The Scientific Method and its Limitations: From Empirical Reductionism to the Causal System. Epistemological Limitations of the Empirical Scientific Method (Part 2)

(Translated)

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The Correct Epistemological Theory:

In this context, the rational method of inquiry can be viewed as an approach based on the rules, laws, and essential conditions of sound thinking. These basic conditions are the senses, external reality, a brain capable of making connections, and previous information, upon which human beings base their interpretation and judgment of reality. Through this integration, the human mind is capable of arriving at a definitive judgment regarding the existence of things and some of their attributes, relying either on direct sensory perception or on inferring from their indicative traces in a certain and deductive manner, without any need for a direct laboratory experiment.

Furthermore, this method does not bypass reality; instead, it begins from reality itself, relying on primary rational premises without which human thinking cannot function, such as self-evident axioms, fundamental principles, the principle of causality, and the principle of correlation. These serve as legitimate and correct foundations for constructing evidence, building knowledge, and formulating deductions through rigorous rational reasoning.

Reasoning through the Causal System:

Based on understanding the reality of causality and the causal system, we realize that the relationship between cause and effect is not merely a repeated sequence that the mind has become accustomed to observing—as claimed by the Humean (of David Hume) empirical concept—but is a real relationship existing within reality itself, arising from the inherent nature and characteristics of things. A cause is not simply an event that precedes another event in time. Instead, it is an influential element possessing real power, as a causal capacity, to produce a specific effect when appropriate conditions are met and obstacles are absent. For example, fire does not burn wood simply because we are used to seeing burning after fire; rather, it is because fire possesses an active property, which is heat, and wood possesses a combustibility property. When the conditions for interaction are fulfilled—by bringing together the appropriate causes and conditions in the absence of impediments—the effect or result occurs in a regular and inevitable manner.

To clarify the concept of the causal system more precisely, it is necessary to distinguish between two types of natural causality because confusing them leads to a distorted understanding of the relationship between cause and effect. These two types are Simple Causality and the Causal System. The detailed breakdown is as follows:

A. Simple Causality

By nature, things tend to remain in their stable state, upon the principle of stability, and resist any process that alters their condition. The changing factor capable of altering the state and condition of these things is the cause, which occurs when it gains an active power (capacity) at a specific moment that enables it to transform things capable of being affected—meaning those with suitable properties—from one state to another. For a cause to be effective, it requires the cooperation of other assisting factors known as "conditions." Following the process of causal influence, the result, that is the effect, inevitably occurs. Thus, the foundation of causal influence is the presence of causal energy; once this energy is exhausted, the influence of the cause ends, whereas this requirement is not necessary for a condition.

B. The Causal System

The causal system, on the other hand, is broader than a simple linear relationship between a cause and an effect. A system consists of a set of components and interconnections that bind these parts together in a specific manner, according to an arrangement and organization—a kind of programming—that achieves a specific purpose or performs a defined function. In their natural state, things do not spontaneously tend toward order. Instead, they tend toward disintegration and chaos, possessing an inherent inclination to break free from order and constraint. Consequently, they lack any spontaneous self-motivation to cooperate among themselves to organize and form connections. Therefore, the initial existence of any system requires an active cause, as an agent, that gathers its components, arranges them, and organizes them so that the system performs the function intended by that agent.

The difference between an ordinary system and a causal system is that a causal system is not merely an arranged structure. It also possesses an active capacity enabling it to produce effects and changes in other entities while performing a specific function or task. A constructed building is a system, a table is a system, a water canal is a system, and so on. Examples of causal systems include a car and a refrigerator, as well as living systems such as the human body and the brain. A car, for instance, is not just a collection of separate parts, but an interconnected causal system whose components operate in a coordinated manner to perform the function of movement.

Through this clear articulation of the reality of causality and the causal system, it becomes possible to construct definitive rational inferences based on the causal system as one manifestation of the rational method of thinking and research, without needing to conduct a direct laboratory experiment to prove the cause-and-effect relationship as demanded by the empirical school.

Reasoning through the causal system is a method through which the true reality of the causal relationship can be identified as an actual, impactful relationship rather than a mere mental habit. In doing so, it firstly corrects the empirical concept of causality and adopts the concept emerging from the rational method. Reasoning through the causal system relies on understanding the true nature of the relationship between causes and effects, instead than on the simple observation of repetition. Secondly, the human mind becomes capable of moving from observing an effect to discovering its appropriate cause, and from understanding a system to inferring the existence of an Organizer, because the order, interconnection, and function of parts cannot be correctly explained by mere coincidence or repetition.

Hence, this articulated concept of the causal system aligns with the philosophy of powers or capacities, which holds that existing entities possess real properties and powers that enable them to produce specific effects when appropriate conditions and circumstances are present. The concept of the causal system also aligns with the findings of contemporary systems philosophy, which maintains that complex phenomena cannot be understood solely by analyzing isolated parts, but rather by understanding the relationships, structure, and internal organization that connect the parts within an overall system. Reality is not merely a collection of detached elements, but interconnected causal systems in which forces and influences interact within organized structures to fulfill specific functions. Therefore, explaining a phenomenon is not achieved merely by studying an individual element, but by understanding the complete causal system within which relationships, transitions, feedback loops, conditions, and obstacles are organized.

Through the concept of the causal system, an inferential methodology is reached that transcends the traditional divide between the empirical method and the rational method. Experiments and laboratories are not rejected; instead, they are considered important tools for understanding parts of reality and specific relations of influence. However, reducing all knowledge to the boundaries of direct sensory observation is rejected, as is turning experimentation into the sole source of knowledge.

According to the inferential causal system approach, the role of the human mind is not limited to merely recording empirical repetition. Instead, through a specific methodology based on clear steps—starting with analyzing the internal structure of systems and then eliminating inadequate alternatives—the mind can reach inferential causal certainty without the need for a direct laboratory experiment. This certainty is not based on mere mental habit, but on understanding the factual necessity of the causal relationship, which renders an effect inexplicable except through the existence of a specific cause possessing the appropriate properties.

Consequently, this inferential methodology is suitable for generalization. Beyond its validity in explaining specific causes within the world and its alignment with reality, it allows us to move forward to investigate the deeper existential question: What explains the very origin of these systems themselves? And what made the universe stand upon this precise order, governing laws, and interconnected causal relationships? If causal systems within the universe require organization, laws, and precise determination, then the question no longer remains restricted to “How do things work?” Instead, it becomes: Who created the origin of this causal system itself? And how did these governing laws, capacities, and organized relationships upon which the entire universe rests come into existence?

Thus, the inferential methodology of causal systems becomes an endeavor to construct a rational theory of knowledge that transcends empirical exclusivity without denying the value of science and experimentation. This methodology becomes an intellectual pathway that restores due status to human reason, demonstrating that reality is an organized structure built upon interconnected causes, laws, and systems. This naturally leads human reason to seek the Primordial that established and brought this system into existence.

Steps of Reasoning through the Causal System:

Reasoning through the causal system is based on conceiving reality as a domain where simple causality intersects with interconnected causal systems. Consequently, phenomena are not understood as isolated events or simple mechanical relationships, but rather as either direct causal results or elements within systems possessing an internal structure and interconnected organizational relationships.

Based on this conception, the human mind moves beyond the level of superficial description of facts to analyze their internal structure and the relationships that contributed to producing them, whether those are direct causal relations or structural relations within integrated systems. This includes studying the interconnectedness of system elements and the nature of conditions required for an effect to appear and persist, allowing a transition from the question “What happened?” to “How did it happen?” and subsequently to “According to which causal structure did this event occur?”

Hence, reasoning through the causal system becomes a rational method for understanding reality more comprehensively than reductionist explanations that limit themselves to studying isolated parts separated from the overall structure of the system.

The steps of this inferential method can be summarized as follows:

1. Observing the effect or phenomenon existing in reality.

2. Identifying the nature of the cause or agent associated with the effect.

3. Distinguishing between simple causality and an organized causal system.

4. Analyzing the relationships and interconnections between the components and functions of the system.

5. Identifying all possible explanations or hypotheses to account for the cause of the phenomenon.

6. Evaluating the hypotheses according to their explanatory sufficiency for all elements of the effect and the system without deficiency or contradiction.

7. Eliminating explanations that are inadequate or inconsistent with the nature of the effect.

8. Determining the necessary attributes of the cause or agent capable of producing this effect or system.

Thus, reasoning through the causal system takes shape as an organized rational methodology for understanding relationships between causes and effects, analyzing various phenomena and systems, and moving from observing reality to explaining it in an organized causal manner consistent with the nature, characteristics, and governing laws of things. Through this, reality is understood as a network of interconnected causal systems rather than a series of detached events or random repetitions.

This methodology relies on the premise that human reason—by analyzing the system and the relationships among its parts—is capable of perceiving the true reality of causal influence, ruling out inadequate explanations, and subsequently inferring the attributes of the active cause appropriate to the nature of the existing effect or system. In this way, reasoning through the causal system goes beyond merely recording empirical repetition to focus on understanding the real structure of systems and their governing causal relationships, making explanations far more consistent with the interconnected nature of reality.

Accordingly, it becomes clear that reasoning through the causal system is not a methodology confined to explaining specific phenomena or simple relationships. Instead, it is a general rational framework that can be applied across various levels of reality. This applies to natural systems, biological systems, systems of the brain, thought, and language, as well as societal phenomena, criminal investigation, archaeological artifact analysis, and certain historical events. This methodology rests on a fundamental principle: that the order of phenomena and the interconnection of their elements within systems having a specific structure and function allows them to be understood according to the same inferential rules, where only the degree of complexity varies, not the nature of the method itself.

Building upon this, analyzing causal systems serves as a general doorway to understanding reality on a deeper level, allowing the scope of its application to expand to encompass various kinds of phenomena and questions that require explanation. From this point, this methodology can be employed to study major existential issues as a natural extension, starting from analyzing the structure of the universe and its general order, using the exact same inferential rules that govern the understanding of all other systems.

The Internal Revolution within the Philosophy of Science against Empirical Reductionism:

Critique of the limitations of the reductionist scientific method is not confined to external objections. Instead, a broad critical movement has emerged over recent decades from within the philosophy of science itself. The study of complex systems in physics, biology, and cognitive sciences has led to a re-examination of the reductionist premise, which assumes that understanding isolated parts is sufficient to explain the overall structure of reality. Consequently, several schools of thought and intellectual movements have emerged, sharing the emphasis that a system is not always understood by breaking it down into its elementary components, but rather by studying the relationships, structure, and organization that connect these components within a single system.

First: The Stanford School and the Philosophy of Powers

This direction is represented by several contemporary philosophers of science, most notably Nancy Cartwright and John Dupré. In her books “How the Laws of Physics Lie” and “The Dappled World: A Study of the Boundaries of Science,” Cartwright presented an influential critique of the concept that treats scientific laws as universal and comprehensive descriptions of reality. She argues that laws discovered in isolated laboratory environments often operate within specific conditions, and that natural reality is far too complex to be reduced to a set of context-isolated relationships.

In the same context, John Dupré, in his book “The Disorder of Things. Metaphysical foundations of the disunity of science,” criticized the reductionist tendency that assumes understanding the parts is sufficient to understand the whole. He emphasized that living and natural systems possess organizational properties that cannot be fully explained merely by reducing them to their elementary components. A system is not simply the sum of its parts, but a network of relationships that grants it new properties that do not appear when studying elements in isolation.

This school arrives at an important conclusion: that explaining a system is not always achieved by moving from the part to the whole, but instead requires studying the overall structure and organized relationships that grant the parts their meaning and function within the system.

Second: The School of Emergence and Holistic Organization in Physics

This orientation emerged clearly in the work of Nobel laureate physicist Robert Laughlin, particularly in his book “A Different Universe: Reinventing Physics from the Bottom Down.” He started from the observation that many major physical phenomena cannot be adequately explained solely through the study of elementary particles alone because new properties emerge when these particles become organized within more complex holistic structures.

Hence, the concept of emergence stood out as one of the fundamental concepts in contemporary physics, where certain properties of a system result from the architecture of part organization and their relationships, rather than from the properties of individual parts alone. According to this view, understanding reality requires examining different levels of organization, rather than limiting oneself to the lowest level alone.

Third: General System Theory

In the field of biology and systems theory, Ludwig von Bertalanffy laid the theoretical foundation for what became known as “General System Theory” which he presented systematically in his book “General System Theory: Foundations, Development, Applications.” Bertalanffy began from the study of living organisms to show that complex systems do not operate according to a simple linear causal model, but rather within networks of mutual relationships, feedback loops, and continuous interaction among parts. Therefore, understanding a system is not achieved merely by analyzing its components, but requires understanding the overall structure that gives it its identity, function, and stability.

This theory reveals that the whole is not merely the sum of its parts, but a system possessing organizational and functional properties that arise from the relationships connecting its various elements.

The Additional Step: From Describing the System to Seeking the Organizer

These three schools, despite their different starting points, reveal a common conclusion of great significance: that reality does not appear as a random collection of independent elements, but as interconnected systems with internal organization, specific functions, and holistic properties that cannot be entirely reduced to their elementary components. They also reveal the limitations of reductionist explanations that settle for analyzing parts without paying attention to the structure within which they are organized.

However, despite their importance, these trends remain largely confined to describing the nature of complex systems and how they operate. They explain organization and demonstrate the properties of holistic structures, but they do not directly address the question regarding the very origin of this organization itself, nor the condition for the possibility of these systems existing in the first place.

From here emerges the methodological step we adopt: if contemporary philosophy of science has concluded that the universe cannot be understood as a mere gathering of separate elements, but rather as an interconnected, organized system built upon holistic relationships and functions, then the next question becomes: What explains the origin of this system itself? And what cause is capable of explaining its existence, its order, and its intellectual comprehensibility?

Thus, these schools do not mark the end of the explanatory path; rather, they serve as a springboard toward foundational research. While they reveal the existence of the holistic system and highlight its organizational properties, this inquiry takes an additional step, seeking to explain the very origin of this system's existence and searching for the foundational cause capable of explaining its possibility, order, and comprehensibility as an interconnected overall causal system.

Conclusion:

The crisis of modern materialist thought lay not in its empirical scientific achievements, but in its materialist doctrine and ideology and in transforming scientific experimentation from a partial tool for understanding certain phenomena into a comprehensive epistemological authority that attempted to reduce all of existence to the limits of laboratory experimentation and sensory measurement. Modern reductionist empirical methodology, despite its great success in understanding many natural phenomena, has proved—with the advancement of science—incapable of fully explaining complex systems, organized structures, and real causality.

This shift led to the emergence of contemporary philosophical and scientific trends that restored due consideration to the concepts of system, structure, causality, and function, demonstrating the limits of reductionist explanation in dealing with complex systems. However, these trends, despite their success in uncovering the shortcomings of reductionism, often stopped at describing the system and analyzing its characteristics, without moving forward to the foundational question regarding the origin of this system's existence and the conditions of its possibility.

In this context, the methodology of reasoning through the causal system presents itself as a rational and normative framework for analyzing systems and phenomena, aimed at rebuilding the relationship between reason and reality on foundations more aligned with the nature of existence. It does not reject science or experimentation. Instead, it places them within their natural scope as essential tools for understanding phenomena within the system, without reducing all levels of knowledge to the bounds of empirical methodology alone. Through the analysis of causal systems, this methodology affirms the independent authority of human reason in analyzing systems, narrowing down possibilities, and eliminating inadequate explanations to achieve complete explanatory certainty—moving beyond mere partial empirical description toward understanding the deeper explanatory structure of reality.

The application of this methodology is not restricted to studying the universe alone; instead, it can be utilized across multiple fields, including life, language, thought, human organizations, criminal investigation, and other complex systems. However, its most important application lies in studying the universe as the overarching causal system that encompasses all partial systems; for analyzing its structure, order, and comprehensibility leads to seeking the explanatory foundation that accounts for the origin of its existence, possibility, order, and continuation.

From this point begins the foundational proof of this subject—not from predefined metaphysical assumptions, but from analyzing reality as an organized causal system, and then following the requirements of rational explanation until arriving at the foundational Originator upon which the possibility, order, and comprehensibility of the cosmic system depend. [Concluded]