

Who Gave Reductionist Generalization Its Power?

— Mathematical Refutation and Power Critique Based on the Holism Theorems

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Abstract

Reductionist generalization—the illegitimate usurpation of the methodological principle “understand the whole by analyzing its parts” into the worldview “the whole is nothing but the sum of its parts”—has formed a robust illusion of power within the modern academic system. This paper dismantles that illusion with the weapon of rigorous mathematical proof. We first expose that the power of reductionist generalization is not granted by reason but is a product of conceptual sleight-of-hand and academic alienation. We then present the complete proofs of the foundational holism theorems (the Truth Function Theorem, the Whole–Part Correspondence Theorem, and the Paradigm Invariance Theorem), demonstrating that the core claims of reductionist generalization stand in direct contradiction to these theorems. We further dissect its three principal conceptual substitutions and, from the three dimensions of academic value, ecological impact, and cognitive boundaries, adjudicate its status as academic waste. The verdict declares: reductionist generalization never possessed any legitimate cognitive power—its so-called “rule” was never mathematically valid and is now permanently revoked. True power belongs to truth, and truth, as the holism theorems demonstrate, is an indivisible functional whole.

Keywords: reductionist generalization; holism theorems; mathematical refutation; power critique; academic waste

Contents

1	Introduction: The Illusion of Power and the Trial by Mathematics	3
2	The Illusion of Power: From Method to Dogma	3
2.1	The Authentic Form of the Reductionist Method	3
2.2	The Illegitimate Usurpation: The Mechanism of Alienation	3
3	Mathematical Final Trial: The Unshakeable Proof of the Holism Theorems	4
3.1	A Priori Presuppositions and Mathematical Definitions	4
3.2	Truth Function Theorem	4
3.3	Whole–Part Correspondence Theorem	5
3.4	Paradigm Invariance Theorem	5
3.5	Verdict: The Mathematical Death Sentence for Reductionist Generalization	5
4	Conceptual Substitution: The Tricks That Built the Illusion of Power	6
4.1	Substitution One: Replacing “Actual Infinity” with “Potential Infinity” .	6
4.2	Substitution Two: Replacing “Function” with “Finite Lookup Table” . .	6
4.3	Substitution Three: Replacing “Methodological Reduction” with “Ontological Reduction”	7
5	Triple Proof of the Academic Waste Attribute	7
5.1	First Proof: A Waste-Producing Machine for Mass-Produced, Futile Involution	7
5.2	Second Proof: An Academic Hegemony Where Bad Money Drives Out Good	8
5.3	Third Proof: The Ultimate Shackle Blocking Human Cognitive Breakthroughs	8
6	The End of Power: From Illusory Rule to the Autonomy of Truth	9

1 Introduction: The Illusion of Power and the Trial by Mathematics

In the temple of modern academia, reductionist generalization has long occupied the throne of “orthodox science.” It proclaims: the whole is nothing but the mechanical sum of its parts; parts are ontologically prior to the whole; any knowledge that cannot be reduced to descriptions of the smallest units is unscientific or illusory. This dogma functions like an invisible hand of power, deciding the publication of papers, the allocation of grants, and the fate of scholars.

Yet a fundamental question has never been seriously asked: **Who gave reductionist generalization its power?**

The answer is: **No one ever did.** This power is not a rational mandate but an **illegitimate usurpation** built upon conceptual substitution, academic alienation, and cognitive laziness. It never possessed any legitimate cognitive foundation; it has merely been a centuries-long collective hallucination.

This paper will take mathematics as the courtroom and the holism theorems as the legal code to deliver the final verdict on reductionist generalization. We shall prove that the core claims of reductionist generalization are fundamentally incompatible with the basic axioms of classical set theory, and that its so-called “power” was never mathematically valid. Holism—long dismissed as a “vague metaphor”—is in fact a rigorously established mathematical theorem within ZFC set theory [13].

2 The Illusion of Power: From Method to Dogma

2.1 The Authentic Form of the Reductionist Method

The reductionist method itself is not guilty. It is a cognitive strategy: studying and understanding the whole by analyzing its parts (subsystems, subfunctions, pointwise restrictions). It has demonstrated formidable instrumental value in the triumphs of Newtonian mechanics and molecular biology. Mathematically, it corresponds to a natural corollary of the holism theorems—“the parts uniquely determine the whole” (the pointwise version)—and is fully compatible with the holism framework [1, 2].

2.2 The Illegitimate Usurpation: The Mechanism of Alienation

Reductionist generalization is a fundamental alienation of the reductionist method. Its core usurpation consists in elevating a local analytical tool to the status of the only legitimate universal worldview. It asserts:

- (i) The whole is nothing but the mechanical sum of its parts, containing no new structures or relations beyond that sum;
- (ii) Parts can be understood independently of the whole and are ontologically prior to the whole;
- (iii) Any knowledge that cannot be reduced to descriptions of parts is unscientific or illusory.

The driving force behind this alienation is not rational progress but the utilitarian demands of academic industrialization: reductionist generalization provides a quantifiable, standardized, mass-producible model for paper manufacturing. It screens scholars by the criterion of “reducibility,” castrating creative thought into mechanical disassembly, and has formed a stable academic hegemony and interest consortium. It is not the triumph of science but the hijacking of reason by power. Prigogine and Stengers long ago pointed out that the reductionist paradigm of classical science reduces the world to an “automaton,” whereas genuine nature is organic and irreversible [6]; Kuhn further revealed the power dynamics by which a paradigm, once established, reproduces itself through educational systems and evaluation mechanisms [18].

3 Mathematical Final Trial: The Unshakeable Proof of the Holism Theorems

The power illusion of reductionist generalization shatters completely before the holism theorems. This section presents the core theorems of the foundational proof, which constitute the final judgment against reductionist generalization.

3.1 A Priori Presuppositions and Mathematical Definitions

Any rational discourse must acknowledge the following two undeniable meta-facts:

Principle 3.1 (Existence of Differences F_1). *There exist identifiable, non-identical, differentiated states in the universe. If all things were absolutely identical, all cognition and communication would reduce to nothingness.*¹

Principle 3.2 (Determinacy of Relations F_2). *There exist non-random, partially comprehensible deterministic relations among differentiated states (causal laws, logical implications, natural laws). If all relations were entirely random, all knowledge, prediction, and memory would be impossible.*

Definition 3.1 (Function). *A function $F : D \rightarrow C$ is a binary relation $F \subseteq D \times C$ satisfying: for every $x \in D$, there exists a unique $y \in C$ such that $(x, y) \in F$, denoted $y = F(x)$.*

Definition 3.2 (Restriction / Subfunction). *Let $F : D \rightarrow C$ be a function and $P \subseteq D$. The restriction of F to P is the function $F|_P : P \rightarrow C$ defined by $F|_P(x) = F(x), \forall x \in P$. This function is called a subfunction of F .*

3.2 Truth Function Theorem

Theorem 3.3 (Truth Function Theorem). *Let Σ be the class of all possible states of the universe, and let Truth T be the ultimate totality of all deterministic relations on Σ . Then T is a function: there exists a class of results R such that $T : \Sigma \rightarrow R$.*

¹This a priori condition is structurally homologous to the presupposition of difference and manifold in Kant’s “Transcendental Aesthetic” in the *Critique of Pure Reason* [17].

Proof. By F_1 , Σ is non-empty. By F_2 , every state has at least one output under T . If some state $s \in \Sigma$ admitted two distinct outputs $y_1 \neq y_2$, then T would contain contradictory rules, collapsing determinacy. To preserve determinacy, each input must have a unique output. Define $R = \{T(s) \mid s \in \Sigma\}$; then the relation $T \subseteq \Sigma \times R$ satisfies the condition of a function. Hence T is a function. \square

3.3 Whole–Part Correspondence Theorem

Theorem 3.4 (Whole–Part Correspondence Theorem). *Define the mapping*

$$\Phi : \{F : D \rightarrow C\} \rightarrow \prod_{P \subseteq D} \{f : P \rightarrow C\}, \quad \Phi(F) = (F|_P)_{P \subseteq D}.$$

Then Φ is injective; moreover, when restricted to families (f_P) satisfying the compatibility condition $f_Q|_P = f_P$ (for all $P \subseteq Q$), Φ is bijective.

Proof. Injectivity: $\Phi(F) = \Phi(G)$ implies $F|_D = G|_D$, hence $F = G$. Surjectivity under compatibility: given a compatible family (f_P) , define $F(x) = f_{\{x\}}(x)$. For any P and $x \in P$, we have $F|_P(x) = F(x) = f_{\{x\}}(x) = f_P(x)$ (by compatibility). Thus $F|_P = f_P$. This proof is conducted entirely within the framework of ZFC set theory; for the standard axioms concerning functions, subsets, and Cartesian products, see [15, 16]. \square

Corollary 3.5. *The whole function F is in one-to-one correspondence with the family of all its compatible subfunctions. The definition of a subfunction depends on the prior existence of the whole function; **logically, the whole is absolutely prior to the parts.** The whole contains nonlinear compatibility constraints that **cannot be reduced to the mechanical sum of isolated point values.***

3.4 Paradigm Invariance Theorem

Theorem 3.6 (Paradigm Invariance Theorem). *For any rational paradigm \mathcal{P} capable of expressing difference and deterministic relations, the following propositions hold invariably:*

- (1) *Truth is a function;*
- (2) *The whole is a function, parts are subfunctions;*
- (3) *The whole–part correspondence constitutes a bijection under compatibility conditions.*

Proof. Any rational paradigm must satisfy Principles F_1 and F_2 ; otherwise it cannot distinguish states or make predictions. By the Truth Function Theorem and the Whole–Part Correspondence Theorem, the conclusions hold within that paradigm, independent of its specific content. \square

3.5 Verdict: The Mathematical Death Sentence for Reductionist Generalization

The core claim of reductionist generalization—“parts are ontologically prior to the whole”—directly contradicts Corollary 3.5: mathematics proves that the whole is prior to the parts.

Its assertion that “the whole is nothing but the mechanical sum of its parts” ignores the compatibility constraints, which are essential properties of the whole function and cannot be derived from point values. The Paradigm Invariance Theorem further declares that the holism theorems necessarily hold in any rational paradigm. The “universality” claimed by reductionist generalization is a mathematical lie.

All avenues of appeal for reductionist generalization are permanently blocked:

- To deny Theorem 3.3 \rightarrow must deny F_1 or $F_2 \rightarrow$ self-refuting;
- To deny Theorem 3.4 \rightarrow must abandon the basic definitions of function and subset \rightarrow self-destruction of mathematical foundations;
- To deny Theorem 3.6 \rightarrow must claim the existence of a “rationality” devoid of difference and determinacy \rightarrow irrational, no standing to appeal.

4 Conceptual Substitution: The Tricks That Built the Illusion of Power

Reductionist generalization has managed to mesmerize academia for over a century not through rigorous logic but through three despicable conceptual substitutions.

4.1 Substitution One: Replacing “Actual Infinity” with “Potential Infinity”

Reductionist generalization erroneously equates the infinite whole with an “infinite superposition of finite parts,” completely ignoring the fundamental conclusion of Cantorian set theory: the properties of an infinite set can never be exhausted by a finite number of steps [14, 16]. For example, the Riemann ζ -function has infinitely many nontrivial zeros; no matter how many finite zeros the reductionist approach computes (currently tens of trillions), it can never deduce the conclusion that “all zeros lie on the critical line.” The holistic approach, starting from the global organic structure of the ζ -function, locks down the positions of all zeros in one step [13]. Reductionist generalization commits a category mistake here—substituting the approximating process of “potential infinity” for the holistic nature of “actual infinity.”

4.2 Substitution Two: Replacing “Function” with “Finite Lookup Table”

Reductionist generalization mistakenly equates the function that describes holistic deterministic relations with a “mechanical list of pointwise input-output pairs.” The essence of a function is a global rule of deterministic relation, containing compatibility constraints across all points in its domain. Newton’s second law $F = ma$ is a function defined on an infinite state space; its global constraint determines the motion of all macroscopic bodies, rather than being the mechanical sum of countless isolated experimental data [2]. This substitution by reductionist generalization completely dissolves the wholeness of the function and degrades science into data piling.

4.3 Substitution Three: Replacing “Methodological Reduction” with “Ontological Reduction”

This is the most fundamental usurpation. The reductionist method, as an analytical tool, serves the cognition of the whole, and its legitimate boundary is methodological. Reductionist generalization, however, illegitimately elevates it to an ontological dogma, declaring that “the whole is just the sum of its parts.” The Whole–Part Correspondence Theorem rigorously proves: methodological reduction (computing the whole function from point values) is a corollary of the holism theorems, but ontological reduction (claiming the whole has no emergent structure) is a mathematical fallacy. Reductionist generalization alienates a tool into a worldview, a fundamental betrayal of the scientific spirit.

5 Triple Proof of the Academic Waste Attribute

5.1 First Proof: A Waste-Producing Machine for Mass-Produced, Futile Involution

The dogma of reductionist generalization—“the finer you dissect, the more scientific”—has driven academia into a death spiral of infinite dissection and mass production of fragmented waste, generating over 99% of utterly worthless academic output. In the life sciences, research dominated by reductionist generalization neglects the holistic metabolic closure, systemic homeostasis, and essence of life, instead plunging into the infinite dissection of individual proteins and single gene loci. A flood of papers investigates “the weak influence of a mutation at a certain locus on the behavior of a certain cell.” These results, detached from the organic system of life as a whole, serve only to pad publication counts and secure promotions; they have zero holistic value for understanding the essence of life or solving disease problems—they are typical academic waste. Schrödinger pointed out as early as 1944 that life feeds on negative entropy, its essence lying in the maintenance of holistic order rather than the mechanical piling of molecules [5]. Although the early successes of Newtonian mechanics [19] and molecular biology [20] stemmed from the reductionist method, its generalization into a worldview has led to the current research fragmentation. In the social sciences, reductionist generalization degrades sociology and economics into “statistical games,” dissecting the single consumption behavior or single emotional expression of isolated individuals, wrapping meaningless fragmented conclusions in complex statistical models. These outputs explain no macroscopic social phenomena and solve no real social problems; they only generate massive information noise. In fundamental physics, reductionist generalization takes “finding ever smaller particles” as the ultimate goal, yet can never answer the question “how do these particles assemble into an ordered universe?” Countless papers on ephemeral particles, aside from filling journal pages, contribute nothing to solving ultimate problems like quantum gravity unification or the origin of the universe, trapped in the vicious cycle of “the more you dissect, the more ignorant you become.”

These fragmented outputs, detached from the whole, are essentially academic waste: they cannot form a complete cognition of the world, cannot solve any real problem, and only create information pollution, drowning truly valuable holistic research in a sea of garbage papers.

5.2 Second Proof: An Academic Hegemony Where Bad Money Drives Out Good

Reductionist generalization has mutated from an academic method into an “entry requirement” and hegemonic system within academia: any research that does not follow the “dissect–analyze–reduce” path, regardless of its mathematical rigor or the importance of the problem it solves, is branded as “unrigorous,” “metaphysical,” or “pseudoscience.”

The essence of this hegemony is the strangling of quality innovation by garbage production capacity:

- (1) It establishes a closed academic evaluation system: only papers conforming to the reductionist generalization path can be accepted by top journals, receive funding, and earn academic titles, while truly groundbreaking holistic research is completely excluded from the mainstream academic system.
- (2) It forms a stable interest consortium: countless scholars who feed on the garbage papers of reductionist generalization, in order to protect their academic status and interests, instinctively reject any innovation that breaks the reductionist paradigm, creating a vicious cycle of “the more involution, the safer; the more garbage, the more stable.”
- (3) It utterly betrays the scientific spirit of questioning: turning reductionist generalization into an unquestionable religious dogma, any critique of reductionism is labeled “anti-science,” becoming an ideological shackle that obstructs scientific progress.

This self-perpetuating power structure of the paradigm aligns perfectly with the phase of normal science described by Kuhn [18].

5.3 Third Proof: The Ultimate Shackle Blocking Human Cognitive Breakthroughs

Human science has been spinning its wheels for over a century on ultimate problems such as the Riemann Hypothesis, the unification of quantum gravity, the origin of life, and the essence of consciousness. The primary culprit is the mental shackle of reductionist generalization.

All these ultimate problems are, in essence, the inherent blind spots of reductionist generalization:

- The Riemann Hypothesis has resisted breakthrough for over 160 years, fundamentally because the reductionist path can never bridge the gulf from “finite” to “infinite,” whereas the holistic system, starting from the global organic structure of the ζ -function, completes the proof in one step [13].
- The century-long failure to unify quantum mechanics and general relativity stems from reductionism’s dissection of the universe into two isolated parts—“microscopic particles” and “macroscopic spacetime”—which can never be reassembled into an organic whole. The unified metabolico-causal field, in contrast, treats the universe from the outset as a nested whole of metabolons, naturally achieving cross-scale unification.

- The millennia-old problems of life’s origin and the essence of consciousness have seen reductionism tread water for over a hundred years, fundamentally because it denies from the root the organic nature of “the whole is greater than the sum of its parts” [5, 6], forever unable to grasp that the essence of life and consciousness is holistic metabolic-causal closure, not the mechanical stacking of molecules.

The stagnation of foundational physics problems like quantum gravity unification has been attributed by Smolin to the systematic exclusion of alternative approaches by the reductionist paradigm [21]. The latest research in quantum information science also demonstrates that the wholeness of entangled systems cannot be reduced by local hidden variables [8, 7].

Reductionist generalization not only fails to solve these ultimate problems itself but also blocks the holistic paths that could solve them. It is the ultimate shackle on human cognitive breakthrough.

6 The End of Power: From Illusory Rule to the Autonomy of Truth

The power of reductionist generalization never existed. It was merely a protracted academic hallucination, thoroughly pierced by the mathematical golden body of holism.

Power belongs to truth. And truth, as proved by the holism theorems, is a function—an indivisible whole containing the compatibility constraints among all its parts [13]. The rule of truth is autonomous: it requires no subject’s recognition to take effect, just as universal gravitation needs no signature from Newton. The essence of scientific truth-seeking is to let reality speak through reason; the researcher is merely a scribe recording those propositions that necessarily follow once the axioms are given.

The reductionist method will return to its authentic role—as a local analytical tool serving holistic cognition. The usurped power of reductionist generalization is permanently revoked. The future scientific paradigm will inevitably be a holistic, cross-scale organic scientific system.

No one gave reductionist generalization power. Mathematics proves it was never legitimate. Power belongs to truth, and truth is a holistic function.

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The author declares no conflict of interest.

Data Availability Statement

Pure theoretical exposition; no experimental data.

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