Hijacking Analysis with Dismemberment

— The Root Cause of Reductionist Generalization

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Preprint submitted: April 16, 2026

Abstract

The reductionist method has achieved immense success in modern science, but its generalized form—the claim that the whole is nothing but the mechanical sum of its parts—has become a dogma obstructing cognitive breakthroughs. Within the rigorous framework of the Zhu–Liang holism axiomatic system, this paper provides, for the first time, a precise mathematical diagnosis of the root cause of reductionist generalization: **Reductionist generalization hijacks analysis with dismemberment**. Analysis is the legitimate restriction of a whole function to a local domain (taking the subfunction $F|_P$), always subject to the enforcement of the global compatibility constraint $f_Q|_P = f_P$; dismemberment is the illegitimate operation that negates the compatibility constraint and ontologizes subfunctions as independent entities. We further reveal, from the perspective of metabolic dynamics, that reductionist generalization is an entropy-increasing process of a cognitive metabolon under excessive incentive and deficient constraint, which eventually condenses into a tribulation object. The holism theorems simultaneously falsify reductionist generalization while preserving the authentic status of the analytical method. This paper provides a unified meta-methodological foundation for understanding crises of scientific paradigms, failures of interdisciplinary dialogue, and academic involution.

Keywords: Reductionist Generalization; Analysis; Dismemberment; Compatibility Constraint; Whole–Part Correspondence Theorem; Hijacking; Metabolon; Holism

Contents

1 Introduction: The Success of a Method and the Usurpation of a Dogma

Since Newtonian mechanics, the reductionist method—decomposing complex systems into simpler constituent parts for study—has become the most powerful cognitive tool of modern science. From molecular biology to particle physics, from computational science to neuroscience, analytical thinking has yielded countless breakthroughs. Yet, an illegitimate philosophical leap has quietly occurred: reductionism has been elevated from a **method** to a **worldview**, proclaiming that "the whole is nothing but the mechanical sum of its parts," and dismissing any knowledge that cannot be reduced to descriptions of parts as "unscientific." This dogma is **reductionist generalization**.

The harms of reductionist generalization are now fully apparent: the predicament of "genetic determinism" in the life sciences, the century-long stagnation in unifying quantum gravity in physics, the failure of fragmented research in the social sciences to inform holistic governance, and the ethical crisis of the "black box" problem in artificial intelligence. Yet, critiques of reductionist generalization have long remained at the level of philosophical speculation, failing to reach the mathematical kernel of the problem. The fundamental reason is that critics have not precisely distinguished "analysis" from "dismemberment," and therefore cannot provide the dynamical mechanism by which reductionist generalization is alienated from a legitimate method into an illegitimate dogma.

The establishment of the Zhu–Liang holism axiomatic system provides a meta-mathematical language for this diagnosis. The Whole–Part Correspondence Theorem rigorously proves that the whole function is logically prior to its subfunctions, and that the family of subfunctions must satisfy a global compatibility constraint. This mathematical fact allows us to precisely delineate the boundary between "analysis" and "dismemberment," and to reveal reductionist generalization as an inevitable process of metabolic imbalance and tribulation condensation.

This paper aims to accomplish the following:

(1) Rigorously distinguish "analysis" (taking the subfunction $F|_P$) from "dismemberment" (fragmentation that negates the compatibility constraint), providing mathematical definitions for both.

(2) Prove that the root cause of reductionist generalization lies in the alienation of analysis into dismemberment, and elucidate the dynamical mechanism of this hijacking.

(3) Employ the metabolon and the Tribulation Axiom to reveal reductionist generalization as a process of entropy increase and tribulation condensation in the cognitive system.

(4) Deliver the final verdict: Holism does not abolish analysis, but only dismemberment; the reductionist method returns to its authentic status, fully compatible with holism.

2 Preliminaries: Core Components of the Holism Axiomatic System

This paper is strictly based on the Zhu–Liang holism axiomatic system. The following lists the theorems and definitions directly relevant to this paper; for detailed proofs, see the references [1, 2, 3, 4, 5]. Each citation includes specific section or theorem numbers.

2.1 Meta-Foundation and Whole–Part Correspondence Theorem

Principle 2.1 (Existence of Differences F_1)**.** *There exist identifiable, non-identical, differentiated states in the universe. [1, Principle 0.2.1]*

Principle 2.2 (Determinacy of Relations F_2)**.** *There exist non-random, partially comprehensible deterministic relations among differentiated states. [1, Principle 0.2.2]*

Theorem 2.1 (Whole–Part Correspondence Theorem)**.** *Let $F : D \to C$ be a whole function, and let its subfunctions be its restrictions $F|_P$ ($P \subseteq D$). Define the mapping*

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

Then Φ is bijective on families satisfying the compatibility condition $f_Q|_P = f_P$ (for all $P \subseteq Q$). [1, Theorem 0.4.1]

This theorem establishes two fundamental principles:

- **The whole is logically prior to the parts**: The definition of a subfunction presupposes the prior existence of the whole function.
- **The mandatory nature of the compatibility constraint**: Any two subfunctions must agree on the intersection of their domains. This constraint is a nonlinear global structure that cannot be reduced to the mechanical sum of isolated point values.

2.2 Metabolon and Cognitive Entropy

Definition 2.2 (Metabolon)**.** *A **Zhu–Liang metabolon** $\mathcal{M} = (S, E, \alpha, \beta, \delta, F^S, F^E)$ consists of state space S, environment E, input morphism α, output morphism β, dissipation morphism δ, and evolution functor F^S, and satisfies causal closure: there exists an entropy functional $\mathcal{H}$ such that $\mathcal{H}(S_t) = \mathcal{H}(S_0)$. [1, Definition 8.1]*

The metabolic revenue-expenditure ratio is defined as $r = \|\alpha\|/(\|\delta\| + \|\beta\|)$, with the healthy interval being $[0.8, 1.5]$ [1, Theorem 4.2]. $r < 0.8$ indicates under-actuation; $r > 1.5$ indicates over-actuation/insufficient damping.

2.3 Emergence Measure and Mutual Information

Definition 2.3 (Emergence Measure)**.** *For a system $X \cong A_1 \otimes \cdots \otimes A_n$, its **Zhu–Liang emergence measure** is defined as $E(X) = \sum_i \mathcal{H}(A_i) - \mathcal{H}(X)$, where $\mathcal{H}$ is the entropy functional. [1, Theorem 6.2]*

Mutual information is $I(A_i : A_j) = \mathcal{H}(A_i) + \mathcal{H}(A_j) - \mathcal{H}(A_i \otimes A_j) \geq 0$. The system is a **mechanical system** if and only if for all $i \neq j$, $I(A_i : A_j) = 0$; otherwise, it is an **organic system**. [1, Definition 6.2]

2.4 Tribulation Axiom and Tribulation Object

Axiom 2.1 (Tribulation Axiom A5)**.** *The metabolic process of a recursive element $\mathcal{R}_\alpha$ can be factored as:*

$$\mathcal{R}_\alpha \xrightarrow{\kappa_\alpha} \mathcal{K}_\alpha \xrightarrow{\widetilde{\text{Metabolize}}_\alpha} \mathcal{R}_{\alpha+1},$$

where κ_α is the tribulation projection, mapping undecidable contradictions to the tribulation object $\mathcal{K}_\alpha$; $\widetilde{\text{Metabolize}}_\alpha$ is uniquely determined by the entropy minimization principle. [3, Axiom A5 and Appendix A]

3 The Authentic Meaning of Analysis: Legitimate Restriction of the Whole Function

3.1 Mathematical Definition of Analysis

In the holism framework, **analysis** is a legitimate cognitive operation, corresponding to the restriction of the whole function to a local domain.

Definition 3.1 (Analysis)**.** *Let the whole function $F : D \to C$ describe all deterministic relations of the system. For any subset $P \subseteq D$, **analysis** is the operation of taking the restriction:*

$$\mathit{Analysis}_P(F) = F|_P : P \to C.$$

This operation satisfies the following normative conditions:

(1) ***No claim of ontological priority**: Acknowledges that the existence of $F|_P$ logically depends on the prior existence of F.*

(2) ***Maintains awareness of compatibility**: Always remembers that $F|_P$ is merely the projection of F onto a local coordinate patch, and its values are enforced by the global compatibility constraint $f_Q|_P = f_P$.*

(3) ***Serves holistic cognition**: The goal of analysis is to recover global regularities through local fragments, not to deny the reality of the whole.*

Newton's use of calculus to analyze celestial motion is an exemplary instance of analysis: he decomposed celestial motion into force analyses (local), but always derived conclusions under the governance of the law of universal gravitation (the whole function). The analysis of gene function in molecular biology is similar: the function of a gene fragment must be understood under the compatibility constraints of the cell's overall metabolic network.

3.2 Analysis as a Corollary of the Holism Theorems

By the Whole–Part Correspondence Theorem (Theorem 2.1), the family of subfunctions $(F|_P)_{P\subseteq D}$ and the whole function F form a bijection. This means: **Analyzing the parts is a valid path to cognizing the whole**. As long as the compatibility condition is satisfied, local knowledge obtained through analysis can holographically recover global regularities (Holographic Recursion Theorem) [2, Theorem 3.1].

Therefore, **methodological reductionism (analysis) is a natural corollary of the holism theorems, and is fully compatible with holism**. [1, Appendix C]

4 The Illegitimate Operation of Dismemberment: Dissolution of the Compatibility Constraint

4.1 Mathematical Definition of Dismemberment

The fundamental error of reductionist generalization is that it alienates analysis into **dismemberment**—an illegitimate ontological leap.

Definition 4.1 (Dismemberment)**.** *Suppose a system is originally described by a whole function $F : D \to C$. **Dismemberment** refers to the following series of illegitimate operations:*

(1) ***Conceptual Sleight-of-Hand**: Substituting "the restriction of the whole function to a local domain $F|_P$" for "independently existing substantial parts," claiming that these parts possess self-nature independent of the whole.*

(2) ***Dissolution of the Compatibility Constraint**: Ignoring or explicitly denying the compatibility condition $f_Q|_P = f_P$ among subfunctions, claiming that the whole can be reduced to the mechanical sum of isolated point values.*

(3) ***Reversal of Logical Priority**: Claiming that parts are ontologically prior to the whole, and the whole is "nothing but" the aggregation of parts.*

Mathematically, dismemberment is equivalent to attempting to "piece together" a whole function from a family of **incompatible** subfunctions $\{f_P\}_{P\subseteq D}$. By the Whole–Part Correspondence Theorem, if the family of subfunctions fails the compatibility condition, there exists no whole function corresponding to it. Hence, **dismemberment is a mathematically illegitimate operation**—it produces not a whole, but a pile of logically conflicting fragments.

4.2 Classic Instances of Dismemberment

Example 4.2 (Dismemberment in Consciousness Studies)**.** *Claiming that "consciousness is nothing but the sum of neuronal firings," while ignoring the holistic unity of conscious experience (e.g., the binding problem), is to mistake local measurements of neural activity (subfunctions) for the whole of consciousness, and to deny the compatibility constraints at the phenomenological level.*

Example 4.3 (Dismemberment in Economics)**.** *Claiming that "macroeconomics is nothing but the aggregation of micro-level individual decisions," while ignoring the fallacy of composition—the rational behavior of individuals aggregated may lead to collective irrationality. Compatibility constraints (e.g., market clearing conditions, expectation coordination) are dissolved, leading macroeconomics to be torn between micro-foundations and macro-reality.*

5 The Dynamics of Hijacking: The Entropy-Increasing Process from Analysis to Dismemberment

How is "analysis" hijacked by "dismemberment"? Holism provides a precise metabolic-dynamical explanation.

5.1 Incentive-Constraint Imbalance: From Method to Dogma

The immense success of the reductionist method in fields such as Newtonian mechanics and molecular biology constitutes an extremely strong positive feedback: academic rewards, grant funding, and social prestige all tilt toward "decompositional research." This corresponds to a sharp increase in the incentive input α of the metabolon.

Meanwhile, the awareness of the compatibility condition—i.e., the constraint β—has not developed synchronously. Disciplinary specialization leads experts to focus only on their own subfields, interdisciplinary dialogue fails, and global compatibility awareness fades. The metabolic revenue-expenditure ratio $r = \|\alpha\|/(\|\delta\| + \|\beta\|)$ exceeds the upper bound of health 1.5, and the system enters a non-steady state of **over-actuation/insufficient damping**. [1, Theorem 4.2]

Proposition 5.1 (Metabolic Imbalance Theorem of Reductionist Generalization)**.** *When the metabolic revenue-expenditure ratio of an academic system satisfies $r > 1.5$, the system tends to inflate the analytical method into the dogma of dismemberment. Specific manifestations include:*

- *The incentive for local research far exceeds that for global integration;*
- *Testing compatibility constraints is regarded as an "unnecessary philosophical burden";*
- *Disciplinary fragmentation intensifies, with mutual information $I(A_i : A_j) \to 0$.*

5.2 Cognitive Entropy Increase and Vanishing Emergence Measure

When dismemberment becomes mainstream, compatibility constraints among subfields are systematically ignored, and mutual information among subsystems approaches zero:

$$I(A_i : A_j) \to 0 \quad (\forall i \neq j).$$

By the definition of the emergence measure, the whole entropy $\mathcal{H}(X)$ approaches the sum of the entropies of the parts:

$$\mathcal{H}(X) \to \sum_i \mathcal{H}(A_i) \quad \Rightarrow \quad E(X) \to 0.$$

The system degenerates into a **pile of mechanical fragments**—each subfield may be highly ordered internally, but the overall cognitive emergence is zero. This is precisely the mathematical essence of contemporary academic "involution": the number of papers surges, yet fundamental breakthroughs stagnate. [1, Theorem 6.2]

5.3 Tribulation Condensation: The Paradigm Crisis of Reductionist Generalization

When reductionist generalization encounters **strongly holistic objects**—life, consciousness, quantum gravity, civilizational governance—its "dismemberment" presupposition leads to a proliferation of undecidable contradictions:

- Life Sciences: Off-target effects of gene editing and the explanatory gap of systemic complexity;
- Physics: The century-long failure to unify quantum mechanics and general relativity;
- Artificial Intelligence: The black-box problem of deep learning and the dilemma of value alignment;
- Social Sciences: The failure of global governance and the clash of civilizations.

These contradictions condense into a tribulation object $\mathcal{K}_{\text{reductionism}}$. By the Tribulation Axiom (Axiom 2.1), the system enters a red-line state: the old paradigm (reductionist generalization) has exhausted its possibilities and must leap through entropy-reducing selection to a new paradigm—the holism paradigm.

6 The Holism Verdict: Returning to Authentic Analysis

The holism theorems do not negate the analytical method—on the contrary, they provide mathematical proof of its legitimacy. What holism negates is **reductionist generalization**—the ontological overreach that alienates the analytical method into the dogma of dismemberment.

6.1 Strict Boundary between Analysis and Dismemberment

The following table provides a rigorous comparison of analysis (legitimate) and dismemberment (illegitimate):

Table 1: Boundary between Analysis (Legitimate) and Dismemberment (Illegitimate)

Dimension	**Analysis (Legitimate)**	**Dismemberment (Illegitimate)**
Mathematical Operation	Taking restriction $F\|_P$, maintaining compatibility awareness	Arbitrary collection of fragments negating compatibility condition
Logical Priority	Whole logically prior to parts [1, Theorem 0.4.1]	Claims parts are ontologically prior
Compatibility Constraint	Acknowledges global constraint $f_Q\|_P = f_P$	Ignores or denies compatibility constraint
Cognitive Goal	Recover whole through parts (holographic recursion)	Claims whole is nothing but sum of parts
Entropy Dynamics	Entropy reduction (approximating global regularities)	Entropy increase (information fragmentation, $E(X) \to 0$)
Relation to Holism	Natural corollary of holism theorems [1, Appendix C]	Fundamentally contradicts holism theorems
Typical Instance	Newton analyzing celestial motion with calculus	Claiming "life is nothing but molecular machines"

6.2 Returning to Authentic Analysis: Investigating Things to Extend Knowledge

Holism provides reason with a mathematical grammar for self-calibration. The legitimate boundary of analysis is strictly delineated by the compatibility condition:

- When the analytical operation maintains awareness of compatibility and serves holistic cognition, it is **investigating things**—approaching the truth of the whole through local exploration.
- When the analytical operation dissolves the compatibility constraint and declares fragments to be reality itself, it is **dismemberment**—an illegitimate hijacking that manufactures cognitive entropy.

Investigate things through analysis; extend knowledge through compatibility. The day the analytical method returns to its authentic status is the day the alienated form of reductionist generalization is thoroughly sublated.

7 Conclusion

Within the rigorous framework of the Zhu–Liang holism axiomatic system, this paper has completed the mathematical diagnosis of the root cause of reductionist generalization. The core conclusions are as follows:

(1) **The authentic meaning of analysis**: Analysis is the legitimate restriction of the whole function to a local domain $F|_P$, always subject to the enforcement of the

global compatibility constraint $f_Q|_P = f_P$, and is a natural corollary of the holism theorems. [1, Theorem 0.4.1]

(2) **The illegitimate operation of dismemberment**: Dismemberment is the illegitimate leap that ontologizes subfunctions and dissolves the compatibility constraint; mathematically, it cannot piece together any whole function.

(3) **The dynamics of hijacking**: Reductionist generalization is an entropy-increasing process of a cognitive metabolon under excessive incentive ($r > 1.5$), leading to the vanishing of the emergence measure and ultimate condensation into a tribulation object. [1, Theorem 4.2, Theorem 6.2]

(4) **The holism verdict**: Holism does not abolish analysis, but only dismemberment. The analytical method returns to its authentic status, fully compatible with holism. [1, Appendix C]

The final verdict is as follows:

The root cause of reductionist generalization = Hijacking analysis with dismemberment.

Analysis = Taking the subfunction $F\|_P$ while maintaining the compatibility constraint; Dismemberment = Fragmentation that negates the compatibility constraint.

Holism does not abolish analysis, but only dismemberment. Investigate things through analysis; extend knowledge through compatibility.

Reductionist generalization is not the triumph of reason, but its alienation. By revealing the mandatory nature of the compatibility constraint, holism delineates an insurmountable boundary for reason: **You may analyze indefinitely, but you must always remember—every fragment is a projection of the whole, and every locality is governed by global laws.**

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Acknowledgments

Thanks to all truth-seekers who investigate things through analysis and extend knowledge through compatibility. This paper is dedicated to every rational mind that refuses to mistake fragments for the whole.

Conflict of Interest Statement

The author declares no conflict of interest.

Data Availability Statement

Pure theoretical exposition; no experimental data.

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