

## Section 5. What the Arrow of Time Is (and Is Not)

After reformulating the paradox of temporal directionality as a problem of realization rather than of flowing time, the next task is to clarify the conceptual boundaries of the arrow itself. Much of the historical confusion persists because the arrow of time has repeatedly been identified with other notions—time, entropy, or psychology—that overlap with the phenomenon only partially and often misleadingly. This section therefore establishes the distinctions required for a more disciplined account.

### 5.1 The Arrow of Time Is Not Time

The most common conceptual error is to identify the arrow of time with time itself, as though time were a substance that flows asymmetrically from past to future or possessed an intrinsic directional tendency. Within the CUWF framework, this identification is rejected categorically.

Time, insofar as it functions in physical theory, operates as an ordering index: a relational parameter used to label sequences of realized events, records, or state-changes. It does not act, it does not flow, and it does not generate directionality. To attribute an arrow to time itself is therefore to reify an ordering relation into a causal agent.

The consequence is immediate. If the arrow is real, it cannot be a primitive property of time. It must arise from a deeper mechanism that makes ordered realization asymmetric. Time labels that asymmetry once it exists; it does not produce it.

### 5.2 The Arrow of Time Is Not Entropy Growth

A second widespread conflation equates the arrow of time with entropy increase. Although entropy growth correlates strongly with irreversible processes, correlation must not be mistaken for

explanation. Entropy is a measure defined over macrostates or ensembles. It characterizes multiplicity, accessibility, or constraint. It does not, by itself, create direction.

A system may occupy a high-entropy state without thereby generating a temporal arrow in the ontological sense relevant here. What matters for directionality is not merely statistical spread, but the irreversible accumulation of realized records. Entropy alone does not explain why realized history is directional rather than reversible.

Moreover, entropy increase is itself described relative to an ordering parameter. To say that entropy rises already presupposes a before-and-after structure with respect to which increase can be stated. In that sense, entropy-based explanation often assumes the direction it is invoked to explain.

Within CUWF, entropy therefore does not generate the arrow of time. Instead, entropic asymmetry biases collapse accessibility. It shapes which realizations are stable or favored once collapse occurs. Entropy influences the landscape of realization; it does not create the fundamental directionality of realization itself.

### 5.3 The Arrow of Time Is Not a Psychological Illusion

A third strategy attempts to dissolve the arrow of time by treating it as purely psychological: a consequence of memory, cognition, or conscious experience rather than a real feature of the world. This view is correct to note that human beings experience time asymmetrically, but it draws the wrong conclusion from that fact.

Psychology can explain how the arrow is experienced, but not why directional asymmetry exists at all. Memory formation is itself an irreversible physical process. Neural traces, inscriptions, and records do not spontaneously reverse. To reduce the arrow to psychology is therefore to presuppose within cognition the very physical irreversibility that still awaits explanation.

Within CUWF, psychological time asymmetry is not the origin of the arrow, but one of its downstream manifestations. Human experience reflects directional record accumulation; it does not generate it.

#### 5.4 The Arrow of Time as an Ordering Constraint on Realized History

Once these misidentifications are removed, the arrow of time can be stated positively. Within CUWF, the arrow of time is an ordering constraint on realized history.

Reality does not unfold because time itself flows. Rather, definite outcomes are selected through directional collapse from structured spaces of possibility. Each realized collapse produces a persistent record. These records accumulate, and once accumulated, they constrain what may be realized next. Directionality therefore arises because realization generates history under asymmetric constraint.

On this account, the arrow of time is neither externally imposed nor statistically inferred as a mere summary. It is a structural consequence of how reality becomes definite. Temporal direction is therefore anchored in collapse-driven history formation rather than in a metaphysical current of time.

This definition will guide the remainder of the paper. From this point onward, the arrow of time is to be treated not as a mystery attached to time itself, but as the structural signature of irreversible realization and cumulative historical constraint.