

CHAPTER 1

Change Comes First

1.1 What the clock touched

You look at a plain quartz clock on the wall. On this one, the second hand makes a small step, pauses, then steps again. The face gives you a reading at once. What has happened inside the clock is less immediate, but not mysterious.

A battery powers an electronic circuit. A quartz crystal in that circuit resonates at a stable frequency. The circuit divides that recurrence into regular pulses; the pulses drive a small motor; gears turn the hands. The position of the hands is the clock's physical retained record, available for comparison or for someone to read. Every stage is a change in a material system.

The device is useful because its changes are sufficiently regular for the task and because its reading belongs to a wider practice. The hands have been set. The dial carries agreed units. Other clocks and records make comparison possible. A clock that runs steadily but has never been related to a unit or another process is an oscillator, not yet a shared answer to the question, "What time is it?"

The crystal's oscillation, the accumulating count, the position of the hands and the agreed unit are therefore distinct. The oscillator may remain steady while the hands are set wrongly; the display may fail while the crystal continues to resonate. Conversely, a visible movement becomes a timekeeping result only through its relation to a standard. None of these distinctions makes the reading subjective. They show how physical recurrence, retained count, presentation and public unit cooperate.

But what did the clock encounter? It encountered its power supply, its own physical organization and the conditions under which it operated. Its parts changed in a repeatable way, one change was counted against another, and the result was retained in the arrangement of the hands. Nothing in that description identifies a temporal fluid entering the case or pushing the mechanism onwards.

That absence is not a proof that every possible temporal ontology is false. Time might be proposed as a relation, a structure or a primitive feature rather than a substance a detector could register. A clock need not detect a thing called Time in order to provide objective temporal information. The modest result comes first: the instrument works through physical change, and its reading gives operational access to comparisons among changes.

This is the first reversal Changism asks the reader to consider. The clock is not a passive window opened onto an independent flow. It is an active part of the world it measures. Before we decide what its reading tells us about Time, we should understand what explanatory work has already been done by the changing clock.

1.2 The noun trap

Ordinary speech is generous with Time. Time passes. Time heals. Time makes us old. Time runs out, catches up with us, refuses to wait and occasionally flies. The grammar is useful because it compresses complicated processes into sentences that everyone understands.

One phrase can also leave several referents undecided without deceiving anyone. "The time was long" may concern a measured interval, an experience of waiting or both. "The time has come" usually concerns conditions and decisions, not a substance arriving. Daily conversation succeeds because the situation supplies what grammar omits. Metaphysics cannot rely on that generosity. If an argument begins with the harmless flexibility of *time* and ends by assigning causal powers to a single bearer, it must show why those uses converge upon the same reality. The noun does not perform that unification for us, however often it is repeated.

The compression becomes risky only when its grammatical subject is promoted into an independent worker.

Consider “time heals”. A cut closes through biological activity: damaged tissue, inflammation, repair and remodelling. Some wounds heal badly; some do not heal without treatment. The number on a calendar does not perform the repair. It helps us compare stages of a process whose work is being done by cells, tissues, circulation, treatment and the organized body.

“Time makes us old” compresses even more. Bodies metabolize, repair, accumulate damage, adapt and lose capacities in many interacting ways. Calendar age compares that changing history with a public standard. The comparison can matter greatly without becoming the cause of what it records.

“Time passed” may be harmless shorthand for a meeting ending, shadows lengthening, a clock advancing or a person noticing that the room has grown quiet. Trouble begins when the sentence is taken to report another occurrence in addition to all of those: the passage of an entity or medium whose movement is supposed to explain why the rest happened.

None of this requires ordinary speech to be purged. “Sunrise” remains useful after we understand the rotation of the Earth. In the same way, we can keep saying that time passed, that a journey took three hours or that an appointment is at ten. The question is not whether the phrase is permitted. It is what the phrase licenses when an argument moves from speech to ontology.

Grammar cannot answer that question alone. A noun need not name a substance, but neither does exposing a metaphor refute every sophisticated view in which temporal structure is fundamental. The point of the noun trap is diagnostic. It tells us where to slow down. What process occurred? What relation or constraint ordered it? What was counted or compared? After those questions have been answered, we can ask whether something further called Time is still required and, if so, what kind of candidate it is.

Changism’s wager is that much of the work assigned to Time has already been distributed among real processes, objective order, metric relations and practices of comparison. That is an interpretation, not a conclusion licensed by English grammar. It must earn its place by showing that the distinctions recover what ordinary life and physics need without quietly borrowing the independent temporal stage it rejects.

1.3 Three things hidden in one word

The word *time* has been carrying at least three kinds of work. Changism calls them productive change, immanent order and comparative ledger. They belong together, but no one of them can stand in for the other two.

Begin with a wound that heals and leaves a scar. Something happens. Tissue is damaged; the organized body responds; the wound closes and the tissue is altered. The process may be described in finer biological detail, but the ontological point does not depend on that detail. It was produced through activity that made and retained a difference.

That is the first layer: **productive change**. Change here does not mean a numerical contrast noticed between two descriptions. It means concrete transformation—what processes do and undergo when they interact, repair, maintain, transmit, disrupt or reorganize.

Changism takes productive act as primitive. This does not mean that an entity called Act stands behind the wound and makes it heal. Nor does it mean that the sight of change deductively proves a process-first ontology. A rival can accept every observable stage of healing while giving a different account of what is fundamental. The Changist commitment is that concrete actuality is genuinely in act and that production should not be derived from a basis defined as wholly nonproductive unless the derivation can explain how the work is done. It is a declared starting point defended by comparison, not a theorem smuggled out of a verb.

The wound also reveals a second layer. The stages are not a shuffled collection. Damage constrains the response; repair inherits the altered condition; the scar depends on the wound in a way the wound does not depend on the later scar. Some continuations are physically available and others are excluded. Organization persists through change while being changed by it.

Changism calls this **immanent order**: dependency, inherited constraint, recurrence, asymmetry and organization internal to changing reality. The order is not donated by a clock. A clock may tell a clinician how long a stage lasted, but it does not make the wound productive of the scar. Nor does objective order require every occurrence in the universe to occupy one total sequence. Order may be local, partial, causal or tied to a particular history.

A clock adds another kind of order. Its quartz crystal recurs in a sufficiently stable pattern. The circuit relates one cycle to the next and accumulates a count. That recurrence is itself immanent order within a changing device. But recurrence alone is not yet the whole of timekeeping. The process must be related to a unit, a protocol and other records before its count can coordinate anything beyond itself.

That brings us to the third layer: the **comparative ledger**. A ledger is the real organization through which ordered changes are counted, measured, coordinated and represented. Clocks, units, readings, calibration procedures, synchronization rules, calendars, records and coordinate systems can all enter such an organization. The word does not mean a paper book, and it does not imply that comparison must be performed by a conscious human observer. A physical system can retain a difference; instruments can exchange signals; processes can be correlated and reconciled. Human communities add particular units, conventions and purposes, but they do not invent the objective patterns to which successful comparison must answer.

Return to the wound. Its healing is productive change. Its dependency and inherited organization belong to immanent order. A dated clinical entry, a sequence of photographs or measurements, and a clock standard can place stages of repair within a public structure of comparison. Those records do not produce the healing, and they need not capture it perfectly. Their role is to make aspects of an already ordered process available for later comparison and coordination.

Immanent order is a real feature of change. A comparative ledger is a real physical, operational or social organization within changing reality. Calling either derivative does not make it imaginary.

The distinctions also block three tempting shortcuts. Time is not identical with change: a healing wound and an oscillating crystal are different processes, not portions of one temporal stuff. Time is not identical with immanent order: dependency and before-and-after can obtain where nobody has established a shared metric comparison. And a ledger does not manufacture the reality it compares: a coordinate label, calendar entry or clock reading cannot create the productive relation or objective metric structure to which it is answerable.

Ordinary speech lets one word move among all three layers. That flexibility is useful. Philosophy becomes confused only when the movement goes unnoticed—when activity, order and comparison are gathered beneath the noun *Time* and the noun is then asked to explain the work performed by the things it gathered.

1.4 Time is real, but not a thing

The three-level distinction lets us say what Changism means by *time* without saying either that time is a substance or that it is unreal.

In plain language, time is the real comparative organization by which ordered changes are made answerable to one another. A clock count can be related to another clock count; a physical history can be assigned a duration; an appointment can be coordinated across a community; a worldline

can be represented within a metric model. These are not illusions. They are achievements of changing systems organized for comparison.

The full definition is more exact:

Time, in disciplined Changist usage, is the derivative ledger of ordered change: the comparative and operational structure through which changing processes are counted, measured, coordinated, and represented, and through which objective metric relations among them are accessed, expressed, and compared. It is real as comparative organization, but it is not an independent container, substance, flow, universal master sequence, global present, or cause of change.

Each part matters. *Derivative* means that the ledger depends on changing processes and their immanent order. It does not mean fictional, subjective or dispensable. A clock network could not operate without physical oscillators, signals, records and stable constraints. A calendar can organize material obligations and shared activity. A coordinate system can be indispensable to a successful physical representation. These structures are dependent, but they are not thereby unreal.

A dependent structure can still constrain practice, sustain prediction and be represented with precision. Its dependence tells us what it requires in order to exist; it does not decide whether it exists.

Ordered change prevents time from collapsing into change alone. If the world were merely a set of unrelated differences, there would be nothing for comparison to preserve. Recurrence, causal accessibility, inherited constraint, metric relation and productive asymmetry make disciplined comparison possible. The ledger answers to those features; it does not bestow them upon an otherwise unstructured world.

Comparative and operational prevents the ledger from becoming another invisible stage. Its work appears in what changing systems can do with it: count cycles, align records, coordinate activity, assign intervals, compare paths and translate between descriptions. Ledgers are physically and institutionally embodied. They can be reliable or faulty, local or distributed, rough or extraordinarily precise. Their objectivity depends on how successfully they remain coupled to the structures they track, not on their being outside the changing world.

This is also why *ledger* must not be reduced to human bookkeeping. A clock retains a reading whether or not anyone is looking at it. One physical process can correlate with another. Signals can carry comparisons between instruments. Human beings design units and protocols, but the success of those arrangements is constrained by recurrences, interactions and metric relations that are not matters of choice.

What Changism refuses is the additional promotion. It does not turn the system of comparison into a container in which change occurs, a fluid whose motion causes passage, or a universal sequence that places every occurrence in one privileged order. Saying that a meeting lasted an hour need not posit a corresponding portion of temporal substance. It means that the meeting's changing history stood in a specified comparative relation to accepted clock processes and records.

Nor does Changism claim that every use of *time* must be replaced by *ledger*. Ordinary and scientific language have legitimate families of use. Disciplined usage becomes necessary when an inference depends on which reality the word denotes. At that point, we must say whether we mean productive change, immanent order, proper time, coordinate time, experienced duration, a clock reading or a broader comparison practice.

The compact version can now be used once without being asked to carry the argument by itself: **time is a ledger of ordered change, not a stage beneath change**. The slogan is a reminder of the distinctions already made. It is not their proof.

1.5 What Changism keeps

Calling time derivative can sound like a polite way of making it disappear. That is not the proposal. The reality of a phenomenon does not depend on its being fundamental, and several different realities can be gathered under one word without sharing one bearer.

Physical clocks are real processes with histories, mechanisms and readings. They can be stable or unstable, calibrated or miscalibrated, suitable for one purpose and poor for another. Clock networks, standards and synchronization practices are real achievements. Their readings can coordinate laboratories, navigation, transport and ordinary life.

Measured duration is not made arbitrary by being mediated. Two occurrences or stages of a process can stand in objective comparative relations, and a specified clock procedure can give those relations a usable expression. An instrument can provide access to a real relation without creating that relation.

In relativity, **proper time** is the invariant duration along a specified timelike worldline between two events on it. An admissible ideal clock travelling along that worldline operationally measures it.

Changism keeps all of this. Its vocabulary describes proper time as objective invariant comparative structure. A physical clock following the specified history accumulates cycles, phases or operations—its proper count—and produces a clock reading through which the relation becomes available. Proper time, proper count and clock reading are connected, but they are not identical. A faulty display does not alter that invariant duration, and the duration is not a fluid entering the clock.

Changism also keeps metric and causal structure. Relativity contains objective invariant relations that no choice of vocabulary or coordinate convention can wish away. Coordinates and diagrams represent that structure; clocks and signals provide operational access to it. The representation is not automatically a container, but neither is the structure reduced to the marks used to measure it. Likewise, causal order constrains which occurrences can influence others without supplying one total ranking of every occurrence in the universe.

It keeps succession and immanent before-and-after. A scar can depend on a wound; a detector record can inherit from an interaction; an organized process can carry constraints into what follows. Such order can be real before anyone assigns a timestamp. Changism denies only that every form of order must be donated by one external temporal sequence.

It keeps records and memory while refusing to identify either with the occurrence remembered or recorded. A record is a stabilized retained difference and may be accurate, partial, distorted or misleading. Memory is a real activity of living systems. Both can bear what later chapters will call past-role, but neither is the whole of what happened. The loss of a record does not reach backwards and erase its source.

It keeps lived duration. Boredom, urgency, anticipation and the felt continuity of an afternoon are genuine experiences, not failed readings of a hidden master clock. Their explanation belongs to Chapter 4. Their reality does not establish a flowing cosmic medium, but the absence of such a medium does not make the experience unreal.

And Changism keeps ordinary time-talk. We can ask what time a train leaves, say that a repair took a week, compare historical periods and write equations containing a temporal coordinate. Disciplined translation is required only when the argument turns on what the word commits us to. Then the exact referent matters.

What is removed is narrower than the list of what remains: the unexplained promotion of these phenomena into one additional container, substance, flow, universal master sequence, global present or cause. Physics does not become less exact when that promotion is questioned. Changism's interpretation must preserve every established equation, prediction, invariant and successful procedure relevant to its subject. If it cannot, it has ceased to be an interpretation and must be corrected or reclassified.

This chapter therefore makes no demand that a physicist alter a calculation. It asks a metaphysical question about what the successful calculation, instrument and practice require us to believe exists. That question remains open to answers other than Changism's.

1.6 What would count against the view

The ledger account is a metaphysical interpretation. It is not protected from criticism merely because it does not introduce a new empirical hypothesis. Its burden is to reconstruct temporal work without distorting the science, losing the phenomena or covertly relying on the independent stage it rejects.

The interpretation is stronger if it explains why our best temporal practices succeed and where their limits arise. It is weaker if it merely redescribes them retrospectively. That comparative burden applies even when two views predict the same observations, because ontological economy is not permission to omit necessary structure.

A serious rival need not propose a temporal substance or an extra variable that a detector could find. Fundamental time might be defended as a relation, a metric structure, an ordering principle or a primitive feature of reality. Evidence for such a candidate should be appropriate to its category. It may consist in causal, constitutive, modal, explanatory or unifying work that cannot be recovered without it. Changism cannot answer that case merely by observing that no clock has encountered a fluid called Time.

Nor can Changism prevail by renaming every temporal achievement. If *ledger* were simply another word for an unexplained fundamental time, the reconstruction would be empty. The account must show how concrete change, immanent order and physically embodied comparison jointly recover the relevant work, while keeping their roles distinct.

Several failures would therefore count against the view. First, if ordered change cannot be specified without presupposing an independent temporal structure, and the apparent reconstruction proves circular, the claim that change comes first must be narrowed or abandoned. Second, if the ledger account cannot preserve objective duration, proper time, metric relations, causal order and the warranted agreement of clocks, it has failed its preservation test. Third, if a rival temporal primitive performs indispensable explanatory work that the Changist resources cannot perform, with no compensating cost or loss, the rival should be preferred on that point, and the Changist claim narrowed or revised. Fourth, if the interpretation misstates an established physical result, the interpretation—not the result—must give way.

These are not all tests of the same kind. Some concern coherence, some explanatory comparison and some fidelity to physics. None promises a single decisive experiment. But together they prevent the view from winning by definition. A derivative account must do at least as much disciplined work as the ontology it seeks to replace, and it must make clear where that comparison remains unsettled.

This chapter has not settled lived passage, personal identity, relativistic simultaneity or the block universe. Its narrower result is a definition and a burden of reconstruction, not a completed philosophy of time.

Chapter 1 has separated the changing process, its immanent order and the comparative ledger. It has not yet explained how a recurring process becomes a public standard, how clocks are

calibrated, or how communities make different records answerable to one another. Those are the next tasks. **What must be added to a recurring physical process before it can serve as a trustworthy shared clock?**