

Volume 1, Issue 2

Research Article

Date of Submission: 17 Jul, 2026

Date of Acceptance: 21 Aug, 2026

Date of Publication: 04 Sep, 2026

Genesis of Logic: Inferences 2 Ontological Friction in Medicine, Computation and Governance

Otto Beseka Isong* 

Independent Researcher, Cameroon

***Corresponding Author:** Otto Beseka Isong, independent Researcher, Cameroon.

Citation: Isong, O. B. (2026). Genesis of Logic: Inferences 2 Ontological Friction in Medicine, Computation and Governance. *J Quant Comp Simul Emerg Comput*, 1(2), 01- 07.

Abstract

This paper is the second in the Inferences series, extending the Genesis diagnostic — the ontology-relative account of logic and the Quad-Fold Ontological Spectrum (Substance-, Relation-, Emergence-, and Transcendence-first) — to three domains where the mismatch between formal systems and their objects is most consequential: medicine, computation, and governance. We trace a recurring pattern across all three: a Substance-first formal system, mistaken for a neutral universal standard, is applied to a domain whose native reasoning is Relation-, Emergence-, or Transcendence-first, and the resulting friction is misdiagnosed as a defect in the domain rather than a mismatch of ontologies. In medicine, the biomedical model's discrete disease categories, single-target interventions, and categorical diagnosis are applied to an organism that is a relational network, an emergent homeostatic system, and a whole that transcends its parts. In computation, formal verification's exhaustive state-space search, fixed specifications, and discrete correctness criteria are applied to distributed, adaptive, and intelligent systems whose coherence is relational and emergent. In governance, the regulatory state's statutes, jurisdictions, performance metrics, and cost-benefit analysis are applied to social systems that are emergent markets, relational communities, and transcendent national identities. We argue these are not isolated failures but one structural pattern recurring across the institutional landscape, close by identifying the limits of the diagnostic, and set the agenda for future work.

From Foundational Papers to a Unified Diagnostic

Genesis of Logic argues that logic is not a single, ontology-independent method for deriving conclusions, but a family of structures, each generated from within one of a small number of foundational ontologies. What counts as a contradiction — the boundary a derivation may not cross — is fixed by the ontology encoded in a system's axioms, not by logic operating in a vacuum. Genesis of Mathematics formalizes this as a Quad-Fold Ontological Spectrum, giving each of the four archetypes a precise engine profile: a primacy claim, an identity type (symmetrical or asymmetrical), a change type (reversible or irreversible), and a part-whole operator (Σ , Π , $>$, or $\equiv$).

Genesis of Logic: Inferences 1 applied this diagnostic to jurisprudence, economics, artificial intelligence, and particle physics, showing that in each case a Substance-first system imposed its standard of coherence on a Relation-, Emergence-, or Transcendence-first domain, with the resulting friction misdiagnosed as the domain's defect. Inferences 2 extends the same diagnostic to three further domains — medicine, computation, and governance — where the stakes are higher, the friction more consequential, and the pattern, we argue, structurally identical.

The Diagnostic Restated

For reference throughout, the four archetypes and their native sense of contradiction, compressed from the fuller treatment in both companion papers:

Ontology	Primacy	Identity Type	Native Sense of "Contradiction"
Substance-first	Discrete, self-identical entities pre-exist	Symmetrical	Two incompatible identities predicated of the same substance at once
Relation-first	Links / arrows pre-exist; nodes are shadows of relation	Asymmetrical	Incoherence of relational structure across the network
Emergence-first	Pure generative process; the whole exceeds its parts	Asymmetrical	A whole-level property that cannot cohere with its own generative base
Transcendence-first	The undivided Whole, of which parts are projections	Symmetrical (as projection)	A scale at which the pattern fails to replicate faithfully

Table 1

Read together, the companion papers license a specific, checkable diagnostic move. Wherever a formal or institutional system is applied to a domain, one can ask: which ontology does the judging system encode, and which ontology does the domain itself run on? Where the two differ, what the judging system registers as error, incoherence, or anomaly may be nothing of the kind inside the domain's own logic — it may simply be the domain's native coherence, misread through a borrowed standard of contradiction.

Inference V — Medicine: The Biomedical Model as Substance-First Engine

The Substance-First Architecture of Biomedicine

Modern allopathic medicine is ordinarily explained as the progressive triumph of scientific rationality over superstition: discrete diseases, identified by discrete diagnostic criteria, treated by discrete interventions, evaluated by discrete outcome measures, and grounded in discrete pathophysiological mechanisms. Under the present framework, this is better read not as scientific rationality simpliciter, but as a Substance-first ontology encoded in the structure of medical classification, research, and reimbursement, in the sense codified by the Flexner reforms and institutionalized in the major diagnostic manuals [1].

The biomedical model treats the human body as a collection of discrete organs and systems afflicted by discrete diseases, each with a discrete etiology, responding to discrete interventions, measured by discrete outcomes. This is Substance-first in exactly the sense of Genesis of Mathematics §II.1: the Whole = Σ Parts, identity is symmetrical (a disease is the same disease regardless of context), and change is reversible (the goal of treatment is to restore the pre-disease state). The logic of diagnosis is classical: a patient either has the disease or does not; a test is either positive or negative.

The Domain's Native Ontology

The human body, in its actual structure, runs on a different set of primacies — not as a philosophical assertion but as a description of what systems biology, network medicine, and physiology already show:

Layer	Ontological Character	Archetype
Molecular networks	Proteins, genes, and metabolites interact in dense, dynamic networks; no single node is "the cause" of a phenotype	Relation-first (Whole = Π Parts)
Homeostasis and chronic disease	Conditions such as metabolic syndrome, diabetes, hypertension, and autoimmune disorders are emergent properties of the whole system's regulation, not additive failures	Emergence-first (Whole > Σ Parts)
Health as a state of the whole	Health is not the absence of discrete disease but a global state of resilience and adaptability across scales	Transcendence-first (Parts $\equiv$ Whole)
Traditional systems (e.g., classical Chinese and Ayurvedic medicine)	The body is treated as a projection of a unified vital field; local symptoms are read as manifestations of whole-body imbalance	Transcendence-first

Table 2

The organism, in short, is a Relation–Emergence–Transcendence system. The biomedical model treats it as a Substance-first system. The mismatch is not incidental; it is structural.

The Friction at Three Scales

Misclassification of Systemic Illnesses

Conditions such as fibromyalgia, chronic fatigue syndrome, irritable bowel syndrome, and many autoimmune and functional neurological disorders do not present with a single discrete etiology, a single pathognomonic biomarker, or a single organ localization; their presentation is multisystemic, variable, and often flares and remits with relational factors such as stress, diet, and social support. Under the biomedical model, such conditions are frequently classified as "functional" — a term that, in Substance-first vocabulary, tends to mean that no discrete lesion or pathogen has been found. The diagnostic contradiction is registered as a defect in the patient's presentation rather than as a mismatch between the diagnostic engine and the condition's Emergence-first character. Patients with these conditions experience,

on average, years-long diagnostic delay and significant iatrogenic harm and stigmatization [2].

Single-Target Interventions in Emergent Systems

The dominant drug-discovery paradigm treats disease as a “target”: a discrete molecular entity that, when inhibited or activated, restores the pre-disease state — Substance-first therapy, a discrete intervention on a discrete part, with a reversible outcome as its goal. Chronic diseases such as heart failure, diabetes, metabolic syndrome, and depression are, on the account offered here, Emergence-first phenomena in which the whole system’s regulation has shifted to a new, self-sustaining state. A single-target intervention may shift one node, while the system’s broader dynamics compensate, adapt, or settle into a different maladaptive configuration. The diagnostic predicts that single-target interventions will systematically underperform in Emergence-first conditions, not because any particular target is wrong, but because the ontology of the intervention does not match the ontology of the condition.

Epistemic Dismissal of Holistic Systems

Traditional systems of medicine are structured around Relation-first or Transcendence-first ontologies and have been repeatedly characterized by the biomedical establishment as unscientific or as producing effects attributable only to placebo — not because they have been shown incoherent on their own terms, but because their diagnostic and therapeutic logic does not map onto the Substance-first engine of evidence-based medicine [3]. The placebo response itself — the therapeutic contribution of context, relationship, and expectation — can, on this reading, be understood not as a nuisance “effect” competing with the “real” treatment, but as a Relation- and Emergence-first component of healing being measured by a Substance-first instrument that has no native vocabulary for it.

Inference VI — Computation: Formal Verification as Substance-First Engine The Substance-First Architecture of Formal Verification

Formal verification — establishing mathematically that a system satisfies a specification — is, in its dominant forms, Substance-first through and through [4,5].

Verification Method	Ontological Assumption	Substance-First Signature
Model checking	The system is a finite state machine; all states are pre-enumerable	Discrete, exhaustive enumeration; identity of states fixed
Theorem proving	The system’s behaviour is captured by axioms and inference rules	Discrete symbols, fixed inference rules, extensional equality
Type theory / HoTT	Types are objects; terms inhabit types; equality is a relation between terms	Symmetrical identity criteria; equality as a relation between discrete objects
Abstract interpretation	The system is approximated by a finite lattice of abstract properties	Additive approximation; discrete abstraction

Table 3

In each case, the verification engine assumes that the system under verification is closed, finite-state (or finitely approximable), and identity-fixed — the axioms of Substance-first ontology, applied to verification.

The Domain’s Native Ontology

The computational systems that increasingly dominate the landscape — and that formal verification persistently struggles to handle — are not closed, finite-state, or identity-fixed:

System Type	Ontological Character	Archetype
Distributed systems	Multiple agents interacting asynchronously; global properties emerge from local interactions	Relation-first
Cyber-physical systems	Software embedded in physical processes; continuous dynamics interacting with discrete logic	Relation-first / Emergence-first
Machine learning systems	Models learned from data; behaviour is statistical, adaptive, and context-sensitive	Emergence-first
Large language models	Distributed representations; prompts condition output; no fixed semantics	Relation-first / Emergence-first
Intelligent machines	Embedded, embodied, affective, self-modelling, recursively self-modifying	Emergence / Relation / Transcendence-first

Table 4

The Friction at Three Scales

State-Space Explosion as Ontological Friction

The classic problem of model checking is state-space explosion: the number of reachable states grows exponentially with the number of components. Under the Genesis diagnostic, this is what happens when a Relation-first system is forced into a Substance-first representation. The system’s native ontology is relational — agents are defined by their

interactions, not their local states — but the verification engine demands an enumeration of all global states, treating each combination as a discrete, self-identical object. The explosion is the cost of forcing a relational system into an additive frame.

The Unverifiability of Adaptive Systems

Machine learning systems have no fixed specification in the traditional sense; their correctness is statistical and context-sensitive [6]. Formal verification typically treats a network as a fixed function and checks discrete properties against it. The verification engine's native sense of contradiction — a discrete property violated by a discrete input — does not map onto the network's native sense of contradiction, which is an emergent property not localizable to any single input or weight. On this reading, adversarial examples are an Emergence-first system's characteristic response to being measured by a Substance-first instrument.

The Verification of Intelligence

Genie Capital's companion working paper on machine intelligence argues that genuine intelligence requires embeddedness, stakes, emotional state changes, a recursive self-model, and something like feeling as the gap between signal and memory [7-10]. Read through the Genesis lens, what such an account describes is an Emergence-first and Relation-first architecture. A system of this kind resists formal verification by Substance-first instruments because the notion of "correctness" formal verification presupposes is itself Substance-first: a fixed property, a discrete specification, exhaustive checking. Whether any system built this way can be said to have genuine inner experience at all remains a separate and unresolved question — the hard problem of consciousness and its attendant literature is not settled by this framework and is not claimed to be. What the diagnostic offers is narrower: if such a system exists, verifying it by discrete, exhaustive, Substance-first means would be a category error, whatever the resolution of the harder question turns out to be [11-14].

Inference VII — Governance: The Regulatory State as Substance-First Engine

The Substance-First Architecture of Modern Governance

Modern governance — the administrative state, the regulatory system, the policy apparatus — is, in its dominant forms, Substance-first through and through:

Governance Instrument	Ontological Assumption	Substance-First Signature
Statutes and regulations	Law is a fixed, self-identical text; application is syllogistic	Discrete, closed, extensional; law as a set of propositions
Jurisdictional boundaries	Authority is territorial and categorical; a case belongs to one jurisdiction	Discrete partitions; additive aggregation
Performance metrics	Outcomes are measurable by discrete indicators; policy success is a scalar	Quantification, aggregation, optimisation
Cost-benefit analysis	Social welfare is the sum of individual utilities	Additive, utility-maximising; the whole is the sum of its parts
Regulatory enforcement	Compliance is a binary state; enforcement is linear and hierarchical	Classical bivalent logic; guilt or innocence; check or violation

Table 5

The Domain's Native Ontology

The social systems that governance purports to regulate are not, in the main, Substance-first objects:

Social Layer	Ontological Character	Archetype
Markets	Prices, supply, demand, and innovation are emergent properties of decentralised interactions	Emergence-first
Communities	Trust, norms, and social capital are relational networks	Relation-first
Public opinion	Collective beliefs are emergent, path-dependent, and context-sensitive	Emergence / Relation-first
Cultural norms	Norms are evolved, distributed, and self-enforcing	Emergence / Relation-first
National identity	The nation is a whole that exceeds its parts; citizens see themselves as projections of a shared identity	Transcendence-first
Rule of law	The law is a shared projection of a just order, sustained by collective belief	Transcendence-first

Table 6

The Friction at Three Scales

Unintended Consequences as an Emergence-First Response

Unintended consequences are not, on this account, primarily a failure of prediction; they are the characteristic response of an Emergence-first system to a Substance-first intervention. A social system is a complex adaptive system with feedback loops, emergent properties, and path-dependent dynamics [15]. A Substance-first intervention perturbs the system, and the system responds with adaptations, compensations, and reorganizations the intervention's designers did

not model, because the model treated a relational, emergent system as a collection of discrete, rule-following objects.

Regulatory Capture as a Relational-First Network Response

Regulatory capture — where agencies come to be dominated by the industries they regulate — can be read as the Relation-first logic of the social network asserting itself over the Substance-first logic of formal regulation. An agency is not a discrete, self-identical institution external to the industry it regulates; it is a node in a dense relational network of industry, politics, media, and expertise, and is in significant part constituted by its position in that network. On this reading, capture is not simply a bug correctable by additional rules, but a recurring feature of the Relation-first ontology governance actually operates within, even where its formal instruments assume otherwise.

The Gap Between Law and Lived Order as Transcendence-First Projection

The persistent gap between the formal legal order and the lived social order can be read as a structural consequence of the mismatch between the Transcendence-first ontology of the rule of law and the Substance-first ontology of legal positivism. On this reading, law's authority does not derive solely from its text; it derives in part from a community's ongoing projection of authority onto that text. The lived order — the shared commitment, the collective identity — exceeds its formal expression. Attempts to close the gap solely through more law, more enforcement, or more formalization may be treating the gap as a defect in the projection rather than as a recurring signature of the whole's irreducibility to its formal parts.

International Governance: The Mismatch Amplified

The ontological mismatch is amplified at the international level, where there is no global sovereign and no unified Substance-first authority. International law is, in large part, a Relation-first system: treaties, customs, and norms emerge from the interactions of states, international organizations, NGOs, and transnational networks, with no global legislature, no global executive, and no court of universal compulsory jurisdiction. The system's coherence is relational rather than substance-based.

Yet international law is often evaluated as though it were a Substance-first system: treaties read as fixed texts, compliance treated as a binary state, enforcement expected to be hierarchical. The resulting friction is familiar: international law is frequently dismissed as “weak” or “not really law” for lacking Substance-first enforcement machinery. Under the diagnostic offered here, this is a category error rather than a verdict on international law's coherence: it is not a failed domestic legal system, but a Relation-first legal system whose coherence should be tested by the stability of its relational network rather than by compliance with a fixed text alone.

The Common Pattern: One Table

Domain	Substance-First Engine	Domain's Native Ontology	Symptom of Mismatch
Medicine	Biomedical model: discrete diseases, single-target interventions, categorical diagnosis	Relation-first (networks), Emergence-first (homeostasis), Transcendence-first (health as whole-state)	“Functional” labels; single-target drug failure; dismissal of holistic systems
Computation	Formal verification: model checking, exhaustive state-space, fixed specifications	Relation-first (distributed systems), Emergence-first (ML/adaptive), Relation-Emergence-Transcendence (intelligent systems)	State-space explosion; adversarial examples; unverifiability of intelligence
Governance	Regulatory state: statutes, jurisdictions, performance metrics, cost-benefit analysis	Emergence-first (markets), Relation-first (communities), Transcendence-first (national identity, rule of law)	Unintended consequences; regulatory capture; gap between law and lived order

Table 7

What Relation, Emergence or Transcendence-First Alternatives Might Look Like

The diagnostic points toward, without fully specifying, design principles for practices ontologically aligned with their subject matter. These are offered as tentative, incomplete, and actively contested directions — the shape a Genesis-informed practice might take, were it to be built — not as a settled agenda.

Medicine

- **Network-based diagnosis:** diagnostic categories organized around patterns of network dysregulation rather than discrete disease entities.
- **Whole-system interventions:** therapeutics that target regulatory architecture (diet, exercise, stress, sleep, social connection) alongside single molecular targets, rather than in place of empirical testing.
- **Context-sensitive trial design:** methodologies that do not average away relational and context-dependent effects, such as N-of-1 trials and pragmatic trials.
- **Recognition of traditional systems as ontologically distinct:** evaluating traditional systems on their own

terms while still subjecting specific interventions to empirical confirmation.

Computation

- Relational verification: verifying relational invariants — network connectivity, interaction-pattern stability, structural coherence — rather than only global states.
- Emergent verification: verifying a system's capacity to maintain integrity under perturbation — robustness, adaptation, self-repair — rather than only satisfaction of a fixed property.
- Inhabitation-based oversight: for candidate intelligent systems, supplementing exhaustive checking with ongoing observation, interaction, and institutional accountability.

Governance

- Emergence-first policy design: treating policy as a perturbation of a complex adaptive system, favoring adaptive, iterative, locally responsive design with built-in feedback loops.
- Relational-first regulation: designing regulatory systems that distribute authority, increase relational transparency, and make existing networks visible, including through multi-stakeholder governance.
- Transcendence-first law: treating the gap between formal order and lived order as something to be honored and narrowed through deliberation and collective commitment, not eliminated by formalization alone.

Limits and Cautions

Three limits bound everything argued above, and stating them plainly is part of the paper's claim, not a concession appended to it.

- Diagnosis is not therapy. Naming the ontological mismatch does not by itself produce a cure, a verified system, or a better policy. Courts must still decide cases, physicians must still treat patients, and policymakers must still govern. The framework offers a diagnostic, not a blueprint.
- The individuation question applies. As stressed in *Genesis of Mathematics* §V, any formal system — including any attempt to build Relation-first or Emergence-first alternatives — is currently specified using Substance-first construction techniques in practice. Whether a genuine non-Substance engine can be built all the way down remains an open question this paper does not settle.
- The reflexive caveat still governs. This synthesis is authored from within an ontology and offered for inhabitation and revision — including by readers who inhabit the
- Substance-first ontology it most often examines — not delivered from a neutral vantage above the four.

Conclusion: The Genesis Diagnostic Across the Institutional Landscape

Genesis of Logic argued that logic is not a single, ontology-independent method for deriving conclusions, but a family of structures each generated from within one of a small number of foundational ontologies. *Genesis of Mathematics* formalized this as a Quad-Fold Ontological Spectrum and showed that each archetype generates its own axioms, logic, and results. *Genesis of Logic: Inferences 1* applied the diagnostic to law, economics, artificial intelligence, and particle physics, identifying a recurring pattern of Substance-first imposition on Relation-, Emergence-, or Transcendence-first domains.

Inferences 2 has extended the diagnostic to three further domains: medicine, computation, and governance. In each case, the same pattern recurs: a Substance-first formal system, mistaken for a neutral universal standard, applied to a domain whose native ontology differs, with the resulting friction misdiagnosed as the domain's defect rather than as a mismatch of ontologies.

The cumulative force of these case studies is the core contribution of the *Inferences* series so far: the pattern is not confined to any single discipline, but recurs across the institutional and scientific landscape in a structurally similar shape each time. The framework offers a vocabulary for naming it, a diagnostic for detecting it, and a tentative agenda for building alternatives more closely aligned with their subject matter's native ontology. The work of inhabitation — entering Relation-first, Emergence-first, and Transcendence-first logics on their own terms, rather than testing them solely against Substance-first instruments — remains to be done. This paper is offered as a continuation, not a settled result [16-28].

References

1. Flexner, A. (1910). *Medical Education in the United States and Canada: A Report to the Carnegie Foundation for the Advancement of Teaching*. New York: Carnegie Foundation.
2. Nimnuan, C., Hotopf, M., & Wessely, S. (2001). Medically unexplained symptoms: An epidemiological study in seven specialties. *Journal of Psychosomatic Research*, 51(1), 361–367.
3. Kleinman, A. (1980). *Patients and Healers in the Context of Culture*. Berkeley: University of California Press.
4. Clarke, E. M., Grumberg, O., & Peled, D. (1999). *Model Checking*. Cambridge, MA: MIT Press.
5. Baier, C., & Katoen, J.-P. (2008). *Principles of Model Checking*. Cambridge, MA: MIT Press.
6. LeCun, Y., Bengio, Y., & Hinton, G. (2015). Deep learning. *Nature*, 521(7553), 436–444.
7. Isong, O. B. (2026c). *Genesis of Mathematics: Integral Quaternion Formalism (Revised ed.)*. Genie Capital Ltd, Working Paper.

8. Damasio, A. R. (1994). *Descartes' Error: Emotion, Reason, and the Human Brain*. New York: Putnam.
9. Damasio, A. R. (1996). The somatic marker hypothesis and the possible functions of the prefrontal cortex. *Philosophical Transactions of the Royal Society B*, 351(1346), 1413–1420.
10. Seth, A. K. (2014). Predictive codes of interoception, emotion, and the self. *Frontiers in Psychology*, 5, 189.
11. Nagel, T. (1974). What is it like to be a bat? *The Philosophical Review*, 83(4), 435–450.
12. Searle, J. (1980). Minds, brains, and programs. *Behavioral and Brain Sciences*, 3(3), 417–424.
13. Searle, J. (2009). Chinese room argument. *Scholarpedia*, 4(8), 3100.
14. Penrose, R. (1989). *The Emperor's New Mind: Concerning Computers, Minds, and the Laws of Physics*. Oxford: Oxford University Press.
15. Farmer, J. D., & Foley, D. (2009). The economy needs agent-based modelling. *Nature*, 460(7256), 685–686.
16. Fields, C., Glazebrook, J. F., & Levin, M. (2021). Minimal physicalism as a scale-free substrate for cognition and consciousness. *Neuroscience of Consciousness*, 2021(2), niab013.
17. Isong, O. B. (2026). *From Computation to Intelligence: A Theory of Machine Intelligence*. Genie Capital Ltd (2026). Working Paper.
18. Isong, O. B. (2026a). *Genesis of Logic: Toward an Ontology-Relative Foundation for Logical Structure*. Genie Capital Ltd, Working Paper.
19. Isong, O. B. (2026b). *Genesis of Mathematics: Construction of the Foundations of Mathematics (Revised ed.)*. Genie Capital Ltd, Working Paper.
20. Isong, O. B. (2026d). *Genesis of Logic: Inferences 1 — Ontological Friction, from Jurisprudence to the Standard Model*. Genie Capital Ltd, Working Paper.
21. Llewellyn, K. N. (1960). *The Common Law Tradition: Deciding Appeals*. Boston: Little, Brown.
22. Maturana, H. R., & Varela, F. J. (1980). *Autopoiesis and Cognition: The Realization of the Living*. Dordrecht: D. Reidel.
23. Merryman, J. H. (1969). *The Civil Law Tradition: An Introduction to the Legal Systems of Western Europe and Latin America*. Stanford, CA: Stanford University Press.
24. Metz, T. (2007). Toward an African moral theory. *Journal of Political Philosophy*, 15(3), 321–341.
25. Newell, A., & Simon, H. A. (1976). Computer science as empirical inquiry: Symbols and search. *Communications of the ACM*, 19(3), 113–126.
26. Ramose, M. B. (1999). *African Philosophy through Ubuntu*. Harare: Mond Books.
27. The Univalent Foundations Program (2013). *Homotopy Type Theory: Univalent Foundations of Mathematics*. Princeton, NJ: Institute for Advanced Study.
28. Zweigert, K., & Kötz, H. (1998). *An Introduction to Comparative Law* (3rd ed.; T. Weir, Trans.). Oxford: Clarendon Press.