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Universal Flux Theory Consciousness as the Net Stream of Our Evolution

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Abstract

This paper proposes the *Universal Flux* theory, which posits that consciousness is the net stream of ongoing evolutionary change. The theory treats evolution as a universal process that encompasses physical, biological, computational, and subjective domains, with relativity as its inherent fabric. All entities and events are considered relative causes and effects that collectively form a directional stream of evolution. Consciousness, on this account, is not a static property or an isolated computation but a continuous pattern of ongoing transitions, the net causal flux by which an entity tracks, responds to, and contributes to its evolutionary trajectory. In this universal flux governed by evolution, every event unfolds from prior causes along an inevitable trajectory. At each instant, the system follows a unique path determined by its configuration and environment. The only law that exists is causality and the relativity of those that accompany the flow. In such a universe, there is no force; everything is flow, from gravity to thoughts. Evolution, on this account, is the fundamental reality, and consciousness, as the manifestation of evolution, is our determined reality.

Keywords: evolution; relativity; computation; consciousness; memory; accessibility; optimization

Introduction

I begin the article by honoring two great philosophers from two different eras: Baruch (Benedict de) Spinoza (17th century) and the pre-Socratic Heraclitus of Ephesus.

Baruch Spinoza made causality the backbone of his philosophy. He argued that each event is part of an unbreakable chain of causes extending indefinitely. People experience themselves as free because they are aware of their desires but ignorant of the causes that determine those desires (de Spinoza et al., 1996).

> "Every individual thing is determined to exist and act by another cause, which is also determined by another, and so on to infinity."[1] —Baruch de Spinoza

Heraclitus emphasized that reality is in constant change. He described reality as perpetual flux: the world is always "becoming" rather than merely "being" (Kirk et al., 1983).

> "No man ever steps into the same river twice."[2] —Heraclitus of Ephesus

These concepts of causality and flux underpin the *Universal Flux* theory, which posits consciousness as an evolutionary flux. This article explores how Spinoza's deterministic chains and Heraclitus' vision of flux converge in a unified framework, conceptualizing the universe and us as a river.

[1] Baruch Spinoza, *Ethics*, trans. Edwin Curley (London: Penguin Classics, 1996), Part I, Proposition 28, 16.

[2] Heraclitus, quoted in G. S. Kirk, J. E. Raven, and M. Schofield, *The Presocratic Philosophers: A Critical History with a Selection of Texts*, 2nd ed.

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Evolution

> "We see nothing of these slow changes in progress until the hand of time has marked their course." —Charles Darwin

Biological Evolution

Evolution, in its classical biological sense, refers to the process by which populations of organisms change across successive generations through variation, natural selection, and inheritance, driven by random mutations and survival-related selection pressures.

Its core mechanism has long been described as natural selection, whereby the proportion of individuals with advantageous traits increases in a population over generations. The classical account of evolution has been extended to incorporate molecular genetics, gene flow, and genetic drift, reflecting a broader understanding of evolutionary processes.

The Modern Synthesis, developed in the early 20th century, integrated Mendelian genetics with Darwinian selection and emphasized gradual genetic change (Huxley, 1942, Dickins, 2021).

More recent advancements, such as the Extended Evolutionary Synthesis, further expand the concept of evolution to encompass non-genetic mechanisms, including niche construction, epigenetic modifications, and cultural evolution, while acknowledging environmental feedback and developmental plasticity. This view treats evolution as a dynamic, multifaceted process shaped by relational contexts rather than isolated mechanisms (Laland et al., 2015, Müller, 2017).

These perspectives emphasize relationality, where evolutionary outcomes depend on interactions among organisms, environments, and other related systems.

Universal Evolution

Universal Darwinism, also referred to as generalized Darwinism or universal selection theory, pioneered by thinkers like Donald Campbell and Richard Dawkins, extends the principles of Charles Darwin's theory of evolution by natural selection beyond the biological realm (Dawkins, 1983).

It posits that the core mechanisms of Darwinian evolution, variation, selection, and retention, can be applied to explain non-biological systems. The concept has gained traction in interdisciplinary fields, framing evolution as a substrate-independent algorithm for adaptation that encompasses biological, physical, chemical, and even cosmic transformations.

Lee Smolin's theory of cosmological natural selection extends Darwinian principles to cosmology, proposing that universes reproduce through black holes, where each new universe inherits slightly varied physical constants and selection, deriving cosmic evolution by favoring universes optimized for maximal black hole formation (Smolin, 2004). Gerald Edelman's Neural Darwinism applies the principles of variation and selection to brain development, explaining the adaptation of neural circuits through synaptic pruning, akin to natural selection (Edelman, 2004). Bayesian interpretations further link Universal Darwinism models of the world through variation and selective updating, linking evolution with understanding and learning (Campbell, 2016). And other fields, such as social science (Nelson, 2007), cultural evolution (Mesoudi et al., 2004), memetics (cultural ideas as replicators), and evolutionary economics (Cordes, 2006) also, apply the same generalized logic.

However, Darwinian evolution can be extended beyond Universal Darwinism into an even broader generalization, where change itself plays the pervasive principle and underly all phenomena and reality. Extend Universal Darwinism into a broader meta-theory of universal change and flux by explaining change as fundamental, and reframing other mechanisms as aspects of relativistic change.

Relativity

A key implication of this generalized framework is that these changes are not isolated events but are intrinsically interdependent, related to one another, their environment, and their scale, manifesting as relativistic transformations and causation.

This interwoven cause-and-effect, context-dependent picture implies a dependence of outcomes on the network of relations and environmental context, making relativity a fundamental aspect of evolution.

Each change is related to other changes that act upon it and cause it; each state is both a consequence of prior relative transformations and a cause of related subsequent states. Each moment is a link in an unbroken chain of causality. Thus, the relativity of causal influences on subsequent states is foundational to evolution.

In this perspective, alterations in one component ripple through interconnected networks, affecting and being affected by other related components and contextual factors. The net change that emerges in any case is related to the most relevant influences.

Relativity thus appears inherent to the fabric of evolution.

The environment and context are both evolving participants and selective filters. Organisms and systems modify their context, which in turn shapes them. The same change can have different evolutionary significance depending on the relational context.

In Universal Flux Theory, the Darwinian core remains the same but is generalized to include all types of change.

Perturbation

Instead of random variations and mutation as the primary source of novelty, perturbations are directed changes induced by relational imbalances and interactions within the system's relational context.

Evaluation

Rather than selection for fitness, evaluation is the process by which a system's perturbed state is assessed relative to its context, determining which changes stabilize and which configurations gain persistence or influence relative to alternatives.

In classical accounts, selection is an external filter. In this generalized account, selection is network-mediated, relativistic, and can be endogenous. Selection is relativistic because the criteria for evaluation are not universal but depend on the system's specific relational web, ensuring that outcomes are tailored to the context.

Stabilization

Retention is redefined as relative stabilization, where a system's new state, shaped by perturbation and evaluation, persists as the foundation for future relative changes and causations.

This causal basis ensures that transitions are not random but determined by the relational interplay of internal and external factors, making every state a determined consequence of prior states and a precursor to future ones.

This redefinition shifts the focus of evolution to relativistic change, where all systems evolve through relativistic, causally dependent transitions.

Unlike classical Darwinian evolution, where heredity refers to the transmission of genetic traits from one generation to the next, or Universal Darwinism, which extends to the replication of entities like memes, Universal Flux Theory broadens these concepts to encompass the persistence or transformation of any system's state, including non-replicating systems.

Shifts the emphasis from survival and replicating-oriented evolution to a broader ontology of flux, where relativistic changes enable emergence and novelty without necessitating heredity, framing evolution as a universal, pervasive principle rather than a process tied to survival or a byproduct of competition.

These distinctions enable Universal Flux Theory to describe a broader range of phenomena, including thermodynamic processes and environmental shifts. This universality applies because all systems, regardless of scale or domain, are subject to the same fundamental principles of causality and relationality, making Universal Flux Theory a comprehensive framework for all transformative processes.

Determination

The classical view in evolutionary biology posits mutations as random events with respect to fitness, meaning they are not preferentially generated to meet an organism's adaptive needs or to achieve specific evolutionary outcomes (2003).

This randomness implies that mutations produce unbiased genetic variation, which natural selection subsequently acts upon to shape evolutionary trajectories (Lynch et al., 2016).

The Universal Flux Theory posits directed perturbations rather than random variation; these perturbations are determined by relational imbalances and interactions within the system's relational context. Recent studies also demonstrated that mutations occur with non-uniform distributions, with lower frequencies in functionally essential genomic regions (Monroe et al., 2022).

Perturbations are determined by antecedent relativistic causes, not arising from future foresight, because evolution is an online process.

Arrow of Evolution

In Universal Flux Theory, the direction of evolution refers to the determined trajectory of a system's state transitions, guided by the interplay of perturbations, evaluations, and stabilizations within its relativistic context.

Although evolution is an online process and timeless, irreversibility occurs because each state transition (perturbation-evaluation-stabilization) builds on the previous state, creating a cumulative, causal trajectory that cannot revert to its exact prior states.

Even if we externally revert a state to a prior condition, or if the state itself naturally returns to a similar earlier form, the system continues to update and evolve toward that state, rather than moving backward in time.

According to the Universal Flux Theory, it is accurate to state that the direction of evolution is toward determined possibilities, driven by relativistic causalities. These possibilities are determined because they result from specific causal interactions between the system's current state and environmental constraints.

The net stream of evolutionary change or the river of relativistic causalities are powerful metaphors for understanding the concept of evolutionary direction**.** The net stream represents the cumulative directed flow of state transitions across a system's evolution.

Deterministic Evolutionary outcomes do not, by themselves, imply goal-directedness. The underlying relations and processes do not contain aims; they constrain and determine how systems evolve.

Evolution does not always accompany complexity or order. First, lineages can evolve to or undergo simplifications relative to their prior states (Sirand-Pugnet et al., 2007). Second, complexity and order are context-related and state-related concepts, not absolute: what counts as complex or order depends on the chosen metrics, the explanatory purposes, the level of analysis, and the system in question (Saunders and Ho, 1981). The ordered structure of a crystal is not inherently superior to the chaotic flow of a gas. What's fit and beneficial under one set of conditions can be maladaptive and deleterious under another. Value judgments and fitness are relativistic, not absolute.

Hence, the evolution is overall accompanied by greater complexity (Adami et al., 2000, Ekstig, 2015). The cumulative progression and transformation of related states and determined possibilities driven by perturbation, evaluation, and stabilization can be a source of overall complexity in this framework.

There is no privileged level or scale at which causation uniquely determines the behavior of the whole system (Noble, 2012, Noble, 2017). Although lower-scale evolution can cumulatively affect and cause higher-scale, emergent stream, and higher-level relativistic evaluations, stabilization can affect related lower-scale events, constrain their causal web, and evolution.

In short, Evolution in this theory is reframed as a dynamic web of relativistic causalities, where change itself is fundamental, wandering, and exploring determined possible paths. Viewing evolution in this way unifies diverse evolutionary phenomena under the same framework.

Computation

> "Evolution is an algorithmic, substrate-neutral, mindless process that nevertheless generates design." —Daniel C. Dennett

What is Computation?

The notion of computation has been conceptualized across multiple formal and philosophical traditions, each proposing distinct perspectives on its nature. Here I briefly summarized them.

The formal account explains computation as stepwise, abstract symbol manipulation, conceiving computation as a sequence of discrete state transitions (Turing, 2004). The analog-computation tradition extends computation to continuous-state systems, where dynamical transformations of continuous variables constitute computation (Shannon, 1941). A functional account explains computation as the instantiation of a causal mapping from inputs to outputs by a system's organization (Hilary Putnam), which underpins computational theories of mind (Horst, 1999, Shagrir, 2005). Semantic accounts explain computation as the manipulation of representations with content (Fodor and Society, 1987). Mechanistic accounts explain computation as the mechanistic processing of information. Organized mechanisms transform inputs into outputs according to causal rules with teleological roles (Piccinini, 2015).

The common core idea across many accounts is that Computation is the systematic transformation of a system's state according to rule-like relations (algorithm, function, mapping, or dynamics) that determine how a system's state changes—stepwise or continuously—from inputs to outputs.

In summary, computation is a sequential, relativistic transformation from input to output, a change of the system's state relative to relations that yields the output state.

The Turing machine exemplifies this account of relativistic transformation: a head moves along a tape and changes symbols relative to specified transition rules. The sequential relativistic manipulation and state transformation illustrate the notion of computation.

Modern computing systems exploit parallelism, but parallelism does not alter the conceptual core; what matters is the trajectory of relativistic state transformation by the network of components.

Thus, computation is a process of sequential relativistic state transformation in which the output state is determined by prior state transformations relative to its relational context. This definition of computation aligns with the Universal Flux Theory's definition of evolution. Consequently, computation and evolution can be seen as equivalent processes unified by their shared reliance on relativistic change.

This equivalence unifies computation and evolution as expressions of the same universal process, extending across domains. In short, when construed as a stream of relativistic changes and transformations, computation mirrors evolution in a broad, formal sense.

Consciousness

> "Consciousness is not a chain, but a stream. It flows, bends, and merges — always changing, never still." —William James

Consciousness—many meanings and definitions are attributed to the term; here, I adopt the most commonly used one: consciousness is awareness of a state or object, whether internal (within oneself) or in the external environment.

Definitions of consciousness commonly include cognition, experience, feeling, perception, and thought. In simple terms, consciousness can be described as our state of being, a state characterized by sensation, emotion, volition, or thought.

The term "qualia" denotes the qualitative properties of experience, the subjective ways things appear to an individual. This issue is central to the so-called "hard problem" of consciousness (Chalmers and Chalmers, 2010, Patrick and Dolapo, 2025). Although modulation of neural responses and patterns of information processing correlate with qualia, the neural basis of consciousness remains contested (Tononi and Koch, 2008).

One influential psychological account of consciousness was offered by William James, who characterized it as a "stream of thought."

James proposed that consciousness flows like a stream: it is always changing, no state recurs identically, and it is continuous from moment to moment, composed of senses, impressions, and mental phenomena in constant flux. According to him, consciousness is not static but dynamic and continually evolving (Schutz, 1970).

Framing consciousness as a stream of thoughts and states, with one following another and continually evolving, raises further questions: how the stream is derived, and what are the drivers? Can we become conscious of something without any internal or external causes? For example, can I intentionally recall the capital of France without any external prompt or preceding internal states or cues? Do antecedent causes fully determine the stream? If not, do the randomness in our thoughts and states have any meaning, and do they exclude causal antecedents?

Declarative memories, both episodic and semantic, require external cues or internal related spreading activation to enter consciousness. Treating them as inherently intentional or freely accessible neglects the causal role of external cues, context, and current network state.

Conscious experience, as many experiments and theories have explained, is serial; subjective awareness typically tracks a single dominant content at a given moment.

While early sensory processing often proceeds in parallel, many higher-level cognitive operations are serial thought debates about that still exist (Sigman and Dehaene, 2008). In attentional blink and rapid serial visual presentation (RSVP) studies, only a few items are attended to at a time. Detecting one target temporarily impairs conscious detection of a second target presented within 200–500 ms (the attentional blink), suggesting serial limitations of consciousness (Tang et al., 2020).

Similarly, psychological refractory period (PRP) experiments demonstrate that in dual-task paradigms, response times for a second task increase when it overlaps with the response selection of a first task, suggesting seriality (Zylberberg et al., 2012). Likewise, when making decisions, we cannot be consciously aware of two distinct lines of deliberation simultaneously; instead, we typically think and reason in sequence until reaching a final decision.

The relational antecedent causalities and the seriality of subjective experiences have an important implication: for the current state, consciousness itself is not the initial causal driver but a downstream product of prior causal processes. Consciousness is an effect, not the originating cause for the current state, although this effect can influence subsequent related states.

Thus, consciousness is best defined as the succession of states, a continually evolving flow of perceptions and thoughts, which, being conscious of them, require relational causalities, and this makes consciousness of those as effects of related prior causes. The question then becomes: what determines the trajectory of this stream?

Current neural states, memories, and the environment, and the ways they relate and interact, determine which representational patterns contribute to the stream of conscious content. Before explaining those determinants in detail, I will briefly review relativity in physics.

Einstein's Relativity

Casual relations can also be defined relative to our interpretations, which in turn depend on our physical properties in spacetime relative to other frames of reference, and our internal physical state, all of which shape how we interpret, understand, and measure these events.

One might think that the physical relativity described by Einstein's special and general relativity, and the relativity in how we perceive and understand events—shaped by our brain structure, internal state, accessible knowledge, and environment—are different from the previous evolutionary relativity I explained. However, all these relativities share a common theme: they all involve the relativity of causal relations, which is the core principle of the Universal Flux Theory.

In Einstein's special relativity, measurements depend on the observer's relative motion and velocity. Two observers moving at different speeds relative to an event will measure different physical quantities, yet both measurements and understanding are valid within their respective frames. Likewise, the perception of simultaneity is relative to the observer's frame of reference and their relative motion (French, 2017, Tajuddin et al., 2008).

General relativity, by formalizing the equivalence principle, extends special relativity to include gravity, where spacetime itself is curved by mass and energy and gravity as a manifestation of this curvature. An observer's measurements now depend not just on relative motion but also on their relative position in a gravitational field (Wald, 2024).

Thus, Physical relativity fundamentally describes how measurements of events depend on the observer's relational context.

Perception and interpretation are not only constrained by external relative physical frames and context but also by internal, relative processing. Two observers with different brain architectures and priors deterministically derive different perceptions from the same physical event.

The observer's cognitive process is a subsystem within the broader relational web, undergoing state transitions. An observer's measurement and understanding of a system's evolution are themselves processes within the same relativistic, deterministic framework as the system's causal structure. Perception is not a mere external act but a determined state transition within the same relational web.

Observers are embedded in the same evolutionary fabric, with their cognitive processes shaped by and shaping the environment. It is also important to understand that perception itself is motion, the flow of successive neural activities and states.

Consequently, the observer's relativistic perception is a subset of the universal principle of relational causality and Universal Flux Theory, unifying the act of observation with the system's evolution.

In the following section, I adopt Endel Tulving's distinction between availability— whether a representation exists in storage — and accessibility — the ease with which it can be activated at a given time — to explain why our thoughts, from apparently nonlogical dreams to seemingly sophisticated conscious ones like thinking of gravity as the curvature of space-time, are just determined flows.

Accessibility

> "Accessible pathways tell the evolution where to flow, evolution tells pathways how to access." —John Archibald Wheeler

Accessibility refers to how easily a memory, mental state, or representation can be activated at a given moment (Tulving and Pearlstone, 1966).

Consciousness moves through successive mental states. Transitions from the current representation to the next depend on how accessible each candidate state is given the ongoing flow, which mental-state configuration becomes the next dominant processing pathway relative to the current state and the embedding context.

Although the stream can also be transited *to* several possible next states —like a branching river—one processing stream typically predominates. This dominant stream, the main river of processing produced by relatively stronger activation and/or inhibition of alternatives, largely constitutes the current phenomenal experience and qualia.

Consciousness is therefore a serial selection and integration of the most accessible state, producing a dominant stream at any given time.

Although other potential branches can exist and be processed, they remain unconscious. The dominant current captures subjective awareness and masks alternatives (Ansorge et al., 2008). These unconscious processes, however, can modify accessibility and local scaffolding, thereby influencing subsequent related states.

Transitions to candidate states depend on the current state, the proximity, associativity, and history of the next relative states. The candidate with the highest relative accessibility becomes the next conscious content and shapes the trajectory of subsequent processing. In the following, I summarize the parameters that influence accessibility.

Short-Term Memory

Short-term memory (STM) consists of temporary representations of recent inputs, transient states that sustain immediate processing. STM representations are highly accessible because they are actively maintained by transient neural activity (Shiffrin, 1993, Cowan, 2001).

Working Memory

Working memory (WM) refers to cognitive processes that temporarily maintain and manipulate information in the service of ongoing tasks (Cowan, 2008).

Two widely documented features of WM are limited capacity —the transient nature of its representations— and support for sequential manipulation. Problem solving (for example, multi-step arithmetic) relies on WM to hold intermediate results and perform stepwise transformations; interference or interruption can disrupt this sequential processing (Bancroft and Servos, 2011).

Although WM is often classified as a distinct memory system, it consists of STM representations plus serial manipulation, which correspond closely to our ongoing conscious processes (Aben et al., 2012).

Although manipulation often seems intentional, it assumes knowledge of the relevant processes. If an agent doesn't know how to perform addition, the activation flow cannot carry out the addition step-by-step. The choice of strategy also depends on accessibility: when multiple solution methods are available, the one with higher accessibility in the current context is selected first.

As noted above, some branched, unconscious states can also be partially processed or manipulated depending on their accessibility, given the activation flow. Such manipulations may occur without accompanying subjective awareness. Thus, WM processes are not always accompanied by conscious awareness (Trübutschek et al., 2017).

Spatial Contiguity and Reachability Constraints

Spatial contiguity influences perceptual grouping and association, aids in the grasping of relations, learning, and constructing cognitive maps for navigation (Ginns, 2006).

Beyond grouping and associative effects, spatial contiguity implies a local constraint on neural state transitions. Neural activity tends to flow through nearby, reachable, accessible paths rather than jump arbitrarily to distant, inaccessible states. Suppose accessibility is not immediately altered by environmental or contextual perturbations (for example, an abrupt sound). In that case, the next neural state is most likely to be one of the nearby, highly accessible states. The proximity of the current state to potential next states, modulated by situational context, affects subsequent transitions.

Temporal Order and Proximity

Temporal proximity refers to the closeness between encoding cues, events, or states, which aids in learning (Hintzman, 2016). Synaptic strength changes depend on the precise timing of pre- and postsynaptic spikes (Kennedy, 2013).

Beyond facilitating associations and learning, the temporal order and proximity of states can influence which states follow and bias ongoing processing and the formation of conclusions (Crano, 1977).

Short-term synaptic/neuronal dynamics, facilitation/depression, and persistent neural activity create temporal windows during which prior activity influences the encoding of subsequent inputs, and if related, exerts bias on the processing of incoming states and subsequent transitions.

Activations Histories

The recent history of neural activation—both conscious and unconscious—modulates the accessibility of cognitive representations, biases related processing.

Priming illustrates the impact of prior activation: representations that were recently engaged are reactivated more quickly and with shorter neural latency or, in some cases, are temporarily suppressed, accounting for variable accessibility of recent or related information (Tipper, 2001, Schacter et al., 2004).

Adjustments of neuronal baseline firing after recent activity, either suppressing (habituation) or enhancing (sensitization), also affect the accessibility of those states (Cevik, 2014).

Associative Strength and Network Topology

Pathways with stronger connections and richer associations are more accessible and therefore more likely to be traversed by ongoing neural dynamics. Such structural connectivity and network topology thus favor particular transitions between representations and guide the flow of activation (Luppi et al., 2024).

Modulatory Factors

Neuromodulators (for example, dopamine, noradrenaline, acetylcholine) alter neural gain, plasticity, and threshold dynamics, thereby modulating accessibility either globally or locally, influencing both the main processing stream and branching behavior (Bazzari and Parri, 2019).

Emotions and internal states bias processing toward congruent representations, increasing accessibility of mood-congruent information, and thereby steering the flow of thought toward emotionally relevant states (Faul and LaBar, 2023).

Attention enhances accessibility of contextually relevant representations, providing top-down guidance that aligns the activation trajectory with current goals and environmental demands (Gazzaley and Nobre, 2012).

Environmental Entanglement

Cognition is embedded in and entangled with the environment. The extent to which incoming sensory and contextual information drives neural processing determines how the external environment shapes the main activation flow.

Thus, alongside internal state, external state, and environmental context influence accessibility and direction of processing.

The Brain Is Not Only a Predictive Machine

Predictive processing frameworks propose that incoming sensory information is continuously compared to internal models to generate predictions and minimize prediction error. This comparison is often described within a hierarchical architecture in which higher levels predict the input of lower levels, and mismatches update the internal model—a probabilistic representation shaped by prior experience and biological priors (Sprevak and Smith, 2023).

The Free-Energy Principle (FEP) formalizes this view by describing cognitive systems as inference machines that minimize "variational free energy"—a quantity that approximates the surprise or uncertainty in their sensory data relative to internal models. The system maintains its internal organization by minimizing free energy (Friston, 2010).

The brain's function should not be reduced to prediction alone. Rather, the brain constructs momentary reality by selecting and integrating the most accessible neural states, the dominant stream

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of activation guided by accessibility. From this perspective, the brain function and prediction are derived primarily by accessibility.

Thought

Thoughts, as mentioned, are mental representations and cognitive processes that involve generating, manipulating, and retrieving information (for example, concepts or images).

We cannot think about content without having relevant memory representations, related computational building blocks, relevant causes, and causal mechanisms to access them. Even apparently novel or creative ideas must be constructed from existing elements.

Thoughts are therefore assembled from accessible components and associations, consisting of processing and combining relevant information that is accessible, given the current activation trajectory.

The structure of the activation river inherently constrains and biases our thoughts. At any moment, we can typically think about only a few contents, and remain unaware of alternative representations and discrepancies that do not enter the dominant activation stream.

For example, if one initially encodes the relation a = c and later encodes a = b, the earlier a–c relation will not influence conscious reasoning if it is not sufficiently accessible during processing of a–b; consequently, one may fail to infer any potential relation between b and c.

In everyday reasoning, conclusions therefore tend to reflect the set of computations and representations that are most accessible under the current context and internal state. New evidence can overturn prior impressions when accompanied by countervailing information that becomes dominant in processing, producing conclusions that differ markedly from and even contradict earlier thoughts.

Although pattern similarity and contrast strongly influence transitions between thoughts and enable generalization, their effect depends on accessibility. If relevant, similar patterns are not accessible within the current activation stream, generalization will fail.

Some thoughts appear task-irrelevant. These spontaneous mental activities, commonly called mind-wandering, comprise ideas, memories, or mental images that arise without deliberate intention, reflecting shifts in the dominant activation stream when internally driven activation gains strength relative to task-related processing, and external task demands are low. Its content typically concerns recent worries, goals, and plans (Smallwood and Schooler, 2015).

During sleep or anesthesia, the intensity and structure of activation flows change but do not disappear. Deep sleep and some anesthetic states may lack the coherent activation patterns typical of wakeful cognition, yet localized and smaller-scale activations persist. In other words, while these states are not accompanied by net flow and consciousness, neural dynamics continue, and flow still exists. Flow never dies (Massimini et al., 2005).

In this sense, we are always processing, flowing, and, if I may say so, we are always thinking.

Always, everything, everywhere, is and was optimized.

"This is the best of all possible worlds." —Gottfried Wilhelm Leibniz

The Only World, the Only Way Evolution

In a universe governed by evolution, where every event unfolds from prior causes along an inevitable trajectory, the system follows, at each instant, a unique determined path, the one to which it evolves.

The notion of optimization in this world can just be understood relatively: systems evolve, not toward some absolute objective. What transpires is not optimal in an absolute, value-laden sense but is the sole configuration permissible under the governing relations and constraints—hence, optimally aligned with their causal antecedents.

From other perspectives, outcomes may appear inefficient or imperfect—biological flaws or physical losses of energy, for example—but they represent the only evolution possible given initial conditions, environmental interactions, and immutable physical evolution.

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For consciousness too, given the states of a system and its environment, there is a single lawful trajectory. Every mental state—from fleeting perception to profound insight—is the inevitable outcome of prior causal chains with no alternative paths accessible in the given context and moment. The system evolves in precisely the one way it does, rendering free will an illusion.

This perspective finds analogues in established physical principles, notably the principle of stationary (or least) action (PLA). The PLA is a variational formulation that encodes the same deterministic laws of motion as local differential (causal) laws: it summarizes how a system's entire trajectory between two states or endpoints extremizes an action functional under given constraints. The actual path taken by a system is one for which the action is stationary (2018).

Mathematically, the PLA is equivalent to the local differential laws of motion; it therefore offers a global statement that summarizes locally driven dynamics, providing a compact expression of determination that encapsulates how systems evolve (Siburg, 2004).

In a deterministic universe, there is exactly one physically realized history (trajectory) for a given set of conditions. Thus, the path of stationary action is not a choice but the sole trajectory compatible with the system's constraints. Each evolutionary trajectory, in this sense, is the shortest path, the only possible manner under determinism.

The system does not know its endpoint; it evolves according to local causal dynamics. The summation of all infinitesimal differential changes yields the global path. Newton's second law ($F = dp/dt$) formalizes this, how the flow of changes drives the state. Flows toward net changes provide a clear formulation of evolution.

In this universal flux, the only law that exists is causality and the relativity of those that accompany the flow. In such a universe, there is no force; everything is flow, from gravity to thoughts.

Validity

Validity in this deterministic sense does not confer moral or epistemic approval, only that the event was the result of antecedent conditions. Every action, behavior, fleeting thought, or spoken word is, therefore, valid. Each is a legitimate product of evolution.

Indeed, the concept of validity as a comparative standard loses meaning because there is no genuine alternative against which to measure. Every choice, mistake, and triumph is the singular expression of the universe's causal progression.

From this perspective, science itself loses any absolute status: it too is a product of relentless causality, a human lens shaped by accessible tools and perspectives.

Scientific theories are not final truths but models constructed by beings who are themselves outcomes of causal processes. What we teach and revere in our universities—rigorous, methodical knowledge—may one day be regarded as quaint, even unscientific, by future generations.

Yet, that is precisely how science had to develop: the frameworks we adopt were the only ones given prior constraints. The history of science is a causal stream in which each stage evolves from and enables the next. In this sense, every change, motion, and thought is entirely scientific. Even ideas we call non-scientific, they were determined flows within their creators' minds.

Self

There is no single enduring, isolated self.

The self is not an origin but a process, not a foundation but a flux.

I am a confluence of countless processes—a symphony of many partial selves—each, the same way a composite of interactions, evolution, and communications unfolding across scales. Every cell, every fleeting impulse within me, is a microcosm of activities and changes.

There is no difference between objectivity and subjectivity. My thoughts, feelings, and my very sense of being at this moment are caused by an unbroken stream of evolution.

This stream, this ever-shifting current of being, is not unique to us; it is the essence of the universe. In this sense, no singular isolated physical entity exists; only the dynamic interplay of countless components, each a universe unto itself, evolving and transforming in an eternal dance.

What, then, truly exists? The answer is change itself. Change is the only constant, the heartbeat of the universe, a ceaseless flow of becoming and evolving.

Evolution is the fundamental reality.

Consciousness, as the way we evolve, is our reality.

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