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Organized Information…A New Paradigm?

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Abstract

Information is often treated as a measurable quantity independent of meaning, function, or interpretation. This manuscript begins at the boundary Claude Shannon deliberately established and examines what can happen when informational distinctions are considered within organized systems rather than in isolation. It proposes informational organization as a conceptual framework through which distinctions, constraints, and relations become consequential for a system's existence and future possibilities. Meaning, function, interpretation, and novelty emerge not as added substances but as relational consequences of organized informational processes. Biological organization provides the richest examples, physics the clearest, this framework clarifies recurring structures across physical, chemical, cognitive, and conceptual domains. The result is a pluralistic, non reductive account of how systems preserve, modify, and reorganize informational relations across levels. The manuscript suggests that informational organization may offer complementary philosophical architecture capable of clarifying boundaries, illuminating emergence, and generating more coherent questions about the nature and significance of information.

Keywords

"Information", "Informational Organization", "Meaning", "Function", "Emergence", "Philosophy of Information" and/or "Philosophy of Science"

1. Introduction: Informational Organization: Distinctions, Relations, and Constraint

Information is often spoken of as though it were a thing: something contained in a gene, carried by a signal, stored in a computer, or possessed by a system. Such language is convenient, but it can obscure the essential relational character of informational phenomena. The framework set forth here treats information less as an object than as a distinction among possible states, and informational organiza-

tion as organization in which relations among such distinctions become consequential for a system's future possibilities.

At the most elementary level, information requires distinction. Where no difference can be drawn, no informational alternative exists. Yet distinction alone is not sufficient for organization. A random sequence, such as the "primordial soup" of the Universe contains distinctions and may possess substantial mathematical information, but it need not exhibit a stable relational structure. Organization arises when differences become related in ways that constrain subsequent possibilities.

Constraint should not be understood merely as restriction. Every organization excludes possibilities, but it also enables possibilities that would otherwise be unavailable. By way of example, the grammar of a language restricts arbitrary combinations while enabling intelligible expression. The structure of a protein excludes countless molecular configurations while enabling a particular range of interactions. Legal rules constrain conduct while creating stable expectations. Biological membranes limit exchange while making cellular organization possible. Constraint is therefore both selective and generative.

Informational organization is organization in which relations among informational distinctions become consequential for a system's future possibilities.

This definition is intentionally broad, but it is not unlimited. A difference becomes organizationally relevant only when it participates in relationship(s) which changes what can reliably follow. The framework here does not claim that every difference is meaningful, functional, or interpretable. It claims only that stable relations among differences may constrain future states and thereby become explanatory.

An example can be found in recent experimental work on entangled orbital angular momentum (OAM) states which has revealed that light itself contains hidden topological organization: a 48-dimensional structure with more than 17,000 distinct invariants. These invariants arise from a single degree of freedom and remain stable under disturbances, forming a measurable topological spectrum without requiring engineered quantum states. This discovery provides empirical reinforcement for this manuscript's premise that information is fundamentally organizational. The persistence, robustness, and high-dimensional structure exhibited by OAM topologies illustrate how informational organization can maintain identity across change, expressing a system's tendency toward continued structural consistency.

This relational emphasis avoids two opposing errors. The first is reductionism in an overly narrow sense: the assumption that a complete description of components automatically constitutes a complete explanation of organization. Components are of course indispensable, but the same components may support radically different outcomes depending on how and when they are arranged and related. A dictionary and a novel may contain many of the same words, yet their informational organization differs profoundly. Chemical elements recur across living and nonliving systems, but their organization determines whether they participate in

a mineral, a metabolic pathway, or a nervous system.

The second error is exceptionalism: the assumption that meaning, function, or organization must enter nature from a domain wholly separate from material processes. The present proposal rejects that separation. Organization does not float free of mechanism, it is realized through mechanism. The claim is simply that a mechanistic inventory is explanatorily incomplete when it omits the relational constraints through which mechanisms become coordinated.

Organization therefore occupies an intermediate explanatory position. It is neither an additional substance nor a mere verbal re-description. It concerns the pattern through which physical processes become mutually conditioned or connected. To say that a system is organized is to say more than that it has parts. It is to say that the states and activities of those parts are related in ways that create, preserve, transform, or reproduce a larger or different structure.

This point can be stated hierarchically. Distinctions among possible states constitute information. Informational organization arises when relations among informational distinctions become consequential for a system's future possibilities. Function arises when a consequence of informational organization contributes reliably to the system's continuation or organized change. Interpretation arises through selective response that changes the system's subsequent possibilities for response. Meaning arises through the context-dependent relation between an interpreted informational distinction and its consequences for the system.

Each level presupposes the levels below it, but the higher levels are not exhausted merely by naming their physical components. A molecular signal has chemical properties whether or not it participates in a living system. Within a cell, however, the same molecular configuration may trigger transcription, inhibit a pathway, or alter development. The difference lies not in the signal considered in isolation, but in the organization within which it is present or received.

No single description is likely to exhaust every organizationally relevant relation in a complex system. A statistical account may quantify uncertainty. A physical account may describe energy and motion. A chemical account may identify reaction pathways. A biological account may identify functions. A philosophical account may analyze meanings. These descriptions need not compete. They may address different dimensions or perceptions of one organized process.

The proposed framework is therefore pluralistic rather than imperial. It does not demand that physics become biology, that biology become semiotics, or that philosophy replace empirical science. It proposes that information becomes scientifically and philosophically richer when the relevant level of organization is made explicit. The same event may be described statistically, physically, functionally, and semantically without contradiction, provided that the explanatory claims appropriate to each level are distinguished.

This approach also clarifies the relation between information and observation. Informational organizations need not be fully accessible to an observer in order to influence a system's behavior. Scientific history repeatedly shows that observa-

ble manifestations may represent only a portion of the organization responsible for producing them. Fields, microorganisms, genes, quantum states, plate tectonics, and gravitational waves were inferred from patterned consequences before they became directly measurable through improved instruments. The absence of direct observation is not evidence of the absence of organization; it may reflect the present limits of access or understanding.

At the same time, the concept must not become a license to infer hidden organization wherever explanation is incomplete.

Disciplined inquiry requires evidence that proposed relations have observable consequences, explanatory value, or predictive use. Informational organization is scientifically meaningful only insofar as it can be connected to differences in behavior, persistence, constraint, or transformation.

The framework is therefore simultaneously expansive and restrained. It is expansive because it allows relations of information to be studied beyond communication channels. It is restrained because it requires those relations to be grounded in organized consequences rather than metaphor alone.

2. Meaning, Function, and Interpretation

If information can be quantified without reference to semantics, why do some informational distinctions matter while others do not? The answer proposed here begins with a simple observation: information distinguishes among possible states; meaning emerges when those distinctions become consequential within an organized system.

Meaning, in this account, is not an additional substance attached to a signal after transmission. Nor is it limited to conscious reflection. It is the context-dependent relation between an interpreted informational distinction and its consequences for a system.

A nucleotide sequence illustrates the point. Considered outside a living context, it possesses measurable physical and statistical properties. Within a cell, the same sequence participates in transcription, translation, regulation, development, and environmental response. Its biological significance depends upon the organized networks through which it is expressed, suppressed, modified, repaired, and interpreted. Remove that context and the sequence remains chemically present while much, if not all, of its biological meaning disappears.

This is why information should not be pictured solely as a message moving from sender to receiver. Living systems do not merely receive external information. They actively preserve, modify, compare, filter, and generate or create informational relationships through continuous interaction in their existence or from their environments. The organism is not a passive endpoint of transmission but an organized participant in the production of significance or existence or change.

Function marks a further development. Function is a consequence of informational organization that contributes reliably to a system's continuation or orga-

nized change. It is thus not an intrinsic property of a signal, but arises from the relationship between an informational distinction and the organization of the system in which it becomes consequential.

The word coherence requires care. It does not imply perfect harmony or static equilibrium. A coherent system may contain conflict, fluctuation, and local failure. Coherence refers to the organized alignment of constraints that permits a system to maintain or reestablish or change a recognizable range of behavior despite variability. Biological homeostasis, ecological resilience, linguistic intelligibility, and institutional continuity all exhibit different forms of coherence.

Function enhances or preserves such coherence. A signal is functional when the system is organized so that responding to it contributes reliably to continued operation or adaptive change. A signal that produces consequences but consistently destroys the relevant organization is not functional relative to that organization, even though it remains causally effective. Function therefore adds a relational and evaluative dimension to causal description.

This evaluative dimension does not require conscious purpose.

A heart functions to circulate blood in an organism because that activity contributes to the organized persistence of the organism, not because the heart forms an intention.

A regulatory sequence functions within a gene network because its activity reliably contributes to the production, maintenance or suppression of downstream processes. Function can therefore be objective in relation to an organized system while remaining context dependent.

Context dependence is not a weakness. It is the source of functional diversity. The same chemical signal may be functional in one organism, irrelevant in another, and destructive in a third. The difference lies in the architecture of constraints. Systems with different histories, boundaries, and internal relations transform the same distinction into different consequences.

Interpretation arises through a selective response by which an informational distinction changes a system's subsequent possibilities for response. Interpretation need not be conscious, symbolic, or linguistic. A cell interprets a chemical gradient in a minimal functional sense when its organized machinery produces different responses to different concentrations. An organism interprets environmental cues when those cues alter behavior in ways related to survival or reproduction. Conscious interpretation represents a far richer level, involving memory, anticipation, abstraction, and self-reference, but it is continuous with more elementary selective responsiveness.

Hans Jonas's philosophical work offers a particularly relevant precedent for the present framework. Jonas argued that living beings exhibit an intrinsic directedness through which their organized activity expresses a striving for continued existence (Jonas, 1966).

This striving is not an external purpose imposed upon matter but an emergent consequence of biological organization itself. In Jonas's account, metabolism, re-

sponsiveness, and self-maintenance reveal a continuity between physical process and existential significance. The organism does not merely persist, to some degree it enacts its own persistence through selective responsiveness to the distinctions that matter for its continued being. This perspective aligns with the present proposal by showing how informational distinctions become consequential within organized systems whose very activity constitutes a claim to ongoing existence. Jonas therefore provides a philosophical bridge between biological function and the broader concept of informational organization, without reducing either to mechanism alone.

The language of interpretation should nevertheless also be used cautiously. Not every causal response qualifies. A stone warms in sunlight, but it does not thereby interpret the light in the biological or semantic sense. Interpretation requires organized selectivity: the system must be constituted so that differences are discriminated and incorporated into its own future organization. The concept therefore identifies a level of organization more specific than mere physical causation.

Meaning, function, and interpretation are consequently neither identical nor independent. Meaning concerns significance within an organized relation. Function concerns the contribution of that relation to a system's continuing organization or transformation. Interpretation concerns the process by which distinctions are selectively incorporated into future behavior. Each emphasizes a different dimension of informational organization.

This framework also avoids the opposition between objectivism and subjectivism. Meaning is not wholly objective if that is taken to mean independent of every system and context. Nor is it wholly subjective if that is taken to mean created arbitrarily by a conscious observer. Meaning is relational. It arises through the interaction between organized systems and the distinctions capable of influencing their future states.

Such a relational account may illuminate the continuity between physical, biological, and cognitive organization without erasing their differences. Physical systems can exhibit stable constraints and patterned transformations. Chemical systems form networks of reactions in which configurations affect subsequent possibilities. Biological systems preserve and modify functional relations across generations. Cognitive systems extend interpretation through learning, memory, expectation, and symbolic communication. The levels differ in complexity and capacity, but each depends on prior forms of organized constraint.

Continuity does not imply identity. A crystal is not an organism. A reaction network is not a mind. A self-organizing pattern does not possess semantic understanding merely because it is structured. Informational organization is general; meaning and interpretation arise only under more demanding conditions.

The central proposition may now be stated: meaning does not replace information, and function is not externally added to it. Both emerge when informational distinctions become integrated into organized relations that influence what a system can do and become. This proposition may be especially visible in living

systems, where the organization of information becomes inseparable from persistence and adaptation, but not to the exclusion of Physics.

3. Biological Organization and Functional Information

Living systems provide the clearest and most abundant evidence that information cannot be understood solely as transmitted difference. Organisms continuously distinguish, preserve, modify, and act upon information across multiple scales. Their organization depends not merely on the presence of molecular components but on the coordinated relations through which those components contribute to metabolism, repair, development, adaptation, and reproduction.

DNA is often said to contain information, while organisms are said to interpret it. Both statements are useful, but neither is adequate if treated literally and in isolation. Genes do not function independently of transcriptional machinery, regulatory networks, cellular environment, developmental history, and environmental interaction. Likewise, organisms do not decode a fixed program in a simple linear sequence. They continually construct, preserve, and revise informational relations through feedback across scales.

Biological meaning therefore resides less in isolated molecules than in organized relations among molecules, cells, tissues, organisms, systems, and environments. A sequence becomes biologically consequential because it participates in a network capable of differentially responding to it. The informational content of the sequence may be measurable in abstraction, but its function emerges only within that network.

The concept of functional information is important because it reconnects information with observable consequence. Rather than asking only how improbable or complex a configuration may be, it asks what degree of organization is associated with achieving a specified function. Information is thereby related to what organized structures enable a system to accomplish.

This move is philosophically significant. It shows that informational description need not remain indifferent to performance. Under specified conditions, function can be connected to measurable distributions of configurations and outcomes. A system exhibiting reliable performance within a constrained space provides evidence that successful organizational relations have been established.

Function should not be confused with externally imposed purpose. The specified function may be selected by an investigator for measurement, but the organized capacity being measured belongs to the system. A protein binds a molecule, an enzyme catalyzes a reaction, or a regulatory network stabilizes expression because of the relations through which its components are organized. The scientific question concerns the likelihood and organization of achieving the relevant outcome, not the attribution of conscious design.

Prions offer a striking illustration of the relational character of biological information. Their biological consequences propagate through protein conformation rather than nucleotide sequence alone. The informational relationship lies in a

structural pattern capable of inducing corresponding organization in other molecules. Chemical composition remains necessary, but organization carries the consequential distinction. Information is preserved through pattern and relation.

Development provides an even richer example. A fertilized ovum contains far less material than the mature organism, yet development does not consist of importing a complete external blueprint for every future detail. Successive states create constraints that alter the possibilities available to later states. Earlier organization becomes the context within which later organization acquires significance. Development is thus not merely the execution of stored instructions but a recursive process in which informational relations continually reorganize the conditions of their own continuation.

Evolution extends that process across generations. Natural selection does not preserve isolated genes in abstraction. It preserves organisms and lineages whose organized relations repeatedly produce viable functions under environmental conditions. Genes matter because of their participation in developmental and ecological systems. Variation supplies possibilities; selection constrains possibilities; inherited organization carries forward relations that have proved capable of continued reproduction.

This perspective does not replace established evolutionary theory. It provides an additional explanatory layer. Mutation, recombination, selection, drift, development, and ecological interaction remain indispensable. Informational organization directs attention to how these processes become integrated across scales and how successful relational structures are preserved, modified, or lost.

Failure is also informative. Developmental abnormalities, regulatory breakdown, disease, protein misfolding, and ecological collapse reveal relations that no longer sustain previously successful organization. Failure is not merely the absence of information. It may identify where informational constraints have become insufficient, incompatible, or misaligned.

The study of failure therefore helps disclose organization. A system's vulnerabilities often reveal the relations upon which its coherence depends. When a single alteration produces widespread effects, it may expose a highly connected constraint. When multiple pathways compensate for one another, they reveal redundancy. When a system adapts without losing identity, it reveals flexible organization rather than rigid structure.

Living systems consequently illustrate several features of informational organization with unusual clarity: distinctions become consequential; functions are context dependent; interpretation is embodied in selective response; organization persists in spite of material turnover; and previous states constrain or enable future development. These features make biology an especially fertile domain for philosophical analysis.

Biology, however, need not represent the exclusive domain of informational organization. Functional relations may also appear in ecological networks, engineered systems, social institutions, and physical processes exhibiting persistent,

constrained organization. The mechanisms and meanings differ, and the biological concept of function should not be transferred carelessly. Still, biology suggests a more general principle: organized relations can acquire empirical significance through the reliable differences they make to future possibilities.

This principle provides a bridge from life to emergence. If informational organization can preserve function, can it also account for the appearance of genuinely novel structures? The answer depends on understanding organization not as static arrangement but as a recursive process capable of altering the conditions under which further organization becomes possible.

4. Organized Information in Physics and Chemistry

Every thing we see, stars, planets, cars, computers, are composed of organized information. How did that come to be? All of the foregoing are composed of atoms. Atoms come in approximately 100 different natural combinations, with a number of additional created in the laboratory. Combined together they compose everything we see.

Most astrophysicists, one way or another, articulate the "Big Bang" Theory. Accordingly, it was incredibly hot. Assertedly, in this "primordial soup" two different equal and opposite asymmetries arose, more precisely it seems that for about every 550 million anti-quarks that were present there with the same number of quarks +1. The same with positrons, and electrons being again +1.

As the universe cooled, which means that wavelengths lengthened and energy was lost, the quarks and anti-quarks annihilated each other there was some left over. Those residuals bound together into hadrons, which ultimately became protons and neutrons. All of which brought different information together.

As the electrons and positrons similarly annihilated each other there remained a surplus of electrons. About half of the aforementioned hadrons were protons with the other remaining half as neutrons, each are made up of six quarks, resulting in a neutrally charged universe. Following that they interacted ending up with a proton - neutron balance of about 85 to 15. A fraction of the neutrons radioactively decay, and all of this is about three minutes into the existence of the universe, the first atomic nuclei came into existence. The product, different information.

Tens of thousands of years later, with further temperature reduction, the first ion with one electron bound to it stably (and remember that is an important component of organized information) formed the first Atom. It turns out that was lithium, followed by helium and later hydrogen. From there to today (Siegel, 2026).

In-as-much as Chemistry deals predominately with the outer electron layer of Atoms, but sometimes with the inner or core valances, it is thereby dealing with organized information, and resulting in different configurations with their own possibilities and constraints. As of 2021 there were over 290 million different substances as products of chemistry.

Consequently, Physics and Chemistry join Biology as exemplary domains for considering informational organization, by showing how multi-level consolidations produce different functions, stability, and new constraints (Koopmans et al., 2026).

5. Emergence, Novelty, and the Boundaries of Explanation

One of the persistent questions in philosophy and science concerns the origin of novelty. New structures arise, new biological and physical functions evolve, new patterns become stable, and new forms of explanation become possible. Randomness can supply variation, while regularity supplies continuity. Neither alone appears sufficient to explain the progressive appearance of organized novelty (Hazen et al., 2023).

Informational organization offers a middle path. Novelty may emerge when existing constraints and new distinctions become reorganized into configurations not previously realized. The components need not be new. What is new is the relation or relations among them and the field of possibilities that relation or those relations create.

A musical composition uses a limited range of notes. Language uses a limited alphabet. Biological systems rely on a comparatively small set of chemical elements. Yet the organizational possibilities generated through different arrangements are effectively inexhaustible, consider the perhaps trillions of proteins or protein combinations which exist in nature. Organization multiplies possibility because every stable relation has the potential to become a condition for further relations.

Emergence can therefore be understood as the appearance of new capacities, properties, or constraints through the reorganization of existing components and relations. This account avoids treating emergence as a mysterious addition to physical law. Higher-level properties do not need to originate from outside nature. They arise when interactions establish new constraints that alter the behavior of the system as a whole.

The phrase "the whole is more than the sum of its parts" is suggestive but incomplete. The relevant difference need not be an added quantity. It is organization or re-organization. A collection of parts becomes a system when their relations constrain one another in a way that produces stable or reproducible patterns. The system's behavior can then depend on relations that no component possesses independently.

Complexity alone does not guarantee organization. A truly random sequence may be highly complex while lacking coherent structure. A complicated mechanism may contain many parts while remaining poorly integrated. Organization concerns patterned relations through which complexity becomes consequential. It is therefore possible for a comparatively simple system to be highly organized and a highly complex system to be disorganized.

Recursive organization is central to novelty. Every successful organizational

state changes the landscape in which subsequent states arise. Inter alia, they can, and often do, alter their then present context. Developmental pathways establish or resist conditions for later differentiation. Ecological communities create niches that alter future selection. Languages accumulate structures that enable new forms of expression. Legal precedents reorganize the interpretation of later disputes. Scientific theories alter the questions that investigators consider meaningful.

In each case, earlier organizations become part of the environment of later organization. The process is neither wholly deterministic nor wholly random. Existing constraints limit possibilities, while variation and interaction permit new relations to emerge. The future remains open not because natural law is absent but because lawful systems can support organizational configurations whose significance cannot often, let alone always, be specified in advance.

This openness must not be confused with metaphysical indeterminacy. Some novelty may be unpredictable only because the relevant interactions are too numerous or sensitive to initial conditions for practical calculation. Other novelty may involve more fundamental forms of contingency. The framework of informational organization does not decide that question. It identifies a common explanatory structure: novelty appears when the organization of relations changes what the system can subsequently do.

The concept also illuminates scientific discovery. Investigators rarely create the natural organization they discover, but they do create conceptual organizations through which observations become intelligible.

Scientific revolutions often occur when previously disconnected findings are reorganized within a new framework. Discovery is therefore simultaneously realist and constructive: reality constrains successful explanation, while human inquiry constructs models capable of representing its organization.

Curiosity has a distinctive role in this process. It may be understood as a search for higher-order coherence among incomplete informational structures. Questions do not merely request missing facts. They can reorganize the field of inquiry by directing attention toward some relations rather than others. A fruitful question can create the conditions under which previously invisible organization becomes recognizable.

Curiosity alone, however, is insufficient. Human beings are skilled at perceiving patterns where none exist. Disciplined curiosity therefore requires evidence, criticism, replication, and willingness to abandon favored interpretations or measurements. Scientific method protects the generative power of curiosity by distinguishing stable organization from coincidental arrangement.

The same concern applies to interdisciplinary inquiry. Similar patterns across disciplines may indicate recurring organizational principles, but they may also be superficial analogies. Synchronization in fireflies, neurons, chemical reactions, and physical oscillators may share mathematical features while differing profoundly in mechanism and significance (Buck & Buck, 1976). A general framework becomes useful only when it clarifies both the common structure and the

domain-specific differences.

This requirement leads directly to the problem of boundaries. Scientific disciplines depend on boundaries. Definitions, methods, institutions, and specialized languages or measurements make sustained inquiry possible. Without such divisions, the complexity of nature would overwhelm investigation. Boundaries are therefore indispensable instruments of knowledge.

The danger arises when methodological boundaries are mistaken for permanent divisions within reality. Chemistry and physics most certainly overlap. Biology and chemistry merge in molecular biology. Neuroscience intersects psychology, computation, linguistics, and philosophy. Information theory now informs genetics, ecology, economics, and communication. Increasing knowledge often reveals continuity across divisions that were once treated as fundamental.

The result need not be a universal science that erases specialization. Disciplines remain necessary because different questions require different methods. The more modest proposal is that disciplinary boundaries are maps: selective organizations of inquiry rather than final descriptions of nature's ontology. Maps are useful because they simplify and abstract. Reality endures as it does not.

Informational organization provides one way to understand why boundaries repeatedly shift. If organized relations extend across scales and substrates, then no single disciplinary vocabulary will exhaust them. Physics may explain material realization, biology may explain adaptive function, and philosophy may explain conceptual implications.

The descriptions differ because the questions differ, yet they may concern overlapping aspects of the same organized process.

A mature theory of information should therefore preserve distinctions while examining continuity. It should resist both fragmentation and premature unification. The task is not to declare that everything is information, but to determine where informational organization offers genuine explanatory leverage and where another vocabulary is more appropriate.

6. Toward a Philosophical Framework of Informational Organization

The central proposal of this manuscript can now be stated as plainly as possible: information should perhaps be understood less as something systems possess than as something systems continually create, organize or reorganize.

This change in emphasis has several consequences. Information becomes relational rather than substantial. Meaning becomes contextual rather than externally imposed. Function becomes an organized effect rather than an intrinsic property. Interpretation becomes selective incorporation of distinctions into potential future behavior. Novelty becomes the reorganization of constraints rather than inexplicable creation. Life becomes one particularly rich manifestation of informational organization rather than its source.

The term "general theory" must be used with caution. The present proposal

does not offer a completed mathematical formalism, a universal measure, or a replacement for existing scientific theories though it arises out of one. It is a philosophical framework intended to include organization questions that have often been treated separately. Its generality lies in the recurring structure it identifies: distinguishable states enter relations; those relations establish constraints; constraints alter future possibilities; and sufficiently complex organization gives rise to function, interpretation, and meaning.

A useful general theory should satisfy at least four conditions. First, it must respect successful specialized theories rather than treating them as errors. Shannon's theory remains indispensable for communication. Astrophysics, Thermodynamics, evolutionary theory, molecular biology, and the sciences of complex systems retain their own explanatory domains. Informational organization is complementary, not competitive (Shannon, 1948).

Second, the framework must distinguish levels of organization. Physical constraint is not biological function; biological response is not conscious interpretation; conscious interpretation is not philosophical truth. Continuity across levels does not erase qualitative differences. A theory that calls everything meaningful explains nothing about meaning.

Third, the framework must generate empirical and conceptual efforts. It should encourage investigators to identify relevant distinctions, map the constraints through which they become consequential, and ask how those constraints persist, fail, or transform. It should clarify where existing measures capture organization and where new measures or perspectives may be required.

Fourth, the framework must remain open to correction. Informational organization should not become a doctrine protected from evidence. Its value will depend on whether it explains more clearly than competing concepts, integrates observations without distortion, and produces questions capable of disciplined investigation.

Several research directions follow. One concerns measurement. Shannon information quantifies uncertainty, while functional information connects configurations with specified performance. Additional measures may be needed to describe relational constraints across levels without collapsing organization into complexity alone. The challenge is to distinguish quantity of information from degree and kind of organization.

A second direction concerns causation. If higher-level organization constrains lower-level processes, how should that influence be described without violating physical closure? One possibility is to treat higher-level causation as the selection and stabilization of boundary conditions through which lower-level dynamics unfold. The parts obey physical law, while organization determines which lawful trajectories remain available and recurrent.

A third direction concerns meaning. Relational accounts must specify when a difference becomes significant and for what system. Biological and cognitive examples suggest that meaning depends on selective response, historical organiza-

tion, and consequences for future behavior. A mature theory would need to distinguish minimal significance from linguistic, social, and conscious meaning.

A fourth direction concerns the continuity between life and nonlife. Physical and chemical systems exhibit self-organization, but living systems preserve and reproduce functional constraints across generations. The transition may involve not a single boundary but a progressive accumulation and selection of organization: containment, metabolism, templated replication, error correction, adaptive regulation, and open-ended evolution.

A fifth direction concerns knowledge itself. Scientific inquiry is an informational process in which observations are selected, compared, criticized, communicated, and reorganized into theories. Correction does not merely remove error; it reorganizes the conceptual landscape. The growth of knowledge may therefore be understood as informational organization acting recursively upon informational organization.

This perspective encourages epistemic humility. Every model selects some relations and omits others. Every measurement has finite resolution. Every discipline organizes inquiry according to its purposes. Scientific progress may be less a march toward final completeness than a continuing development of richer and more coherent organizations of evidence.

The proposal also carries an ethical and cultural implication, though it cannot be developed fully here. Systems of law, education, communication, and governance depend on how information is organized, distributed, interpreted, preserved and increasingly, how and by whom may it be accessed. Distorted informational environments can degrade collective coherence, while institutions that sustain criticism and reliable communication can enlarge adaptive capacity. The philosophy of informational organization may therefore have consequences far beyond the natural sciences.

These extensions should not be confused with proof. The present article offers a conceptual architecture. Its purpose is to, among others, make a class of questions more visible: How do differences become consequential? How do constraints create function? How does organization persist through material change? How do new levels of meaning emerge? Where do disciplinary boundaries reflect nature, and where do they reflect the organization of inquiry?

7. Conclusion

The argument advanced here is deliberately modest. It does not claim that all natural phenomena can be reduced to information (though that might be the case), which meaning exists wherever a difference occurs, or that established scientific theories should be displaced. It proposes that informational organization may provide a complementary framework for understanding how distinguishable states become or are related, how those relations constrain or create future possibilities, and how increasingly complex forms of function, interpretation, and novelty arise.

Shannon demonstrated that information could be measured independently of meaning. The present inquiry begins at that precise boundary Shannon deliberately established and asks what becomes visible when information is examined within organized systems. The answer suggested here is not a second substance called meaning, but a hierarchy of relational consequences. Differences become organized; organization establishes constraint; constraint enables function; selective response permits interpretation; and meaning emerges within the continuing history of the system.

Biology provides the richest examples because living systems preserve, modify, and reproduce informational relations across scales and generations. Yet the broader pattern clearly extends into physical self-organization, chemical networks, ecological systems, cognition, culture, and scientific knowledge. Whether those extensions represent a genuine generality or only a family of analogies remains an open question. That question should be settled by careful comparison, conceptual precision, and empirical work rather than by rhetoric.

This framework does not imply that all distinctions disappear. Boundaries are indispensable to thought and inquiry. It asks instead whether some boundaries that organize scientific practice are methodological conveniences or over restrictions rather than ultimate divisions within reality.

The history of inquiry suggests that the limits of information are still unsettled. Emerging work at the intersections of quantum theory, spacetime, entropy, complexity, and the origin of life, to mention only a few, continues to reopen questions once thought separate. Those investigations may ultimately support, modify, or refute the present proposal. What matters is that they show the informational landscape expanding rather than closing.

The framework offered here is therefore not the conclusion of inquiry but its continuation. Its proper measure will be the variety of the questions it helps others to ask. If informational organization proves significantly useful, it will be because it permits investigators to recognize relationships previously obscured by disciplinary boundaries or otherwise while preserving the rigor those disciplines have achieved.

Perhaps the most interesting chapters remain unwritten. The universe may not merely contain information; it may continuously organize it. Living systems participate in that organization. Scientific inquiry participates in it. Mathematics formalizes it. Language communicates it. Curiosity discovers it. Criticism refines it. And every answer, in turn, reorganizes the questions.

The answer proposed here is not a second substance called meaning, nor an enlargement of information until it includes everything. It is a cumulative hierarchy of relational consequences. Differences permit distinctions; distinctions among possible states constitute information; stable relations among distinctions establish organization; organization constrains possibilities; and informational organization makes those constraints consequential for systems.

From this foundation, further concepts may or likely will become available without being presumed. Function arises when organized consequences contrib-

ute reliably to systemic continuation or organized change. Interpretation arises when selective response alters subsequent possibilities for response. Meaning arises through the context-dependent relation between interpreted distinctions and their consequences for a system. Emergence and novelty arise when organization permits consequences and possibilities unavailable to its parts independently or to its preceding configurations.

The framework preserves continuity without requiring reduction. Later forms of organization incorporate the physical, chemical, and informational conditions from which they arise, but those antecedent conditions do not necessarily perform every explanatory function required at later levels. Explanation must therefore remain continuous across levels while recognizing the relational organization distinctive to each.

The argument advanced here itself is constrained. It does not propose that all differences are meaningful, that all organization is functional, or that all systems interpret information. Nor does it displace established mathematical or scientific theories. It proposes informational organization as a complementary philosophical framework for examining how distinctions become consequential and how increasingly complex forms of function, interpretation, meaning, emergence, novelty, and persistence may arise.

The framework offered here is therefore not so much the conclusion of inquiry but its continuation. Its proper measure will be the quality of the distinctions it clarifies, the relations it reveals, and the questions it enables others to ask.

Final comment: The world requires understanding not only what it is composed of but how it is organized.

Declaration of Generative AI and AI-Assisted Technologies in Manuscript Preparation

During manuscript preparation, the author used Claude (Anthropics) solely for limited language editing of selected sentences in order to revise in order to improve clarity. No AI tool was used to generate research content, analyze data, interpret results, or prepare references, the ideas, argument, and intellectual contribution of the paper are entirely original. All AI-assisted suggestions were reviewed, revised where necessary, and approved by the author, who takes full responsibility for the final manuscript.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

References

Buck, J., & Buck, E. (1976). Synchronous Fireflies. *Scientific American, 234,* 74-85. https://doi.org/10.1038/scientificamerican0576-74

Hazen, R. M., Wong, M. L., Cleland, C. E., Arend, D., Bartlett, S., Cleaves, H. J. et al. (2023). On the Roles of Function and Selection in Evolving Systems. *Proceedings of the National*

Academy of Sciences, 120, e2310223120. https://doi.org/10.1073/pnas.2310223120

Jonas, H. (1966). *The Phenomenon of Life: Toward a Philosophical Biology*. Harper and Row Publishing. https://books.google.com/books/about/The_Phenomenon_of_Life.html?id=F2seCz7wmfQC

Koopmans, L., Kay, E. M., & Youk, H. (2026). Predictability Can Be Dynamically Constructed in Deterministic Systems. *Nature Communications, 17,* Article No. 10720. https://doi.org/10.1038/s41467-026-77737-0

Shannon, C. E. (1948). A Mathematical Theory of Communication. *Bell System Technical Journal, 27,* 379-423. https://doi.org/10.1002/j.1538-7305.1948.tb01338.x

Siegel, E. (2026). *Ask Ethan: How Did Atoms Come to Be*? Big Think, Sept. 18, 2026.

Appendix

Glossary of Terms

Abstraction: The reorganization of distinctions and relations so they may be considered independently of some features of the contexts in which they occur.

Boundary: The distinction by which a system is separated from what it does not include.

Causation: The relation within a process by which a preceding state, relation, or constraint contributes to the occurrence of a subsequent change.

Change: A distinction between successive states of the same thing.

Consequence: A change in a system that would not occur in the same way in the absence of a specified distinction, relation, or constraint.

Constraint: A relation that excludes one or more possibilities for a system.

Context: The configuration of relations within which an informational distinction has particular consequences for a system.

Difference: The condition of not being identical.

Distinction: A difference between states.

Emergence: The occurrence of a consequence made possible by relations among a system's parts that no component produces independently.

Function: A consequence of informational organization that contributes reliably to a system's continuation or organized change.

Information: A distinction among possible states.

Informational Organization: Organization in which relations among informational distinctions become consequential for a system's future possibilities.

Interpretation: A selective response through which an informational distinction changes a system's subsequent possibilities for response.

Meaning: The context dependent relation between an interpreted informational distinction and its consequences for a system.

Novelty: The emergence of an informational organization through which a previously unrealized state, relation, constraint, or function becomes possible within a specified system or context.

Organization: The condition in which multiple distinctions stand in stable relations to one another.

Persistence: The continuation of a system's identifiable organization through successive states.

Possibility: A state that could occur but has not necessarily occurred.

Process: An ordered succession of changes.

Relation: A connection between two or more distinctions.

Relational Process: A process in which relations among distinctions shape future possibilities.

Response: A change in a system that occurs as a consequence of an informational distinction affecting that system.

Selective Response: A response that differs according to the informational distinction affecting the system.

Stability: The continuation of a relation through successive states.

State: The condition in which something exists at a specified point or during a specified interval.

System: An organization whose stable relations permit it to be distinguished as a whole.