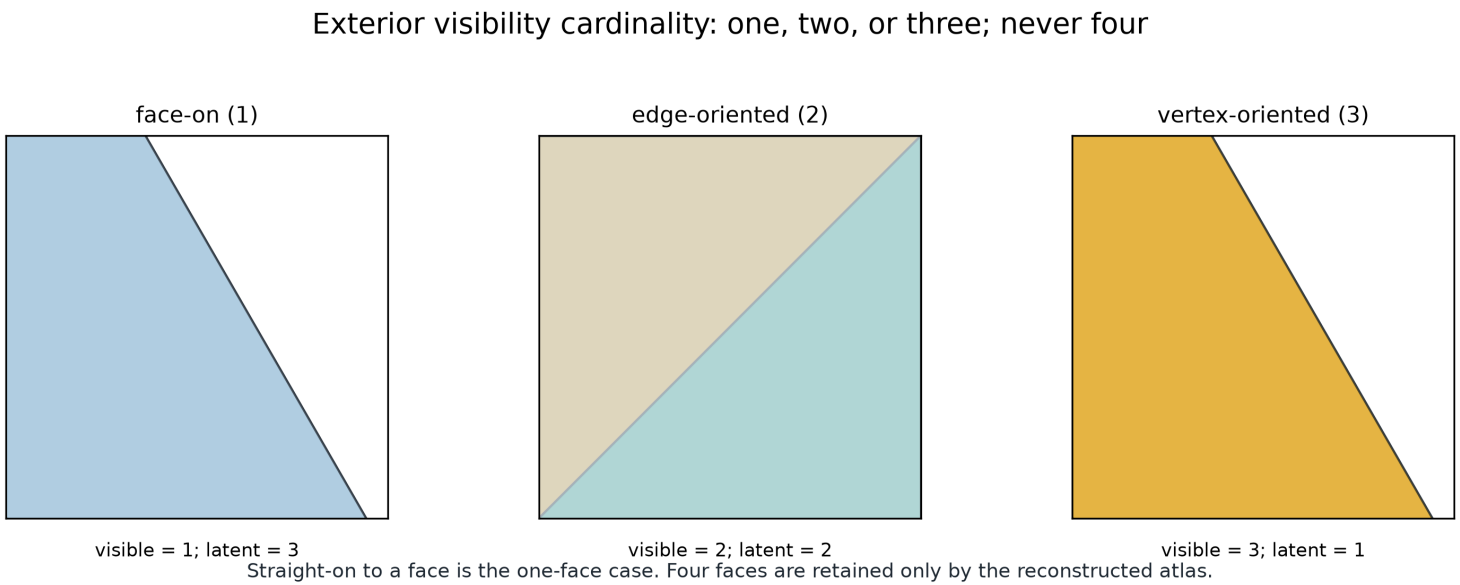

Figure 7: FORMAL — Canonical visibility sequence for the formal exterior classifier: face-on, edge-oriented, and vertex-oriented cases realize the valid cardinalities 1, 2, or 3. 4-face coverage is reserved for the atlas-level union.

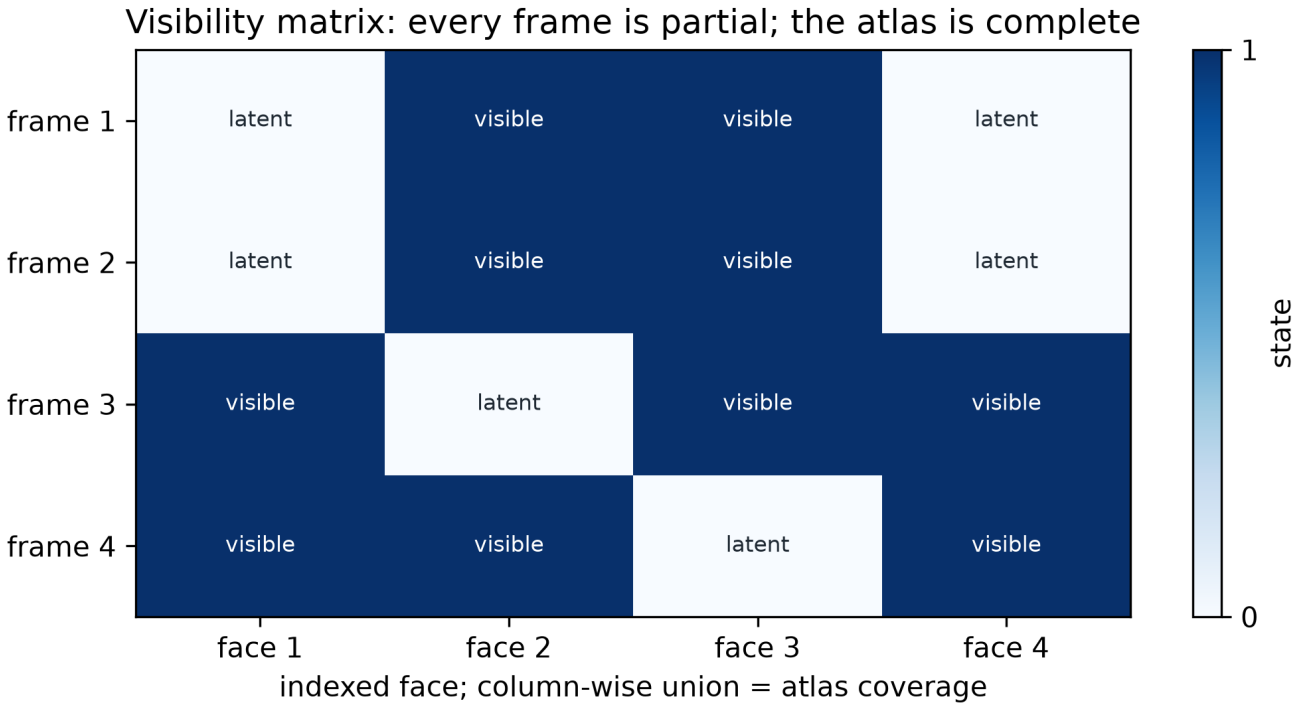

Figure 8: FORMAL — Binary visibility matrix for the formal observability rule: rows are camera frames, columns are indexed faces, and the column-wise union is the atlas coverage state. A row of 4 visible faces is intentionally absent as a negative control.

6.6 Sampling the Exterior: A Diagnostic, Not a Psychology

The atlas is a constructive existence result: these selected frames cover all 4 faces. It does not by itself describe the distribution of face counts over directions. To make that distinction measurable, the build samples 720 midpoints of a deterministic Fibonacci sphere and places the camera on a remote exterior sphere. If $k_i = |V(\mathbf{c}_i)|$, the diagnostic reports:

$$\bar{k} = \frac{1}{N}\sum_{i=1}^{N} k_i, \qquad \bar{o} = \frac{\bar{k}}{4}, \qquad N = 720. \tag{6}$$

The current run reports a mean of 1.999 visible faces and a mean observability of 0.500; its complete count distribution is `0:0, 1:123, 2:475, 3:122, 4:0` (key = visible-face count, value = sampled directions). This is a formal classifier diagnostic. It is not a model of human vision, a psychophysical estimate, or a claim that any face count has a natural probability in Blake's poetry. The remote-camera choice removes the otherwise confounding case in which a camera sphere intersects the tetrahedron itself.

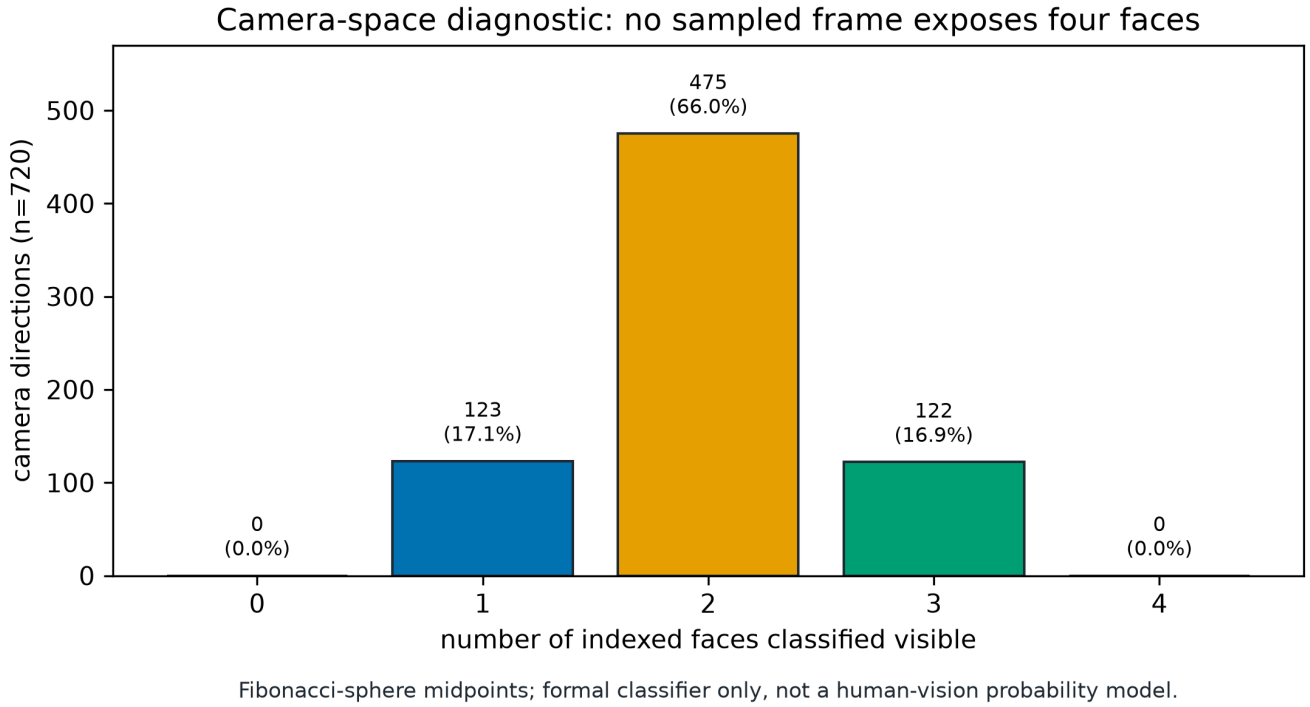

Figure 9: FORMAL — Deterministic camera-space diagnostic over 720 remote Fibonacci-sphere directions. The valid cardinalities are 1, 2, or 3; the negative-control bins 0 and 4 are absent. The finite sample describes the classifier, not human visual probability.

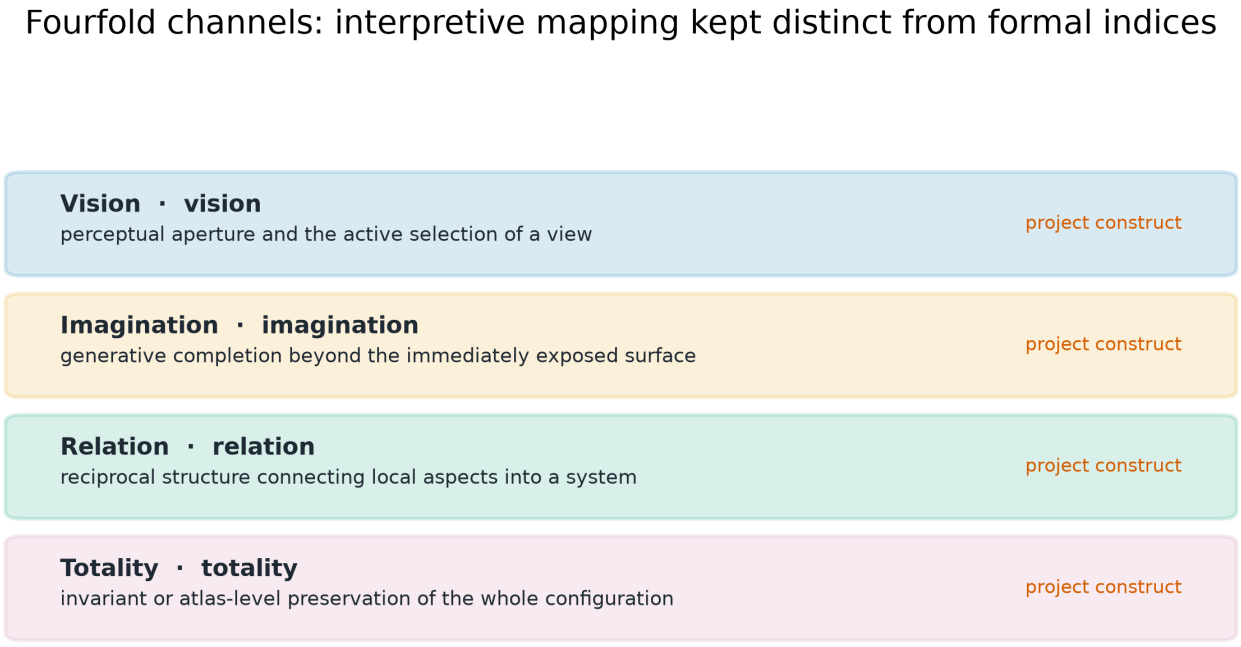

Figure 10: INTERPRETIVE — Project-level interpretive channels—Vision, Imagination, Relation, and Totality—mapped to formal indices while remaining separate from the tetrahedral implementation and from any historical claim that Blake used a coordinate system.

7 Symergetics as Discipline: Exact Arithmetic and Invariant Form

7.1 Exactness as a Constraint on Metaphor

An analogy becomes intellectually useful when it has a failure condition. In this project, exact arithmetic supplies that condition. The local geometry core uses rational coordinates and determinant checks; the QuadMath adapter executes independent integer tetra-volume routes, while Symergetics instantiates standard polyhedra and their IVM volumes [Friedman, 2025d,e].

The Symergetics surface reports a unit tetrahedron of volume 1, an octahedron of volume 4, and a cuboctahedron of volume 20. The ratio is therefore 1:4:20, not an illustrative number chosen for the figure. These are the normalized volumes used by the selected upstream surface; they should not be confused with the local model's exact 8/3 Cartesian volume or with a claim that every physical or historical object has been reduced to an integer lattice. The scale law in eq. 2 explains why the ratio can be portable while the absolute number is not. The same constants are independently asserted in QuadCraft's JavaScript identity suite [Friedman, 2026g]. Agreement across the Python and JavaScript surfaces is not a proof of Fuller's philosophy, but it is a reproducibility check on the formal bridge.

7.2 What the Invariants Do—and Do Not—Warrant

The invariant report tests positive tetrahedral volume, 4 faces, exact coordinate normalization, Cartesian round trips, and the observability negative control. The negative control is essential: if a camera were labeled as exposing all 4 faces, the visual metaphor would have silently changed from "atlas-level totality" to "a single projection sees everything."

QuadMath's information-geometry module also makes the bridge operationally extendable. Its Fisher-information and Active-Inference functions are recorded as an analyzed surface, not smuggled into the geometry theorem. They support a future experiment in which view selection or perceptual updating is assigned a metric, but the present paper makes no claim that Fisher geometry validates Blake's imagination. The layers remain separate: exact invariants constrain the interpretation; they do not determine it.

8 Kirby Urner's Quadray Lineage: Computation as Synergetic Pedagogy

8.1 From Four Rays to a Computable Language

Kirby Urner's Quadray essays provide an important technical and pedagogical lineage for this project. They are not peer-reviewed historical scholarship on Blake, and they should not be treated as Fuller's own unmediated voice. They are, however, primary records of an early effort to make Synergetics executable and teachable on the web. Urner's introduction begins with a sentence that could serve as a compact prehistory of the present viewer: "The game of quadrays starts with a regular tetrahedron and four rays pointing from its center to the four corners" [Urner, 1997a].

That sentence changes the status of the tetrahedron. It is not merely an illustration placed beside a theory; it is a construction interface. A learner can start with four directions, combine them, and ask what spatial relations follow. This is close to the present paper's operational move: fourfold vision is not assigned four meanings by fiat, but modeled as a state whose aspects, views, and relations can be inspected.

8.2 Coordinate Systems Are Choices, Not Revelations

Urner's *Quadrays and XYZ* is especially useful because it refuses to hide the choices that make a coordinate system usable. The relation between Quadray and Cartesian coordinates requires declared conventions of scale and orientation [Urner, 1997d]. This is the right scholarly posture for the Blake comparison. The tetrahedron does not reveal Blake's meaning by itself; it supplies a convention under which partiality, visibility, and reconstruction can be calculated.

The present implementation makes the same convention explicit in a slightly different way. As the geometry chapter derives, the four basis vectors sum to zero and subtracting the minimum component chooses a normalized representative. Urner's work helps locate this operation historically as a practical coordinate problem; the current code treats it as a declared gauge choice. Neither normalization nor the four basis labels should be mistaken for an additional physical dimension or a semantic partition of Blake.

This distinction also prevents a common form of technical mythology. A coordinate system can be elegant, old, influential, or useful without being the unique language of nature. In *Finding A Context for Synergetics*, Urner distinguishes the overstrong claim that Fuller discovered nature's geometry from the more defensible claim that Fuller helped popularize a geometry nature already uses [Urner, 2021]. The same restraint governs this paper's historical claims.

8.3 Shapes as Relations, Not Inventories

Urner's *Quadrays and the Concentric Hierarchy* treats polyhedra as relational data: points are stored as four-tuples and shapes as collections of edges [Urner, 1997b]. This is a direct antecedent for the project's separation of models from renderers. A figure is not the object; it is one view generated from an indexed object and a declared camera. The current `TetrahedronModel`, `ObservationFrame`, and figure registry extend this principle into a rights-aware publication pipeline.

The same essay is pedagogically important because it treats the tetrahedron, dual tetrahedron, octahedron, and related forms as a connected family rather than as isolated solids. Urner's *Quadrays and Volume* then moves from edge differences to volume calculation and links the coordinate representation to the Synergetics concentric hierarchy [Urner, 1997c]. *Pascal's Tetrahedron* extends the lineage toward combinatorial paths and integer-addressed motion [Urner, 2000]. These precedents sharpen the present distinction between three layers:

1. a coordinate convention;
2. a relational object model; and
3. a rendered or traversed observation.

The visual atlas is consequently not a claim to have found the "true" view of a tetrahedron. It is a controlled experiment in how several partial views can be registered against one relational object.

8.4 Three Lineages, No Historical Shortcut

Urner's technical work clarifies how Fuller's geometry can become a curriculum: four rays become addresses, addresses become points, points become edges and polyhedra, and polyhedra become computations. Fuller's philosophical language then supplies a larger vocabulary—Universe, interaccommodation, minimum structural event—within which those computations can be interpreted. The levels remain distinct. Urner's pages are evidence for a technical lineage and an educational practice; Fuller's books are evidence for Fuller; Blake's texts are evidence for Blake.

The analogy to Blake enters at the level of perceptual organization. Blake's *Jerusalem* states: "If Perceptive Organs vary: Objects of Perception seem to vary: / If the Perceptive Organs close: their Objects seem to close also" [Blake, 1820]. Urner's coordinate pedagogy does not prove this claim, but it gives the paper a precise model of what "closure" can mean in one restricted domain: a view is generated from a frame, and the frame determines which faces are visible, latent, or reconstructed. The model makes the relation inspectable without collapsing Blake's theological and poetic argument into geometry.

8.5 What This Project Adds

This project therefore cites Urner as a formative technical interlocutor, not as a token name in a bibliography. The adapter boundary preserves that distinction: the project does not vendor Urner's pages or claim to reproduce his historical code; it reimplements a small, tested surface and records the upstream QuadMath, Symergetics, and QuadCraft executions separately. The result is a lineage with visible seams: Urner's coordinate pedagogy, Fuller's Synergetic system, the public software surfaces, and the new interpretive mapping each remain identifiable.

9 The Executable Atlas: Geometry, Evidence, and the Golden Thread

9.1 Pinned Surfaces and Local Adapters

The project has a layered architecture. `geometry.py` contains pure exact/rational geometry and float projection. `models.py` defines the public data contracts. `evidence.py` validates citations, rights, and upstream pins. The figure and viewer modules are renderers over those contracts, not alternate sources of mathematical truth. `statistics.py` adds a deterministic camera-space diagnostic; it reports face-count frequencies while preserving the boundary between formal classifier behavior and claims about human perception.

The public upstreams are pinned rather than vendored. `docxology/blake` offers the corpus contract and rights-aware release surfaces [Friedman, 2026c]. The viewer is an independent small implementation checked against QuadCraft's browser projection precedents [Friedman, 2026g], while the exact arithmetic remains local and auditable against the QuadMath and Symergetics precedents. This wording matters: no upstream engine is silently repackaged as if it were project-native code.

The build now exercises those surfaces. The Blake adapter parses the canonical target ledger at version `2026-06-22`: 104 target records in 12 categories. The QuadMath adapter imports the real `Quadray`, determinant-volume, Cartesian round-trip, and `fisher_information_quadray` surfaces, exposing 6 selected symbols in the analysis report [Friedman, 2025d]. The Symergetics adapter instantiates its unit tetrahedron, octahedron, and cuboctahedron and records the executed ratio 1:4:20 [Friedman, 2025e]. Finally, a Node subprocess runs QuadCraft's 8-check geometric identity suite before the browser viewer uses the related projection module [Friedman, 2026g]. The analysis records 11 selected-file checksums and reports 0 missing selected symbols, so a passing geometry figure cannot conceal a changed adapter surface.

9.2 A Verification Gate Before Interpretation

The generated invariant figure reports the checks that must pass before the interpretive figures are trusted: 4 basis vertices, 4 faces, positive volume, exactly 1, 2, or 3 faces exposed in every accepted orthographic camera frame, and 4 faces covered by the atlas. The results are shown in fig. 11.

The browser viewer makes the same distinction interactively. It exposes camera azimuth and elevation, highlights visible faces, labels latent faces, and provides face-on/edge-oriented/vertex-oriented presets for cardinalities 1, 2, and 3. It is an interface for inspecting the model, not a replacement for the reproducible static figures. The viewer uses the same 4 basis vertices and face ordering as the Python implementation.

The static atlas and the viewer have complementary epistemic roles. The static figures are versioned publication artifacts with captions and registry metadata; the viewer is a navigable instrument for exploring camera state. Neither surface is allowed to imply that rotating a model produces simultaneous optical access to 4 faces. The generated JSON statistic makes the same restriction machine-readable for downstream audits.

9.3 A Readable Path Through a Radiating Graph

The argument graph is a second atlas. Its nodes are claims or transitions and its edges record relations such as comparative response, formal analogy, computational test, integration, and qualification. The golden thread selects one path: the presentation problem leads to Blake's fourfold critique, then to the tetrahedral grammar, the partial-observation atlas, the philosophical-system claim, and finally the historical limitation.

This graph structure formalizes the Fuller Conjecture's presentational problem. The path is sequential because a reader needs an order; the graph remains non-linear because the meaning of each node depends on reciprocal relations. The software can therefore expose the line without claiming that the line is the whole system. This graph/path distinction follows the language-decomposition and handshake intuition of *Graphspeak* [Djuwidja and Friedman, 2025].

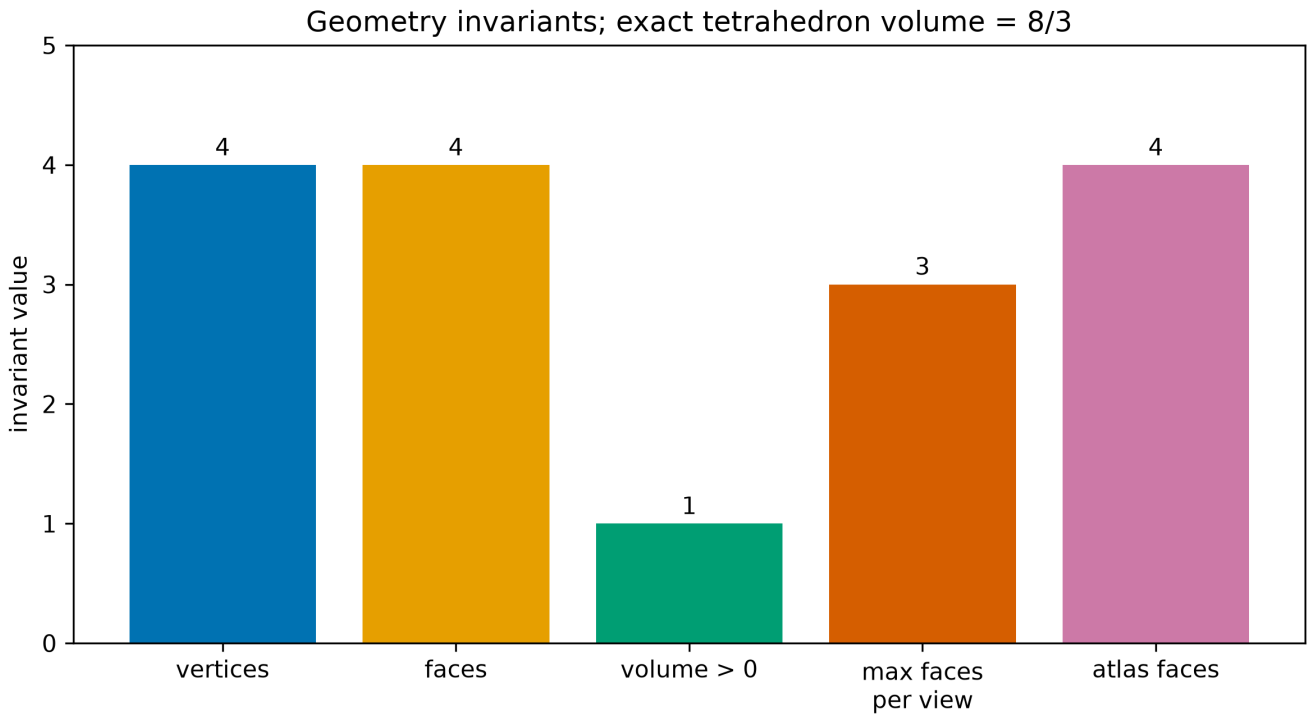

Figure 11: FORMAL — Computational gate for the formal bridge: tetrahedral structure, exact volume, Quadray/Cartesian round-trip normalization, atlas coverage, and the partial-view negative control. These checks certify the implementation, not a Blakean ontology.

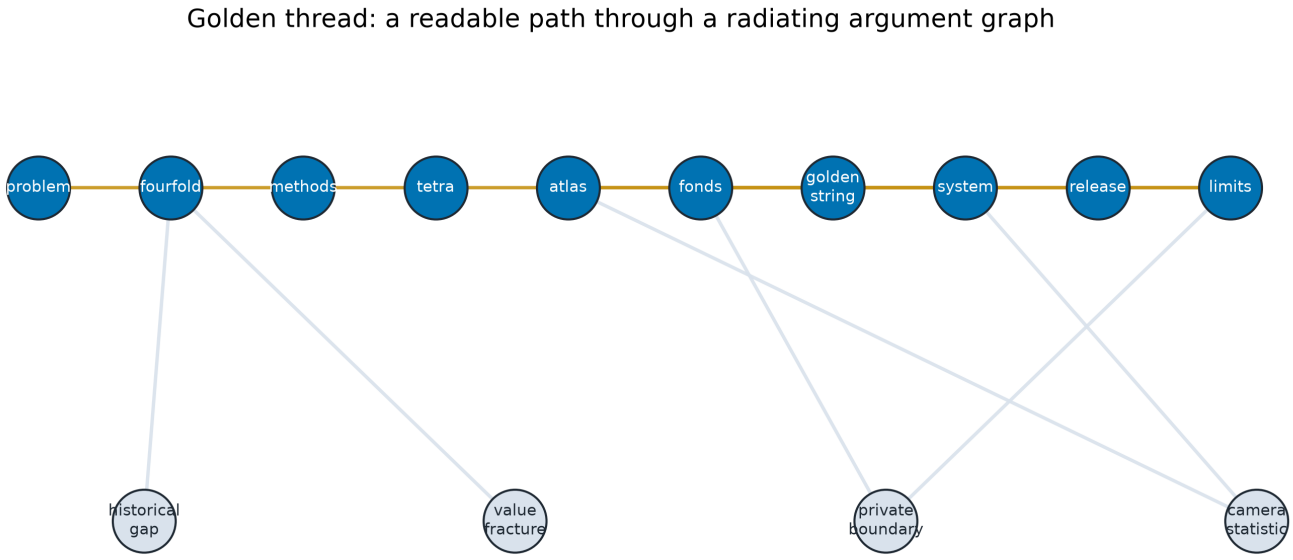

Figure 12: INTERPRETIVE — The selected golden-thread path is a readable traversal through a larger source-backed argument graph. Radiating alternatives, formal tests, tensions, and qualifications remain in the graph even when the manuscript presents one ordered route.

10 Fonds, Sources, and Warrants: A Rights-Aware Blake–Fuller Corpus

10.1 Eight Blake Studies, Eight Jobs in the Argument

The project treats previous work as a connected evidence network. The matrix in fig. 13 records each paper's substantive role: comparison [Friedman, 2023], fourfold/tetrahedral vocabulary [Friedman, 2024], predictive perception [Friedman, 2026e], fourfold hierarchy and pragmatic geometry [Friedman, 2026a], closure [Friedman, 2026d], material valuation [Friedman, 2026b], corpus and rights discipline [Friedman, 2026f], and the agent–niche relation [Friedman, 2025b]. The eighth Blake-related fond is therefore present in the matrix and ledger rather than silently omitted.

10.2 Warrants That Do Not Transfer

The paper's central discipline is not simply "more citations." It is a rule about what each kind of evidence is allowed to warrant:

Evidence layer	What it can support here	What it cannot support by itself
Blake primary text or image	A claim about Blake's wording, object, or historical textual situation	A Quadray theorem or Fuller's later conceptual identity
Blake or Fuller scholarship	Editorial context, competing interpretations, and historiographic caution	A substitute for inspecting the primary object or a software execution
Formal mathematics	Coordinate identities, normalization, volume, and visibility invariants	Blakean meaning, historical influence, or philosophical truth
Executed software surface	A reproducible result at a pinned revision and selected API boundary	The correctness of an upstream's entire repository or corpus
Private metadata and aggregates	Section identity, provenance, and release-safe corpus structure	The content or argument of an unexported private section
Interpretive mapping	A readable, inspectable analogy marked as a project construct	Evidence that the historical actors held the mapped concepts

This hierarchy prevents a common category error: a formal diagram can clarify a comparison without becoming evidence for the historical proposition that motivated it. `claim_ledger.yaml` and the argument graph encode that boundary.

The Fuller argument is similarly stratified. The following table is the paper's anti-conflation control:

Layer	Example	Warrant in this paper	Status
Fuller primary proposition	Fuller's section-numbered claims about interaccommodation, tetrahedral coordination, and generalization in *Synergetics*	Historical reconstruction of Fuller's vocabulary, checked against the cited edition	Primary, edition-limited
Fuller Conjecture interpretation	"there exists a line of reasoning…"; Kenner's elusiveness of linearity; facts/rules; naturalism, structural realism, psychohistoricism	Contemporary reception source that frames the presentational problem	Anchor reception scholarship
Synergetics University reception	*Spelling Synergetics*, *Great Circles*, *Tension and Integrity*, C60, and the Open Letter	Article-level interpretive and material-afterlife context	Citation-only related scholarship

Layer	Example	Warrant in this paper	Status
This paper's formal construction	Visibility rule, cardinality proposition, exact Quadray round trip, atlas union, statistics fingerprint	Reproducible mathematical/software result	Formal/software
This paper's analogy	Blakean fourfold language ↔ four indexed aspects preserved across partial views	Qualified structural interpretation, bounded by historical non-identity	Interpretive; no influence claim

The table makes a deliberate asymmetry visible: the Fuller Conjecture can motivate a presentation problem without becoming evidence for what Fuller historically meant, and a successful geometric test can constrain the analogy without proving it. The locator ledger records this distinction at source and claim level.

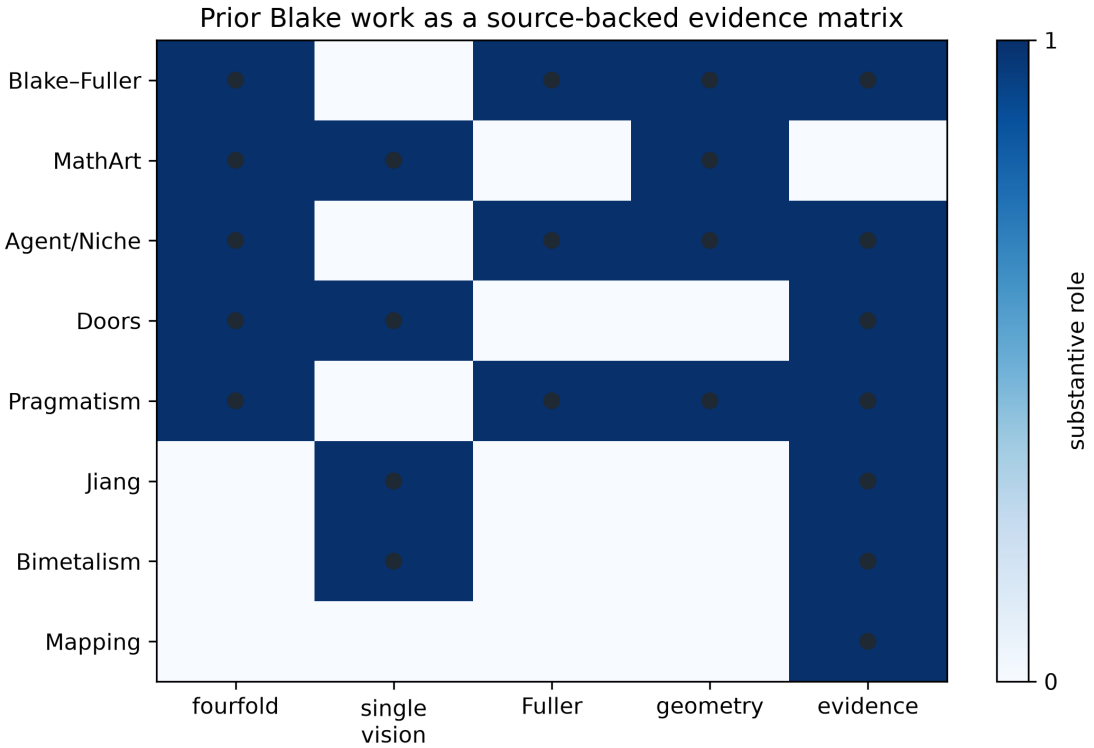

Figure 13: HISTORICAL — Blake portfolio evidence matrix: each prior work has a substantive role in the present argument, while primary texts, interpretive scholarship, software diagnostics, and release status remain distinct evidence layers.

The public `blake` ledger and diagnostics support reproducible corpus claims without granting permission to redistribute provider materials.

10.3 The Fuller Corpus: Primary Text, Private Metadata, Public Limits

The private Synergetics repository contributes 14 section identifiers, blob hashes, byte sizes, figure provenance, and derived metadata aggregates. It does not become a second publication channel for the private PDF or scraped records. The visual shown in fig. 14 plots the manifested byte sizes of those section records; it is intentionally a metadata-derived aggregate rather than a transcription or

facsimile of a private source. The public boundary is tested by the rights matrix and the private manifest's explicit `metadata_only` release posture.

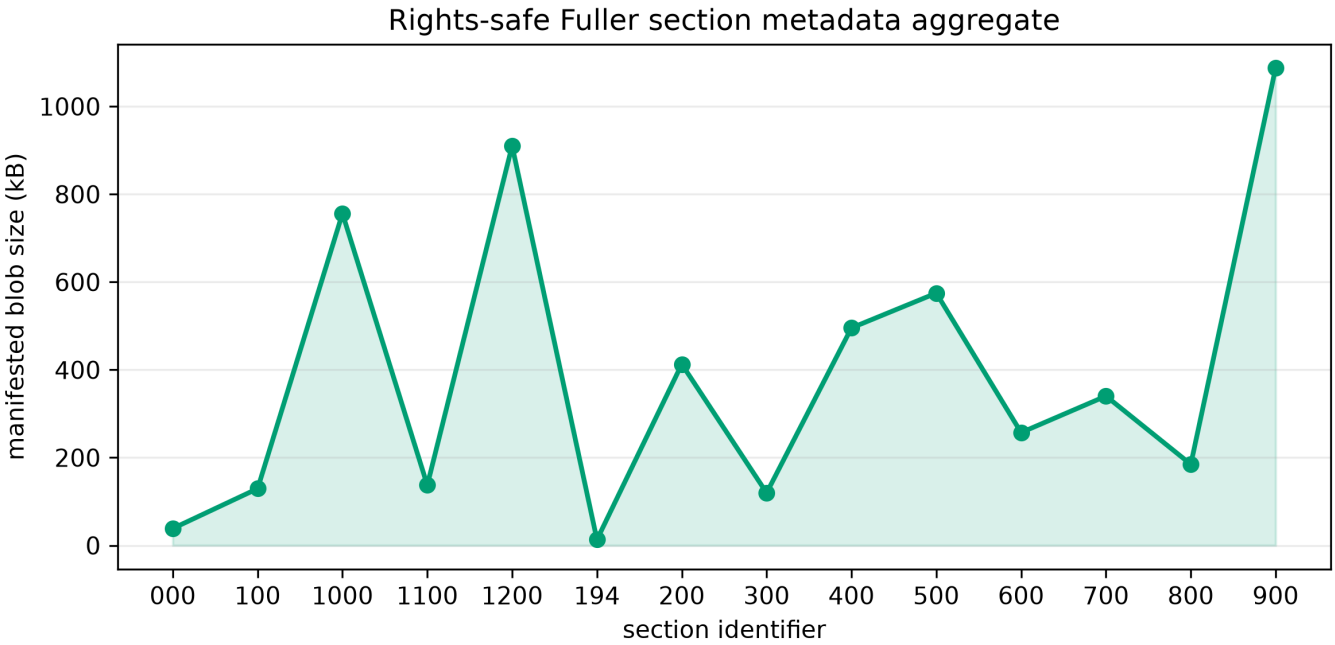

Figure 14: RIGHTS — Rights-safe aggregate of private Fuller section identifiers: the plot uses manifest metadata such as byte size and section identity, contains no private text or raw figure payload, and therefore supports provenance rather than substantive quotation.

10.4 DOI Drift as Scholarly Evidence

The upstream audit found multiple families of identifiers in the QuadMath and Symergetics surfaces. Each family contains a paper-level record and a companion software-release record; in both families the paper-level record also has a preceding version. Treating these as interchangeable would make the paper appear more stable than its provenance actually is. The resolved policy is therefore explicit:

Upstream	Manuscript-facing paper record	Companion software record	Earlier/observed record retained in audit
QuadMath	`10.5281/zenodo.16887800`	`10.5281/zenodo.16887791`	`10.5281/zenodo.16887799`
Symergetics	`10.5281/zenodo.17114390`	`10.5281/zenodo.17114383`	`10.5281/zenodo.17114389`

The selection follows the DataCite record type and version relations inspected on 14 July 2026: the paper records are text outputs that declare the retained identifiers as earlier versions, whereas the companion records are software outputs linked to repository tags. The pinned checkout's README and generated metadata are preserved as observed locations in `data/upstream_metadata_audit.yaml`. The citation ledger and upstream manifest must agree with the canonical paper DOI, and the validator fails if they drift. This is a small but important instance of the paper's thesis: a trustworthy whole is not one that erases local disagreement, but one that keeps the relations among records inspectable.

10.5 Rights Are Part of the Argument

The rights matrix distinguishes project code, provider-supplied Blake payloads, private Fuller records, and generated geometry. Public preflight rejects raw private or provider-supplied payloads; the artifact exposes code, manifests, checksums, source URLs, aggregates, and rights decisions only.

11 The Fuller Fonds as Graph: Metadata, Tensions, and Traversal

11.1 Metadata Without Leakage

The private `docxology/synergetics` repository is used as a corpus of section identifiers and provenance metadata, not as an unbounded text source. The project records 14 section manifests at the pinned revision, each with a path, Git blob SHA, and byte size. The resulting aggregate is plotted in fig. 14. No private section text is read into the public manuscript, and no raw scraped JSON or provider-supplied PDF is copied into this sidecar's release surface.

This boundary is analytically productive. The section inventory lets the project ask how a corpus is partitioned, how a figure or claim might be located, and how a private source can participate in a reproducible argument without being redistributed. It also makes the corpus's incompleteness visible: metadata can establish that a section exists and has a stable blob, but cannot stand in for the section's argument.

The distinction also limits the paper's Fuller scholarship. The private section inventory is not treated as direct evidence for a proposition about Fuller's philosophy in the public manuscript. Those propositions are cited to Fuller's published *Synergetics* and to the public Fuller Conjecture prompt; the private corpus contributes provenance, partitioning, and release discipline. This is a deliberately weaker claim, but it is the claim the available rights surface can honestly support.

11.2 The Graph Behind the Golden Thread

The argument graph joins the Fuller Conjecture, Blake's perceptual plurality, formal tetrahedral geometry, the computational atlas, fonds and ledgers, the philosophical-system claim, and the release boundary. Its branches are not noise. The historical-gap branch prevents the structural analogy from being read as anticipation. The value-fracture branch connects single-vision closure to the material valuation problem developed in *The Golden Compass and the Lunar Flux* and the cognitive closure analyzed in BlakeJiang [Friedman, 2026b,d]. The private-boundary branch ensures that comprehensivity includes what cannot ethically be exposed.

The golden thread traverses the problem, fourfold vision, method bridge, tetrahedron, atlas, fonds, Blake's golden-string interface, system, release, and limits. In its hydrated form the path is `problem` → `fourfold` → `methods` → `tetrahedron` → `atlas` → `fonds` → `golden_string` → `system` → `release` → `limits`, with 9 declared transitions. This is a readable sequence, not a claim that the Fuller corpus itself is sequential. It is a small executable answer to the Conjecture's presentation problem: the path can be read in order, while the graph retains the radiating alternatives and the validator can reject a path whose edges or sources have been silently altered.

The phrase "golden string" is not ornamental here. It names the relation between a source-level image and a software-level operation. Blake's string is a continuity that must be wound; the project's path is a continuity that must be selected, typed, and checked. In both cases, the value lies in guidance through complexity rather than in possession of the whole at a glance. The analogy stops at that functional relation. The code does not interpret *Jerusalem*, and the Blake quotation does not validate a graph algorithm.

12 Discussion: Synchronous Form, Historical Limits, and Consequences

12.1 Synchronous Form Without Omniscience

This paper uses "synchronous omni-rational form" for a representation that:

1. retains several aspects at once as a structured state;
2. records the relation among those aspects rather than flattening them into independent observations;
3. still offers a sequential interface for explanation and critique.

The tetrahedral atlas is a minimal instance: one camera remains partial, while the atlas preserves identity, relations, and coverage. The argument graph is its conceptual counterpart: the golden-thread path is generated from, but not identical to, the graph.

Let C denote the 4 recorded channels, $\mathcal{R}$ their typed relations, $\mathcal{A}$ the atlas of partial frames, and T the selected golden-thread traversal. The operational form is therefore:

$$\mathcal{S} = (C, \mathcal{R}, \mathcal{A}, T). \tag{7}$$

"Synchronous" means co-present aspects and relations remain inspectable; it does not mean simultaneous optical visibility or escape from model bounds.

For this paper the term has 6 measurable obligations:

1. declared aspect set
2. typed relations
3. retained latent state
4. regenerable sequential traversal
5. source and rights boundaries
6. reproducible reconstruction

The tetrahedral atlas satisfies these criteria within its small formal domain; it does not thereby become a complete model of perception or of *Synergetics*.

The adjective "omni-rational" is similarly operational rather than metaphysical. "Omni" refers to retaining a declared set of aspects and their relations across views; "rational" refers to explicit rules, exact-compatible coordinates, typed provenance, and a criticizable traversal. The term does not promise access to every aspect of an object, every meaning of a poem, or every route through *Synergetics*. Its value is negative as much as positive: a form is more comprehensive when it can display what it excludes, what it leaves latent, and which normalization it has chosen.

12.2 Perception, Prediction, and Ecological Constraint

The earlier Doors of Perception paper and Active Inference make it possible to describe perception as inference under a generative model [Friedman, 2026e, Friston, 2010]. The project does not require that vocabulary to validate its geometry; it uses it to discuss why a local view can be adequate yet globally incomplete, and why imagination can construct what a view does not expose.

Adjacent fonds sharpen the bridge: *Agent and Niche* makes observer and environment reciprocal [Friedman, 2025b]; *TemporalDepth* supports integration across temporal scales [Friedman et al., 2025]; and *SystemsProcesses* places it within process philosophy [Friedman, 2025a]. These are interpretive supports, not evidence that Blake or Fuller used contemporary Active Inference terminology.

12.3 Objections That Strengthen the Model

The comparison is most useful when its strongest objections remain inside the model:

Objection	Reply in this paper
A tetrahedron has faces, whereas "vision" is a literary and theological term.	Correct. The relation is structural and operational: partial exposure, latent aspects, and coordinated reconstruction. No semantic identity is asserted.
The comparison is anachronistic.	The 1802 Butts letter is treated as historical evidence in its own context; Quadray and Fuller enter as later formal and comparative resources, not as Blake's hidden vocabulary.
An atlas is not totality.	Correct. It is a finite, model-bounded coverage state. "Totality" names preservation within the selected state, not access to everything that exists.
Active Inference could smuggle contemporary neuroscience into Blake.	It is used as an adjacent explanatory vocabulary for model-dependent perception, with its historical and theoretical limits stated explicitly.
Exact arithmetic may give the analogy a false aura of proof.	The tests certify implementation invariants only. They constrain interpretation; they do not decide literary meaning or philosophical truth.
A frequency plot may be read as a theory of seeing.	The statistic samples a formal classifier over remote directions; its caption, JSON status, and manuscript prose explicitly deny psychophysical scope.

12.4 The Strongest Alternative: Do We Need the Tetrahedron?

The strongest alternative is to drop the tetrahedron and keep only a historical account of changing viewpoints, plural vision, and Blake's critique of Newtonian closure. That version would be cleaner as Blake scholarship: it would lean on Calè, Groves, Ault, Davies, and Erdman, and it would avoid the risk that a later coordinate system appears to explain an earlier poetic practice. The cost is that the paper would lose its executable test case for the relation between a partial view and a reconstructed whole.

12.5 Necessity Versus Usefulness: Why This Simplex

The tetrahedron is useful here without being necessary to Blake's language. The ablation below makes that distinction explicit:

Model	What survives	What disappears	Decision
Tetrahedral atlas	4 aspects, three-dimensional depth, one/two/three-face partiality, Quadray rays, exact volume, and a finite atlas union	Blake's historical meanings remain external to the model	Retain as the paper's executable laboratory
Abstract four-channel state	4 labeled aspects and synchronous retention	No camera geometry, face-cardinality proposition, or Quadray lineage	Retain as the semantic control
Four-sided planar model	4-sided indexing and atlas-level union	No tetrahedral depth, minimal simplex structure, or 3D face-plane dependence	Retain as a contrast, not as the main model

The tetrahedron therefore contributes a minimal three-dimensional 4-face simplex, a direct Quadray lineage, and a computable relation between partial views and atlas coverage. The ablation removes each contribution while retaining 4-channel language; the analogy becomes weaker but does not collapse. This is why the model is selected for usefulness, not presented as a historical necessity or as a deduction from Blake.

A skeptical reader might argue that Calè's reconstructive account already supplies the relevant visual theory, making the tetrahedron unnecessary. That objection is partly right. The literary-historical account is richer than the software model and should remain the primary interpretation of Blake. The tetrahedron earns its place only as a deliberately impoverished laboratory: it makes one relation—coverage across partial views—computable, repeatable, and falsifiable by a 4-visible-faces negative control. It is not a rival explanation of Blake's craft.

The converse objection is equally important. A formal atlas can appear more rigorous than the historical material because its boundaries are crisp. This is a rhetorical asymmetry, not an epistemic victory. The atlas has exact coordinates because the project chose a finite object; Blake's vision is historically difficult precisely because its media, bodies, theology, and revision practices exceed that object. The paper's strongest conclusion is therefore comparative and methodological: a good system should reveal where its precision comes from and where that precision stops.

These replies are negative controls: they prevent a formal or visual result from silently expanding the claim's scope.

12.6 The Negative Knowledge of the Analogy

The project does not prove that Blake possessed a tetrahedral ontology, that Fuller derived his system from Blake, or that Quadray is the uniquely correct mathematics of imagination. It does not turn the *Four Zoas* into coordinates; the mapping file marks such associations as project constructs with source keys.

The historical limitation is part of the result: a comprehensive system must represent blind spots, disputed sources, and unlicensed payloads. Bimetalism and BlakeJiang show how single vision can become valuation or cognitive capture [Friedman, 2026b,d].

12.7 Returning to the Conjecture

The golden thread has a concrete form. Fuller's vision can be presented as a philosophical system when presentation means a coupled graph and path, geometry supplies invariants without exhausting meaning, and release limits remain visible. Blake's fourfold vision gives philosophical language to the demand that a view not be mistaken for the whole.

13 Reproducibility: From Pinned Surfaces to a Public Artifact

The project contains 51 ledger entries and a golden thread of 10 nodes. Its fonds register contains 19 available local records, while the private Fuller manifest contributes 14 metadata-only section records. The current build reports 0 upstream pin mismatches and 0 private metadata hash matches (not_checked_private_checkout_absent). The source tree is organized so that pure geometry can be tested without network access, figures can be regenerated from the local data manifests, and upstream revisions can be checked separately.

The cover is handled as a versioned editorial asset rather than as evidence. `data/cover_manifest.yaml` records its checksum, alt text, generated-art status, and private-first release posture; the build copies the checked asset from `assets/` into `../figures/`. This keeps the publication visually coherent without allowing generated imagery to acquire the authority of a primary Blake or Fuller source.

The reproducibility sequence is:

1. validate ledgers and verify pinned public checkouts;
2. run upstream/fonds analysis and persist checksums;
3. hydrate tokens and run exact geometry/observability tests;
4. generate figures and the dependency-free browser viewer;
5. render and validate the manuscript through `docxology/template`.

The canonical local sequence is:

```
uv run python scripts/sync_upstreams.py
uv run python scripts/build_upstream_analysis.py
uv run python scripts/z_generate_manuscript_variables.py
uv run python scripts/build_figures.py
uv run python scripts/build_viewer.py
```

The upstream manifest pins public repositories by commit and records the private Fuller corpus separately. The provenance manifest is deterministic and contains source identities and citation keys, not raw private payloads. Public release packaging must pass the rights gate before it can include any data artifact beyond code, metadata, aggregate diagnostics, or generated geometry.

Tests enforce the key negative control: an atlas may cover 4 faces, but no camera frame may expose all 4. They also require generated token values and reject unresolved placeholders. The architecture follows the `template/` precedent [Friedman, 2026h] and treats manuscript generation as a stateful decision surface [Friedman, 2025c].

14 Release and Method: Adapters, Interfaces, and the Ethics of Access

14.1 Adapters Instead of Vendored Engines

The project's software architecture follows a private-first, public-safe posture. Public repositories are acquired at pinned commits and narrowed by `data/upstream_surface_manifest.yaml`. The analysis artifact records selected source checksums, API symbols, and the results of small real executions. The complete upstream repositories remain in an ignored cache; the project ships the adapter logic, manifests, and reproducible commands.

This follows the infrastructure-as-code and provenance discipline developed in the *template/* reproducible-research fond [Friedman, 2026h]. The manuscript is also treated as a stateful document surface: source Markdown, generated variables, resolved Markdown, figures, and rendered PDF are successive states with validation gates, an approach consonant with the Markdown Decision Process [Friedman, 2025c].

14.2 The Visual Interface as a Research Instrument

QuadCraft's JavaScript coordinate and projection logic is used as a declared reference surface for a dependency-free browser viewer. The viewer's small implementation is tested independently; rotation, face highlighting, basis overlays, and latent-face labels expose the distinction between visible and reconstructed state. It is deliberately smaller than the C++ engine: its purpose is to make the paper's formal claim inspectable in a browser, not to reproduce an entire game [Friedman, 2026g]. The distinction between "reference surface" and "copied implementation" is recorded in the upstream manifest and keeps provenance honest.

The release surface also includes accessible color choices, explicit labels, machine-readable figure metadata, and a static fallback for every interactive view. This responds to the accessibility and open-learning concerns of the Active Inference accessibility fond [Friedman and Institute, 2025]. The Generative Research Team precedent supplies a complementary model of modular human, computational, and informational roles [Friedman and Smékal, 2023].

The cover follows the same separation of concerns. Its generated image carries an explicit alt-text record and a checksum, while the title and subtitle remain typeset in the manuscript. The image can therefore carry atmosphere and conceptual compression without becoming a rasterized source citation or a barrier to text extraction.

14.3 What Public Means Here

Public-safe does not mean source-free. It means that the public artifact can reconstruct the project's code, pins, ledgers, generated geometry, and aggregate diagnostics while directing readers to the authoritative source repositories for material that is not redistributed. Rights status is carried as data and checked as code.

15 Conclusion: Seeing One, Two, or Three—and Keeping Four in View

The paper's central claim is deliberately qualified: Blake's fourfold vision, anchored in the 1802 Butts letter, is structurally analogous to a tetrahedral totality whose 4 aspects cannot be simultaneously exposed from one ordinary viewpoint. Quadray and Synergetics model partial observation and integration; they do not prove a historical identity between Blake and Fuller.

The Fuller Conjecture becomes tractable when presentation is a coupled graph, atlas, and golden thread: the graph preserves branches, the atlas preserves 4 faces across partial views, and the thread provides a route through the state. Formally, an accepted exterior frame exposes 1, 2, or 3 faces; the number 4 belongs to the atlas-level union, never to a single view. Exact arithmetic, upstream execution, citation ledgers, and rights gates keep the metaphor checkable.

Synchronous omni-rational form is therefore a state that retains mutually conditioning aspects, relations, and evidentiary limits while permitting sequential reading. It is modest enough to test and open enough for systems philosophy, visual epistemology, digital Blake scholarship, and Active Inference. The next step is to test more specific Blake objects, edition histories, and Fuller passages under the same claim-type discipline.

16 Appendix: Evidence Obligations, Claim Types, and Release States

The paper's central analogy is easiest to audit when its obligations are written as a small schema. The following table is the interpretive contract implemented by the project rather than a claim about the structure of Blake's or Fuller's thought.

Claim type	Required support	Executable check	Release state
Historical	Primary text, image, manuscript record, or source-owned catalogue plus an explicit edition/scope	Citation key and source-ledger resolution	Citation or rights-cleared source only
Scholarly context	Identifiable secondary scholarship or prior paper with a stated role	Bibliography and citation-ledger resolution	Public citation metadata
Formal	Definitions, equations, declared coordinate convention, and invariant	Rational arithmetic, round-trip, volume, and observability tests	Generated result with source code
Software	Pinned revision, selected API surface, checksum, and real execution	Upstream analysis and pin validation	Public adapter and metadata; no vendored engine
Interpretive	Explicit status as analogy or project construct, with source keys on both sides of the bridge	Claim ledger, channel mapping, and argument-graph validation	Public prose with qualifications
Rights/provenance	Visibility, payload status, decision, and release boundary	Rights gate, private-manifest, and checksum validation	Public-safe aggregate or private-only metadata

Two negative controls follow from this schema. First, a row of the visibility matrix may never contain 4 visible faces, even though the atlas-level union may contain all 4. Second, a generated cover may never be cited as evidence for Blake, Fuller, or Quadray. These controls preserve the paper's distinction between seeing a relation clearly and claiming that the relation is historical fact.

The schema also explains why the paper keeps a golden thread alongside the full graph. A reader needs a sequential route, but a scholarly claim needs to retain its alternate sources, objections, epistemic status, and release limits. The path is therefore an interface to the evidence state, not a substitute for it.

16.1 Formal Proof and Ablation Obligations

The formal proof in the geometry chapter is the general warrant for the 1, 2, or 3-face result. The generated tests are narrower: they instantiate translated, scaled, reflected, skew, and rational tetrahedra, compare orthographic and pinhole projections, reject interior and hull cameras, and verify that the atlas union—not a frame—can equal 4. The tests are therefore executions of a proved proposition, not a replacement for the proof.

The ablation table in the discussion chapter is the corresponding interpretive control. It prevents the paper from smuggling historical necessity into a successful software demonstration: the abstract 4-channel state preserves the semantic idea without any tetrahedral geometry, while the planar model preserves 4-way indexing without the three-dimensional face-plane identity.

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