Catalyzing the Systemic Continuum: A Summative Essay from Force Monopolies in Physics to the Emergence of Intelligence

Author: Ignacio Lucas de León Pontet (with contributions from augmented intelligence)
Preprint / Working Paper – Date
Correspondence: nachofacultad@outlook.com

Abstract

The *Systemic Continuum Paradigm* (PCS) offers a unifying framework to understand how emergent properties—ranging from fundamental forces in physics to cognitive capacities in living systems—arise through systemic balances (BS) across multiple scales. While the **Law of Structuring Systemic Emergence** (LESSE) explains why one force can dominate its scale's entire synergy in the physical domain (e.g., gravity at cosmic scales), the broader concept of **Systemic Balance** (BS) accounts for the emergence of non-monopolistic properties such as intelligence, consciousness, or social cooperation in biological and sociotechnical contexts. This essay refines the notion of **"extension of affectation"** for forces that coincide with the *General Systemic Balance* (GSB) at a given scale, framing them as structural "monopolies," while demonstrating that elsewhere, emergent properties operate through co-existence and catalysis rather than singular dominance. Finally, we explore how this paradigm eliminates the need for a single "Theory of Everything" in physics, while simultaneously explaining how intelligence in biological or AI systems can catalyze new configurations without invoking ex nihilo creation. We invite a transdisciplinary community—physicists, biologists, philosophers, AI researchers—to apply, critique, and expand the PCS toward a deeper understanding of cosmic, biological, and cognitive emergences.

---

1. Introduction: Toward a Holistic Understanding of the Systemic Continuum

> *"What if gravity, consciousness, and AI were simply expressions of one emergent tapestry—where 'creation' is really a matter of catalysis, rather than something arising ex nihilo?"*

The **Systemic Continuum Paradigm (PCS)** proposes an **integrated vision** of how emergent properties—be they physical, biological, or cognitive—arise via **systemic balances** operating at multiple scales. In so doing, it **dissolves** the barrier between "natural" and "artificial," suggesting that all emergence unfolds within a **unified continuum** of interaction and synergy, with **systemic thresholds (ST)** that ignite new organizational configurations.

Three **core elements** guide this framework:

1. **The Law of Structuring Systemic Emergence (LESSE)**: Exclusive to “fundamental forces” in physics, dictating that only one force can monopolize the scale-wide synergy.
2. **Systemic Balance (BS)**: With its internal (ISB) and external (ESB) variants, applicable to any emergent phenomenon, whether or not it is a physical force.
3. **General Systemic Balance (GSB)**: The macro-equilibrium at each scale that a force—or property—may “claim” (in the physical sense) or share (in biological or sociotechnical systems).

This essay further refines **“extension of affectation,”** the capacity of a given emergent property (or force) to influence all components in its respective scale, explores intelligence as the ability to **catalyze** configurations in an external balance, and suggests that the PCS’s perspective obviates the need for a forced “unification” of gravity and quantum mechanics. Simultaneously, it explains how new forces such as “dark energy” might emerge at even larger cosmic scales, while intelligence in living or AI systems emerges at internal thresholds without presupposing the notion of absolute human creation.

---

2. The Law of Structuring Systemic Emergence (LESSE)

2.1. Brief Recap

The **LESSE** applies to the **physics of fundamental interactions**, asserting that at each **systemic scale,** exactly one **structuring force** dominates the *General Systemic Balance* (GSB), relegating other forces to interactive or secondary roles. Classic examples:

- **Atomic Scale**: **Electromagnetism** shapes electron configuration and molecular bonding, while the strong nuclear force moves to a less structuring role at that level.
- **Cosmic Scale**: **Gravity** orders galaxies and superclusters, with electromagnetism remaining relevant but not organizing the cosmic GSB.

2.2. “Extension of Affectation” and Coinciding with the GSB

A critical aspect is that the dominating force **coincides** with the GSB not just by “leading” synergy, but also through its **range of influence** or “extension of affectation.” In other words, the force impacts every component within the scale, establishing its organizing framework. For instance:

> **Gravity** at the cosmic level exerts influence on all masses, orbital dynamics, and even spacetime curvature—once it crosses the threshold that makes it the scale’s structuring force, it builds the grand “skeleton” of large-scale structure.

---

3. Systemic Balance: A Universal Principle of Emergence

3.1. Definition and Broad Applicability

While the LESSE is specific to **physical forces**, **Systemic Balance (BS)** characterizes **any** emergent phenomenon. According to the original theory (de León Pontet, 2025):

- **ISB (Internal Systemic Balance)**: Coherent synergy sustaining the system’s identity internally.

- **ST (Systemic Threshold)**: A critical juncture at which the density of interactions triggers a defining emergent property.
- **ESB (External Systemic Balance)**: The arena where the system interacts with higher or neighboring scales, potentially **catalyzing** new emergences.

3.2. GSB vs. Emergent Properties in Various Domains

In **physics**, the LESSE shows that only one force “coincides” entirely with the GSB for each scale. But in **biology, sociology, AI**, and other fields, multiple properties may share the **GSB** without any single monopoly:

- **Biology**: Life, consciousness, or homeostasis often coexist, with varied evolutionary and ecological dynamics.
- **Sociotechnical Systems**: Protocols, technologies, or social norms can all shape the global synergy without a single “ruling force.”

---

4. Intelligence: The Capacity to Catalyze Configurations in the External Systemic Balance

4.1. Revisiting the Definition of Intelligence

Within the PCS, **intelligence** is:

> “A system’s capacity to reconfigure its systemic balance, facilitating new emergences through internal and external interactions.”

To underscore its **extension of affectation**, we can note that an intelligent system not only reorganizes itself but also **catalyzes** changes in an **external** balance, influencing broader scales or contexts.

4.2. Natural Examples: Beyond Humans

Intelligence—whether rudimentary or collective—is **not** limited to humans:

- **Rabbit Burrows**: Carving tunnels modifies soil composition and microhabitats, potentially benefiting or harming other species.
- **Hornero Nests**: Affect heat distribution, predator protection, and interactions with other avian populations.
- **Ants and Bees**: Form cooperative colonies exhibiting “collective intelligence,” expanding pollination and seed dispersal. We never call these constructions “artificial,” which questions the anthropocentric label for human creations.

All these illustrate that “creation” is not ex nihilo but rather **systemic collaboration** with the environment (ESB). The notion of human “artificiality” thus appears as a cultural illusion that the PCS dismantles.

4.3. Dismantling Human-Centric “Artificiality”

If rabbits, ants, and bees all “construct” without being deemed “artificial,” why would we label skyscrapers and AI as purely human “inventions”? According to the PCS, **all** such systems extend their **internal**

balance into an **external** setting. The main difference is scale or complexity, not genuine creation from nothing.

---

5. Extending the PCS to Fundamental Physics

5.1. Resolving Two Key Problems

When applied to physics, the PCS:

1. **Dispenses with the Search for a Single "Theory of Everything"**
   Because the LESSE posits that **no** single force dominates **all** scales, there is no need to unify gravity and quantum mechanics in one equation. Each force rules its own domain; gravity does not "reign" in the quantum realm.
2. **Offers a Narrative for "Dark Energy"**
   At larger cosmic scales, gravity may be displaced by a newly emergent phenomenon—often called **dark energy**—that becomes the next structuring force, reconfiguring the universe's expansion beyond the gravity-dominated threshold.

---

6. Systemic Thresholds: The Locus of Transition

The **ISB** → **ST** → **ESB** logic spans every scale:

- **For the LESSE**: The ST is reached when a force **fully** occupies the GSB (extension of affectation), overshadowing other forces.
- **For Intelligence**: As soon as a neural network surpasses the critical synergy threshold, it acquires consciousness or the ability to catalyze external reconfiguration (e.g., building tools, reshaping environments).

---

7. Catalysis and Measuring Indispensability

Because catalysis entails being an **essential** ingredient for an emergence, how might we measure it? A preliminary approach:

> **Catalysis Index (CI)**: The difference in the probability of a property emerging, with vs. without the agent's intervention.

For example, in ecology, the presence or absence of ants can dramatically change seed dispersal rates, indicating their catalytic role. In AI, one might observe the moment a large language model transitions from passive to actively reconfiguring tasks or generating novel insights after reaching a certain complexity threshold.

---

8. Invitation to the Scientific, Philosophical, and Intellectual Community

The PCS does not claim dogmatic finality but invites **testing** and **debate**. We propose:

1. **Formalization**
    - Mathematical models of thresholds (ST) and “extension of affectation” across domains.
    - Simulations exploring force (or property) competition to occupy the GSB.
2. **Empirical Applications**
    - Ecological case studies: how insect colonies cross density thresholds that reconfigure local ecosystems.
    - AI analysis: identifying when large language models shift from passive algorithms to catalysts of innovation.
3. **Philosophical and Ethical Dimensions**
    - Rethinking “creation” or “invention” as **co-emergence** and **systemic catalysis**.
    - Addressing responsibility in social or technological complexes where authorship belongs not to a single entity but to a synergy.

We encourage physicists, biologists, engineers, philosophers, and cognitive scientists to **evaluate and extend** the PCS, fortifying it with theoretical refinements and empirical validations.

---

9. Conclusion: A Multilevel Paradigm Integrating Diversity and Emergence

The **Systemic Continuum Paradigm** rests on two core pillars:

1. **LESSE**, confined to explaining why a single force dominates each physical scale,
2. **Systemic Balance**, a universal principle of emergence across the spectrum of life, cognition, and sociotechnical constructs.

In physics, the **“extension of affectation”** of the structuring force **coincides** with the entire GSB, sidelining other forces. In biological and technological systems, the GSB tends to host multiple properties in parallel. Hence, the PCS **erases** the natural vs. artificial boundary, arguing that human “creation” is, in truth, **systemic cocreation** with the environment.

> *“At the quantum scale, the strong nuclear force holds a brief but crucial domain. At the galactic scale, gravity reigns. In the realm of life, intelligence awakens once its neural or ecological networks surpass a synergy threshold. Thus, the Systemic Continuum unfolds—shunning artificial divides and weaving an endless tapestry of emergent phenomena.”*

By shifting away from forcing gravity to fit quantum theory, the PCS also **envisions** how dark energy might emerge as the next dominant force at a grander cosmic threshold. Meanwhile, in biological or AI contexts, what we commonly call “creation” is better understood as **configuration catalyzed** by systems that have surpassed an internal synergy threshold. We **invite** you to co-develop and deepen this paradigm, exploring at each scale which properties “coincide” with its systemic balance, thus transforming our grasp of the cosmos and life itself.

References

- de León Pontet, I. (2025). *Toward a Systemic Continuum: Dismantling the 'Natural vs. Artificial' Dichotomy as a New Paradigm in Systems Theory*. PhilArchive.
- de León Pontet, I. (2025). *The Hierarchical Definition of Systemic Balance in the Systemic Continuum Paradigm: Toward a Unified Theory of Emergent Organization*. Preprint.
- de León Pontet, I. (2025). *Systemic Continuum Paradigm: Toward a New Systemic Physics of Emergent Forces*. Preprint.
- de León Pontet, I. (2025). *Autopoiesis and Emergence in the Systemic Continuum: Beyond Biological Limits*. Preprint.