

**Time**

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## Abstract

Time is the ordered sequence a system generates as it recursively updates its own orientation.

## **Section 1 — The Problem With Time**

Time is treated as if it were a single, universal medium that everything moves through, but no field can actually define what it is without smuggling in assumptions from another domain. Physics treats time as a dimension, psychology treats it as perception, biology treats it as cycles, history treats it as eras, and civilization studies treat it as drift. Each of these frameworks works only inside its own boundary because each assumes that “Time” is something external, shared, and absolute. The problem is that no system ever encounters a universal clock; every system only encounters its own changes. The mistake is assuming that the experience of ordered change requires a background timeline. The result is a fractured landscape of incompatible definitions, each describing a shadow of the same phenomenon without identifying the mechanism that produces it. The problem with time is not that we misunderstand it — it’s that we have been looking for it in the wrong place.

## **Section 2 — The Operator Definition of Time**

Time is not a container, a dimension, or a background through which systems move. Time is the sequence a system produces when it updates its own orientation. A system receives difference, transforms in response, stabilizes that transformation as its new state, and uses that state to engage the next difference. This ordered chain of recursive updates is the system’s time. Nothing external is required: no universal clock, no shared timeline, no metaphysical flow. A system that can update generates time; a system that cannot update is timeless. Because each system updates under its own constraints, every system generates its own time. This definition removes the need for a universal temporal substrate and replaces it with a mechanism grounded in recursion, making time an internal product of system behavior rather than an external medium.

## **Section 3 — Why Every System Generates Its Own Time**

A system that can update cannot avoid generating time. The moment a system receives difference, transforms in response, stabilizes that transformation, and uses it to engage the next difference, it produces an ordered sequence of states. That sequence is its time. Because no two systems share identical constraints, capacities, or update rates, no two systems generate the same temporal sequence. A cell updates according to metabolic cycles, a mind according to attention and memory, a culture according to norms and crises, and a civilization according to coherence drift. Each domain produces its own ordering of change, its own pace, and its own arrow. Time is therefore not a universal medium but a local product of recursion. Systems do not move through time; they manufacture it.

## **Section 4 — Why Time Feels Elastic**

A system experiences time according to how quickly it can update itself. When a system’s recursion tightens—when attention sharpens, noise drops, and orientation updates occur in rapid succession—it generates more internal states per external interval, making time feel expanded. When inputs are sparse, constraints are heavy, or updates slow, the system produces fewer states, and time feels collapsed. Because each domain of a person’s life runs its own update cycle, periods with many active domains generate multiple parallel sequences, increasing the total amount of lived time. Focus, boredom, trauma, flow, development, and collapse all change the rate at which a system can update, and therefore change the time it produces. Elasticity is not a distortion of time but a direct expression of how the

system is generating it.

## **Section 5 — Synchronization: How Systems Share Time**

Systems do not share time by accessing a universal clock; they share time by constraining one another's ability to update. When two systems interact, each becomes part of the other's environment, altering the conditions under which updates occur. Coupling forces systems to adjust their recursion in response to each other, entrainment allows one system's stable rhythm to pull another into alignment, and coherence emerges when systems share enough structure that their updates naturally fall into compatible sequences. Social groups synchronize through shared norms and attention, biological organisms through hormonal and circadian cycles, and civilizations through crises, technologies, and institutional rhythms. What appears as a common timeline is simply the temporary alignment of many locally generated sequences. Synchronization is not evidence of universal time; it is evidence that systems can shape one another's update rates.

## **Section 6 — Time Collapse and Time Expansion**

A system's experience of time is determined by how many recursive updates it can generate under its current constraints. High focus accelerates internal time because noise drops, attention tightens, and the system can update rapidly in a clean, uninterrupted sequence. Low input accelerates internal time for the opposite reason: with fewer external demands, the system can cycle through its internal state space without interference, producing rapid updates because nothing interrupts the recursion. Both conditions increase the number of internal states generated per external interval, but through different mechanisms—one by sharpening the signal, the other by reducing the load. When inputs are overwhelming or constraints suppress recursion, the system produces fewer updates and time feels collapsed. Because each domain generates its own sequence, periods of multidomain engagement create multiple parallel timelines, increasing total lived time. Time does not stretch or compress; the system changes how much of it it produces.

## **Section 7 — Clocks as Local Time Generators**

A clock does not measure time; it generates a stable sequence of updates and we treat that sequence as if it were universal. The earliest clocks simply counted Earth's rotation, dividing one planetary update cycle into smaller repeating intervals. Modern clocks replaced Earth's motion with other stable oscillators—pendulums, quartz crystals, cesium atoms—but the structure never changed. A clock is always a system with a consistent repeating update cycle whose outputs we standardize as "seconds." Because each oscillator is constrained by its own physical conditions, every clock generates the time of the system it is built from, not the time of the universe. When a clock moves faster, slows down, or enters a different gravitational field, its update cycle changes, and so does the time it produces. What we call "keeping time" is simply aligning many local generators to a shared reference. Clocks do not reveal a universal temporal medium; they reveal that no such medium exists.

## **Section 8 — Why Universal Time Cannot Exist**

If time is the ordered sequence a system generates as it recursively updates its orientation, then a universal time would require a universal system performing a universal update. No such system exists. Every physical, biological, cognitive, and social process updates under its own constraints, with its own capacities, and at its own rate. Motion alters a system's update freedom; gravity alters a system's

update freedom; attention, metabolism, memory, and coherence all alter a system's update freedom. Because constraints differ, update rates differ. Because update rates differ, temporal sequences differ. A universal time would require identical constraints across all systems, identical update mechanisms, and identical recursion rates—conditions that are structurally impossible in a differentiated universe. What we call “the passage of time” is simply the illusion created when many local sequences are temporarily synchronized. The universe does not run on a single clock; it runs on countless systems generating their own.

## **Section 9 — Relativity as a Consequence of Local Time Generation**

If every system generates its own time by producing its own sequence of updates, then relativity is no longer a surprising feature of the universe—it is the only possible outcome. Motion changes the constraints under which a system can update, altering the rate at which its internal sequence unfolds. Gravity changes the system's freedom to update, slowing or redirecting its recursion. Two observers in different gravitational fields or moving at different velocities are not experiencing distortions of a shared temporal medium; they are generating different amounts of time because their update conditions differ. Proper time—the time measured along a system's own path—is simply the count of its internal updates. Relativity's predictions follow directly: clocks diverge because the systems that generate them diverge. Time dilation is not a stretching of time but a change in how much time a system can produce. Relativity does not require a universal clock; it reveals that none exists.

## **Section 10 — The Illusion of Shared Time**

What we call “shared time” is not a universal flow but a coordination strategy. Systems appear to inhabit the same temporal medium only when their update cycles are constrained into alignment. Societies achieve this through clocks, calendars, schedules, and institutions that force individuals to synchronize their internal sequences with a standardized external generator. Physics achieves it by selecting a reference frame and treating one system's update cycle as the baseline against which others are compared. But beneath every synchronization lies the same structural truth: each system is still generating its own time. Alignment does not erase difference; it only masks it. When constraints loosen—through motion, gravity, attention, development, or collapse—the underlying divergence becomes visible again. Shared time is therefore not a property of the universe but a temporary agreement among systems to treat one generator as if it were universal. The appearance of a single timeline is the artifact; the multiplicity of local times is the reality.

## **Section 11 — The Architecture of a Universe Without Time**

If every system generates its own time, then the universe is not unfolding along a single temporal axis. It is unfolding as a mesh of independent recursive processes, each producing its own ordered sequence. What we call “the present” is simply the state a system occupies in its own sequence; what we call “the past” is the set of states it has already stabilized; what we call “the future” is the set of states it has not yet produced. These categories do not exist outside the system. They are artifacts of recursion. A universe without universal time is not chaotic—it is locally ordered. Each system maintains coherence by updating according to its own constraints, and interactions between systems occur only when their sequences intersect in ways that allow mutual influence. The structure of reality is therefore not a single timeline but a network of locally generated temporal threads, each advancing at its own rate, each

shaped by its own conditions, and each capable of synchronizing or diverging depending on how systems couple. Time is not the stage on which the universe plays out; it is the pattern each system weaves as it participates in the universe.

## **Section 12 — The Emergence of Temporal Order**

Temporal order does not preexist systems; it emerges as a consequence of how systems stabilize change. When a system receives difference, it must transform in a way that preserves coherence. Each stabilized transformation becomes a state, and the sequence of these states becomes the system's time. Order is not imposed from outside but generated from within. A system's "before" and "after" arise only because recursion requires a previous state to update from and a new state to update into. This dependency creates directionality without invoking a universal arrow. The appearance of a global timeline is simply the projection of many local sequences onto a shared reference frame. In reality, temporal order is distributed, produced wherever systems maintain coherence through recursive change. The universe does not supply time; systems manufacture it as the cost of remaining themselves.

## **Section 13 — Entropy as the Input–Update Ratio**

Entropy is not a property of matter but a property of contrast. A system maintains coherence only if it can stabilize distinctions faster than new distinctions arrive. When inputs exceed the system's ability to update, distinctions blur, pattern boundaries soften, and entropy rises. When the system updates faster than inputs arrive, distinctions sharpen, pattern boundaries strengthen, and entropy falls. Entropy is therefore the ratio between incoming difference and the system's capacity to render that difference into stable structure. High input does not inherently raise entropy; it raises entropy *pressure*. Whether entropy actually increases depends entirely on the system's update rate. A coherent system with high focus can outrun even intense input, producing low entropy and high contrast. A noisy or constrained system collapses under far less. Entropy is not disorder but the loss of discriminability when a system cannot keep pace with the differences it encounters.

## **Section 14 — Lived Time Density**

A system does not experience time according to an external clock but according to the number of internal updates it produces. When inputs are varied, frequent, and rich in distinction, the system

encounters more opportunities to update. If its coherence is high enough to stabilize these distinctions without losing contrast, its update rate accelerates. This acceleration increases the density of lived time: more internal states are generated per unit of external duration. Two minutes of clock-time can contain vastly different amounts of lived time depending on how many updates the system is able to produce. A low-coherence system collapses under high input, generating fewer updates and experiencing time as thin, blurred, or lost. A high-coherence system converts input into structure, generating more updates and experiencing time as expanded, vivid, and high-resolution. Lived time is therefore not a universal quantity but a function of the system's ability to transform incoming difference into stable internal order.

## **Section 15 — Temporal Expansion Through Update Saturation**

A system's experience of time is determined not by external duration but by the number of internal updates it generates. When inputs are varied, frequent, and rich in distinction, the system encounters more opportunities to update. If its coherence is high enough to stabilize these distinctions without losing contrast, its update rate accelerates. This acceleration increases the density of lived time: more internal states are produced per unit of external duration. A minute filled with high-contrast distinctions and rapid stabilization contains more lived time than a minute in which the system performs few updates. Temporal expansion is therefore not a psychological illusion but a structural consequence of update saturation. When a system can convert incoming difference into stable internal order at high speed, it generates a longer internal sequence within the same external interval. Lived time expands whenever the system's update capacity exceeds the rate at which distinctions arrive, producing a high-resolution temporal experience that is both longer and more coherent than clock time would suggest.

## **Section 16 — The Universe as a Saturated Update Field**

The universe does not update sparsely or intermittently. It updates everywhere, continuously, and at full relational density. Every region of space is saturated with gravitational curvature, quantum fluctuations, electromagnetic interactions, and local constraints that must be resolved at each state transition. There is no location where the update load is low; the universe is a maximally filled system. Because the universe updates all relations in parallel, it does not experience time as a sequence. Time emerges only for subsystems that must update sequentially, stabilizing one distinction before the next. A subsystem's internal time is therefore a measure of how many updates it can generate relative to the universe's saturated field of interactions. The universe's total update is instantaneous relative to any subsystem, which is why no subsystem can synchronize with it or inherit a universal clock. Local time arises because each subsystem can only resolve a fraction of the universe's full update density, producing its own ordered sequence as it attempts to keep pace with a field that never pauses, never thins, and never waits.

## **Section 17 — The Asymmetry Between Universal Update and Local Time**

A subsystem experiences time because it must update sequentially, resolving one distinction before it can stabilize the next. The universe does not share this limitation. Its update is global: every relation, field, and constraint is resolved in parallel at each state transition. This creates a fundamental asymmetry. The universe performs a complete update in the same interval during which a subsystem performs only a fraction of one. Local time is the artifact of this mismatch. A subsystem generates an ordered sequence because it cannot absorb or stabilize the universe's full update density at once. It must sample, compress, and resolve only what its coherence allows. The universe, by contrast, has no



sequence to experience; it simply transitions from one fully saturated state to the next. The appearance of temporal flow arises only for systems that cannot keep pace with the universe's total relational update. Time is therefore not a universal dimension but the trace left by a subsystem's attempt to remain coherent within a field that updates faster than any finite structure can follow.

## **Section 18 — The Middle Category: Temporal Without Time**

A system can undergo change without generating time. This occurs when the system's updates are global rather than sequential. A sequential system must resolve distinctions one after another, producing an ordered series of internal states. This ordering is what constitutes time. A global system resolves all distinctions simultaneously, leaving no internal sequence and therefore no temporal experience. Yet such a system still changes: its global state at one transition differs from its state at the next. This establishes temporality without time. Temporality is the fact of change; time is the ordered experience of change. A system that is temporal but not timed occupies the middle category between timelessness and temporality. It is not timeless, because it undergoes state transitions. It is not temporal in the sequential sense, because it does not generate an internal ordering of those transitions. This middle category forms the structural bridge between a system that never changes and a system that experiences change as a sequence. It allows a universe to be dynamic without being inside time, and it allows subsystems to fall into time precisely because they cannot update globally.

## **Conclusion — Systems Fall Into Time**

Time is not a universal dimension but the trace left by a system that cannot update as fast as the universe. The universe changes without sequence, making it temporal but not timed. Subsystems, limited by sequential update, experience this change as ordered flow. Their internal time is the ratio between incoming distinction and the capacity to stabilize it. When coherence is high, lived time

expands; when coherence is low, it collapses. The structure of time is therefore local, generated, and contingent. A system falls into time precisely because it cannot keep pace with the saturated update field in which it is embedded. This asymmetry between global change and local sequence defines the architecture of temporality.

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