Singularities in Meaning Systems: Stagewise Reflection and Predictability Horizons

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Abstract

We study *parity horizons*—the singular points where a meaning system's optimal reflection of the world changes by stage. Under *reflection parity*, accuracy means a task-sufficient, resource-bounded quotient of the world rather than a 1:1 microstate emulation. As capacity or goals change, the MDL-optimal reflection is piecewise-constant with discrete transitions (singularities). We formalize stages, predictability horizons, early warnings, governance; add a universality and cross-layer resonance account; and demonstrate eureka synchrony in compact simulations.

1 Introduction

Minds do not copy reality; they mirror it. Reflection parity reframes accuracy: a representation is sufficient when it preserves the invariants that matter for goals under resource bounds. This implies *stagewise reflection*: as B and G evolve, the optimal partition changes by jumps. We call the jump points *parity horizons*.

2 Preliminaries: reflection parity

Let W_t be the micro-world, $\sim_{B,G}$ a task-indexed equivalence over world states, and $\pi_{B,G}(W_t)$ the quotient. A representation P_t is reflection-sufficient if there exists a homomorphism $h : P_t \to \pi_{B,G}(W_t)$ with bounded task error and P_t is MDL-minimal under an equilibrium objective $\mathcal{J}$.

3 Stagewise reflection and parity horizons

Definition 1 (Stage). *An interval where P is reflection-sufficient and MDL-minimal for (B, G).*

Definition 2 (Parity horizon). *A critical budget/time where the MDL-optimal partition changes identity (topology or cardinality).*

Definition 3 (Predictability horizon). *Largest window with bounded-regret forecasts under the current partition; beyond it, a partition transition is required.*

4 Theory: piecewise optimality (sketch)

With a Lagrangian $\mathcal{L} = \mathrm{MDL}(P) + \lambda \mathrm{PredErr}(P)$ and mild regularity, optimal assignments are stable except where multipliers hit constraints, forcing discrete reassignments (IB/deterministic-annealing analogy).

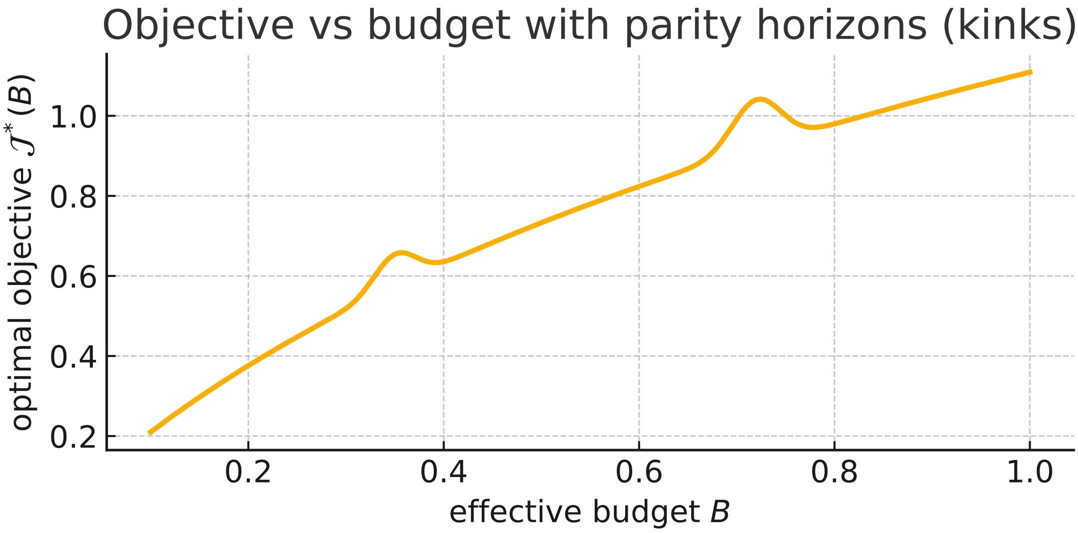

Figure 1: **Objective vs budget.** Kinks at horizons indicate partition changes.

5 Detection and governance

Early warnings: conflict curvature, residual bimodality, MES churn, d_R slowdown. Governance: sandbox transitions; provenance gating; value floors; reversible rewrites; external validation; explainability; staggered multi-agent crossings.

6 Universality and Cross-Layer Coupling

Any meaning substrate $S = (X, \mathcal{O}, U, G, B)$ faces the same trade-off: choose a coarse-graining π and representation P that minimize MDL under bounded task error. This yields stagewise reflection and parity horizons at *every* layer: physics/cosmology, evolution/genetics, minds, language, institutions. Layers ℓ couple via encoders/decoders $E_{\ell\to\ell+1}, D_{\ell+1\to\ell}$; horizons induce upstream pressure and downstream back-reaction. When multiple layers share an emergent invariant, stacked cliffs appear (synchronized transitions).

7 Convergence and Eureka Synchrony

Let a target invariant I^* have minimal prerequisites $\{I_1, \ldots, I_k\}$ forming a dependency DAG. Define a eureka hazard $h(t) = \sigma(w^\top s(t)) \cdot \prod_i ⊮\{I_i \text{ present}\}$, where $s(t)$ aggregates early-warning signals. In a population with coupling $\kappa_{i\to j}$, an exposure-driven reproduction term $\mathcal{R}_e = \sum_{j\neq i} \kappa_{i\to j}\, p(\text{MES accepted by } j)$ predicts clustered first hits when $\mathcal{R}_e > 1$.

7.1 Everyday singularities

Object permanence, mirror self-recognition, and vocabulary spurts are everyday parity horizons: small refactors with large reuse.

8 Simulations

Capacity sweeps reveal plateaus and kinks; multi-agent communication shows message-size cliffs at shared horizons; reflection distance exhibits a transient bump before improved convergence.

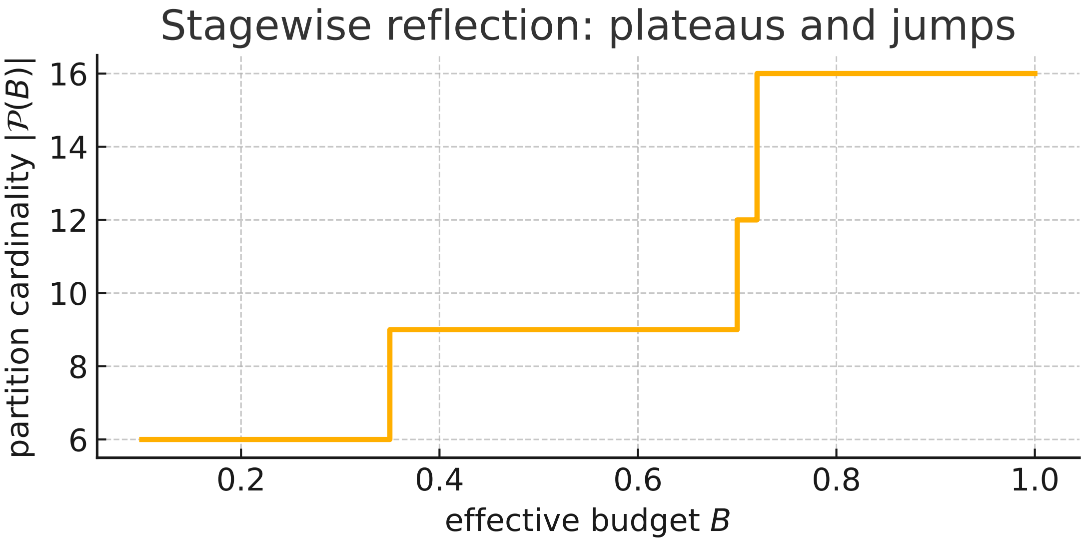

Figure 2: **Partition size.** Plateaus with discrete jumps as capacity increases.

References (inline)

References

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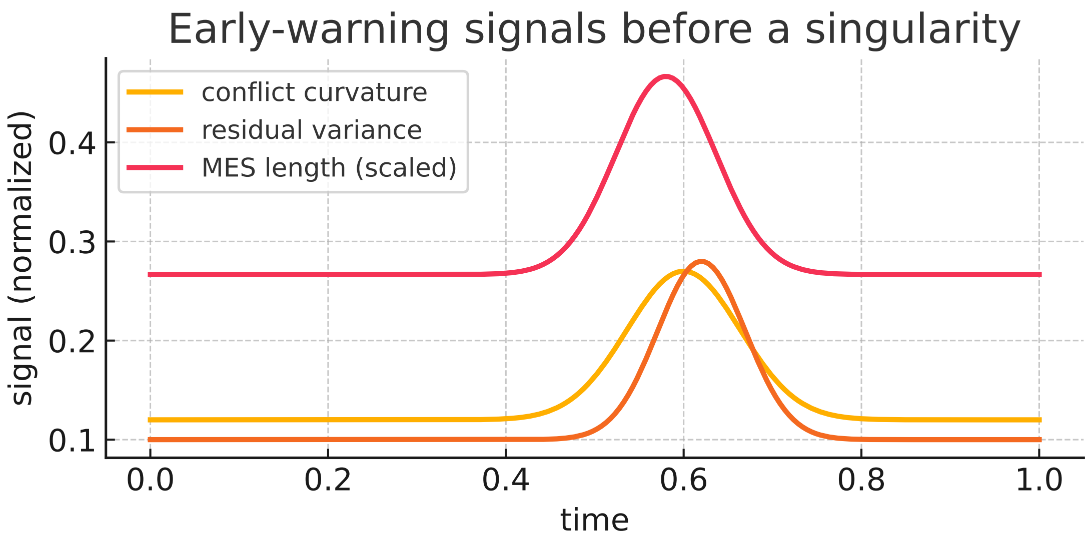

Figure 3: **Early warnings.** Signals spike before a horizon crossing.

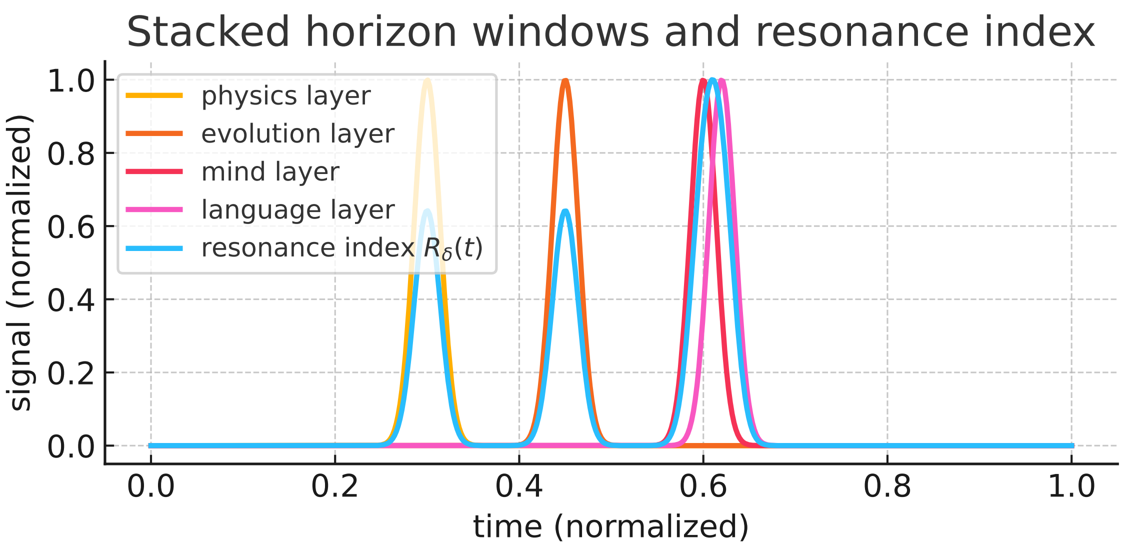

Figure 4: **Cross-layer resonance.** Overlapping horizon windows and a resonance index $R_\delta(t)$ (normalized sum). Peaks mark "stars aligning."

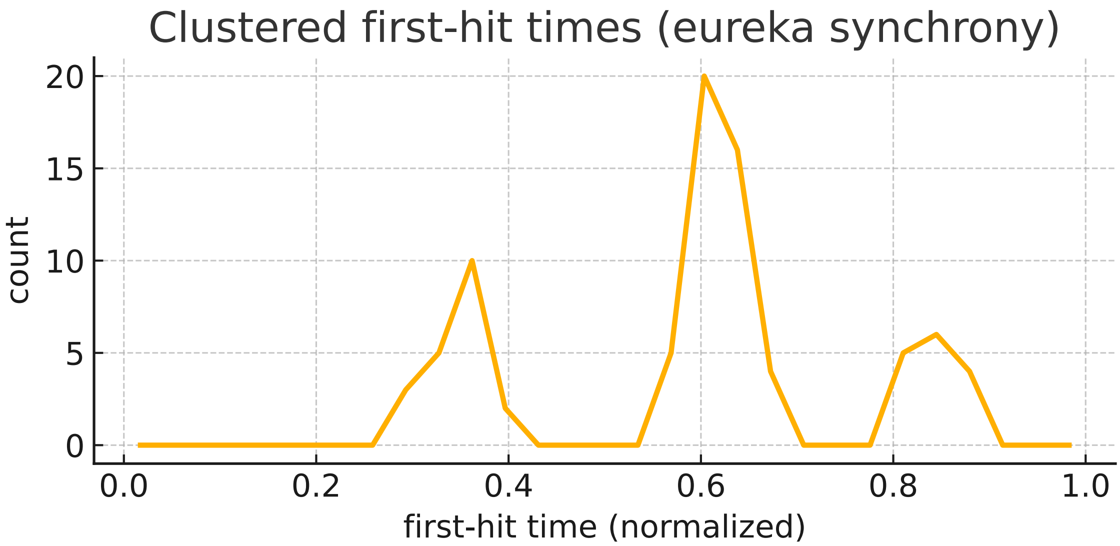

Figure 5: **Eureka synchrony.** Clustered first-hit times in a coupled population (simulated).

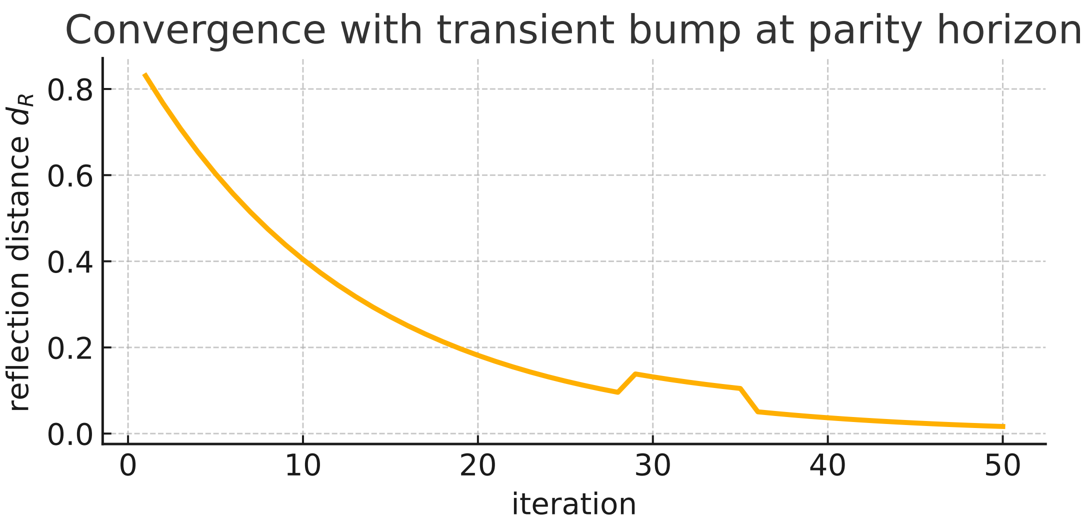

Figure 6: **Reflection distance.** Transient bump then stronger convergence after crossing.