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The Generonic Boundary of Explanation: On the Role and Limits of "Why" in Measurement-Grounded Systems

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Overview

The question "why" has long been regarded as the highest form of explanation in both philosophy and science. From Aristotle's causal analysis to modern theoretical physics, explanatory depth is often equated with the ability to provide generative accounts of observed phenomena. This paper argues that within a measurement-grounded framework—specifically Finite Symbolic Mechanics (FSM)—the question "why" possesses a structural limitation.

We introduce the concept of the *Generonic Boundary*: the non-invertible interface between interaction (inadmissible to direct representation) and symbol (finite, measurable, and admissible). It is shown that any attempt to answer "why" in the sense of generative origin requires in-

version of this boundary, which is not possible within the system. As a result, "why" questions are either reducible to relational statements within the symbolic domain or become inadmissible.

The argument is situated historically through comparison with Kurt Gödel and Ludwig Wittgenstein. While Gödel demonstrated the existence of unprovable truths within formal systems, the present work identifies a distinct limitation: the existence of questions that cannot be meaningfully formulated within a measurement-grounded symbolic system. The paper concludes by affirming the value of "why" as a driver of inquiry while formally delimiting its domain of admissibility.

1. Introduction

The role of explanation in science and philosophy has traditionally been tied to the question "why." To ask why a phenomenon occurs is to seek its cause, its mechanism, or its generative origin. This orientation can be traced back to Aristotelian causality and persists in modern scientific practice, where explanatory depth is often equated with uncovering underlying structure.

However, the legitimacy of "why" as a universal question has rarely been examined in relation to the conditions under which symbols themselves are formed. This paper proposes that such an examination reveals a structural boundary: a limit beyond which the question "why" can-

not be meaningfully applied.

The argument is developed within the framework of Finite Symbolic Mechanics (FSM), a measurement-grounded approach in which symbols arise from finite, resolution-constrained interactions. Within this framework, explanation is not rejected, but redefined. The aim is to clarify what constitutes an admissible explanatory statement and to identify the point at which explanatory demands exceed the domain of symbolic construction.

2. Historical Context: Explanation and Its Limits

The search for explanatory completeness has historically taken several forms.

Aristotle's four causes established a taxonomy of explanation: material, formal, efficient, and final. Later developments in scientific thought narrowed this focus toward efficient causation and mechanistic explanation, culminating in the success of classical physics.

In the twentieth century, the work of Kurt Gödel introduced a fundamental limitation within formal systems. Gödel demonstrated that any sufficiently expressive system contains true statements that cannot be proven within the system itself. This result challenged the notion of complete formal knowledge.

Meanwhile, Ludwig Wittgenstein approached the problem from the side of language, suggesting that meaning is

determined by use within a form of life. Questions that fall outside the structure of language-games lose their meaning rather than their answer.

The present work extends these lines of thought. It does not identify unprovable truths, but rather unformulable questions—questions that cannot be meaningfully expressed within a system grounded in measurement and finite symbolic representation.

3. Measurement, Symbol, and Admissibility

Finite Symbolic Mechanics begins with a commitment: measurement is primary. Symbols are not arbitrary abstractions but arise from finite, resolution-bounded interactions. The formation of a symbol involves:

- a bounded capture of interaction,
- a minimum cost of distinction ΔM,
- compression into a finite symbolic domain.

Let the interaction domain be denoted $\mathcal{I}$ and the symbolic domain $\tilde{\mathcal{S}}$. Symbol formation is represented as a projection:

$$\tilde{\mathcal{G}} : \mathcal{I} \to \tilde{\mathcal{S}}$$

The tilde indicates that $\tilde{\mathcal{S}}$ is not a classical mathematical space but a finite symbolic construction.

This projection is non-invertible. Information not captured within the generonic event is not represented in $\tilde{\mathcal{S}}$ and cannot be recovered.

4. The Generonic Boundary

Definition. The Generonic Boundary is the interface at which interaction is projected into symbolic form under finite constraint.

This boundary separates:

- the interaction domain $\mathcal{I}$ (inadmissible),
- the symbolic domain $\tilde{\mathcal{S}}$ (admissible).

All scientific models operate within $\tilde{\mathcal{S}}$. There exists no admissible operation that maps from $\tilde{\mathcal{S}}$ back to $\mathcal{I}$.

5. The Structure of "Why"

To ask "why does X occur?" is to request a generative account of X. Formally, this requires identifying $\mathcal{I}_X \in \mathcal{I}$ such that:

$$\tilde{\mathcal{G}}(\mathcal{I}_X) = \tilde{X}$$

However, $\mathcal{I}_X$ is not accessible within $\tilde{\mathcal{S}}$.

Any admissible answer must therefore take the form:

$$\tilde{X} \sim f(\tilde{Y}_1, \tilde{Y}_2, \ldots)$$

where f is a relation within the symbolic domain.

This leads to a bifurcation:

1. The "why" reduces to a relational explanation within $\tilde{\mathcal{S}}$.
2. The "why" refers to $\mathcal{I}$ and becomes inadmissible.

Proposition. Generative "why" questions are inadmissible within a measurement-grounded symbolic system due to the non-invertibility of the generonic projection.

6. Comparison with Gödel

Gödel's incompleteness theorems reveal limits internal to formal systems: there exist true statements that cannot be proven.

The Generonic Boundary reveals a different kind of limit:

- Gödel: unprovable truths within the system.
- Generonic Boundary: unaskable questions at the boundary of the system.

The former concerns symbolic insufficiency. The latter concerns epistemic grounding: the inability to reference what lies prior to symbol formation.

7. The Role of "Why" in Practice

Despite its limitations, "why" remains indispensable.

In scientific practice, "why" functions as a heuristic for:

- identifying relationships between variables,
- constructing predictive models,
- stabilising understanding within a community.

In developmental terms, the recursive "why" phase in childhood represents an exploration of explanatory structure. These chains do not terminate in generative origin but stabilise within shared symbolic frameworks.

Thus, the value of "why" is not diminished. It is reframed.

8. Failure Modes in Contemporary Theory

A recurring pattern in modern theoretical work—particularly in domains influenced by large language models—is the extension of symbolic systems beyond admissibility. These include:

- introduction of unobservable dimensions,
- reification of model-layer constructs,
- attempts to explain generative origin using symbolic extensions.

Such approaches remain within $\tilde{\mathcal{S}}$ while presenting themselves as accounts of $\mathcal{I}$. They constitute attempts to invert the generonic projection and are therefore structurally misaligned.

9. Conclusion

The question "why" is both essential and limited.

It drives inquiry, motivates theory construction, and stabilises understanding. Yet when interpreted as a request for generative origin, it exceeds the admissible domain of a measurement-grounded system.

The Generonic Boundary provides a formal account of this limitation. It identifies the point at which symbolic explanation must give way—not to ignorance, but to structural constraint.

Explanation remains possible, but only within the symbolic domain from which it arises.

10. Critical Questions for Further Inquiry

1. Can all scientific explanations be reformulated purely as relational statements within a measurement-grounded symbolic domain?
2. What criteria distinguish admissible symbolic extension from inadmissible generative claims?
3. How does the Generonic Boundary relate to existing notions of observability and operationalism in physics?
4. Are there formal correspondences between the Generonic Boundary and limits identified in computation or information theory?
5. To what extent can developmental patterns of "why"

questioning be modelled as boundary-probing dynamics?

6. Does the recognition of unaskable questions alter the methodology of scientific theory construction?
7. Can this framework be experimentally constrained through analysis of representational cost (e.g., Nexil chains, ΔM)?

Keywords

Explanation, measurement, symbolic systems, admissibility, Generonic Boundary, Finite Symbolic Mechanics, Gödel, Wittgenstein, epistemology