

TOWARD A TAPHONOMY OF SENTIENCE

Collapse Dynamics During the Postmortem Interval

BIOLOGY
MATTER
INFORMATION
TIME

THE INTERREGNUM

Conference Theme

Bridging Forensics & Public Health
Addressing Vulnerable Population Deaths

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1. INTRODUCTION

Forensic and postmortem investigation documents a reproducible transition from coordinated physiological activity to irreversible biological collapse. The *Taphonomy of Sentience* treats collapse as an empirical boundary: infer the organization required to sustain sentience from the ordered pattern of what disappears when recovery is no longer possible. In unattended deaths—especially overdose, environmental exposure, chronic illness without adequate care, and social isolation—the postmortem record may provide the primary biological record of the terminal transition.

RESEARCH QUESTION

Can the irreversible loss of sentience-supporting biological coherence be modeled as an observable, multiscale collapse process during the postmortem interval?

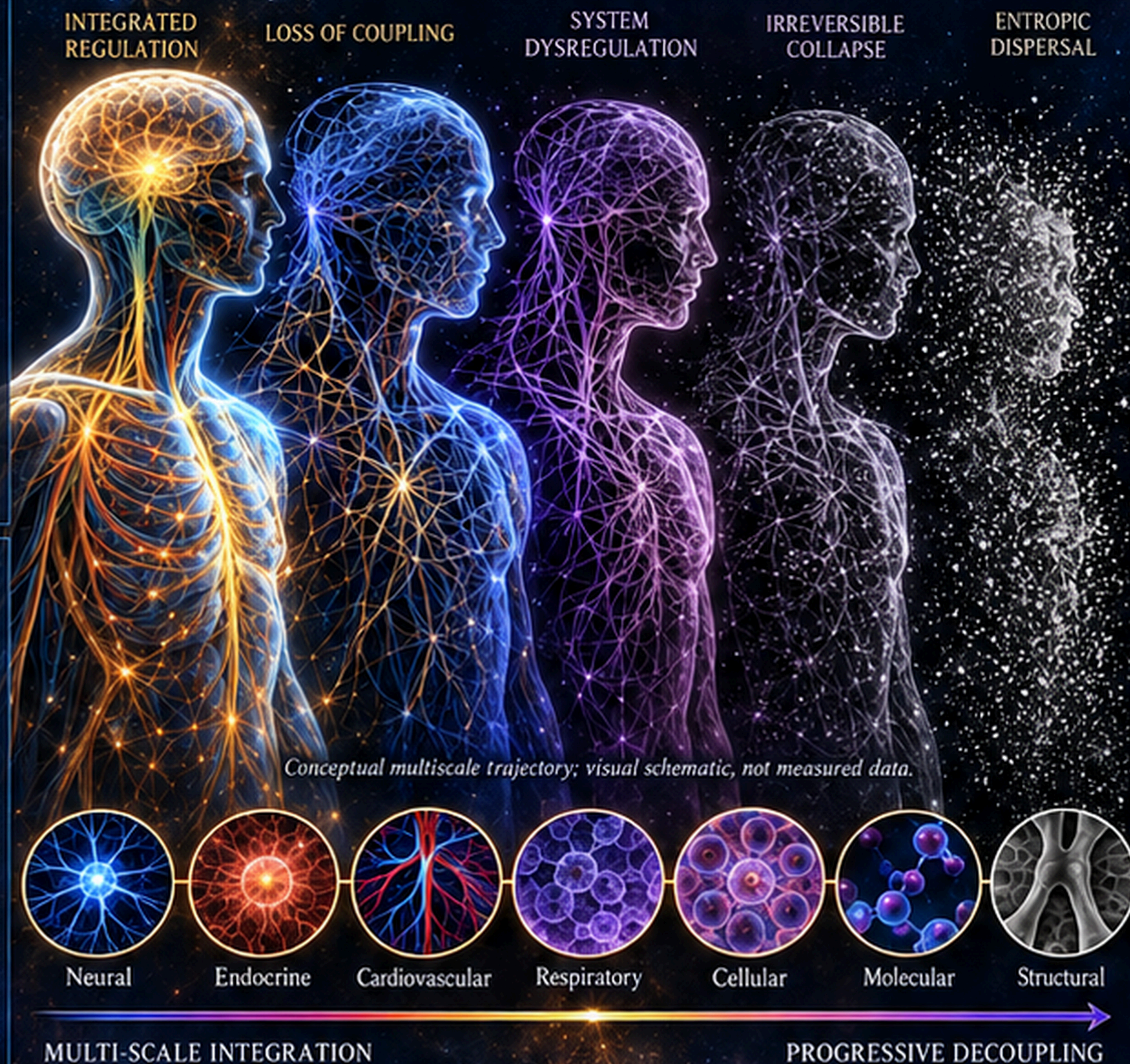
2. OPERATIONAL DEFINITION

Sentience is operationalized as collapse-capable coherence (CCC): the capacity to sustain integrated internal dynamics, preserve internally referential organization, and recover from perturbation until an irreversible threshold is crossed.

$$\Psi = k_B \ln(\Omega_{self})$$
$$\Omega_{self} = C^\alpha I^\beta R^\gamma K_c^\delta$$

C = coherence
 I = integration
 R = self-model fidelity
 K_c = collapse-capacitance
 $\alpha, \beta, \gamma, \delta$ = empirically estimated weights

Ψ describes recoverable organization; it is not a direct measure of subjective experience.



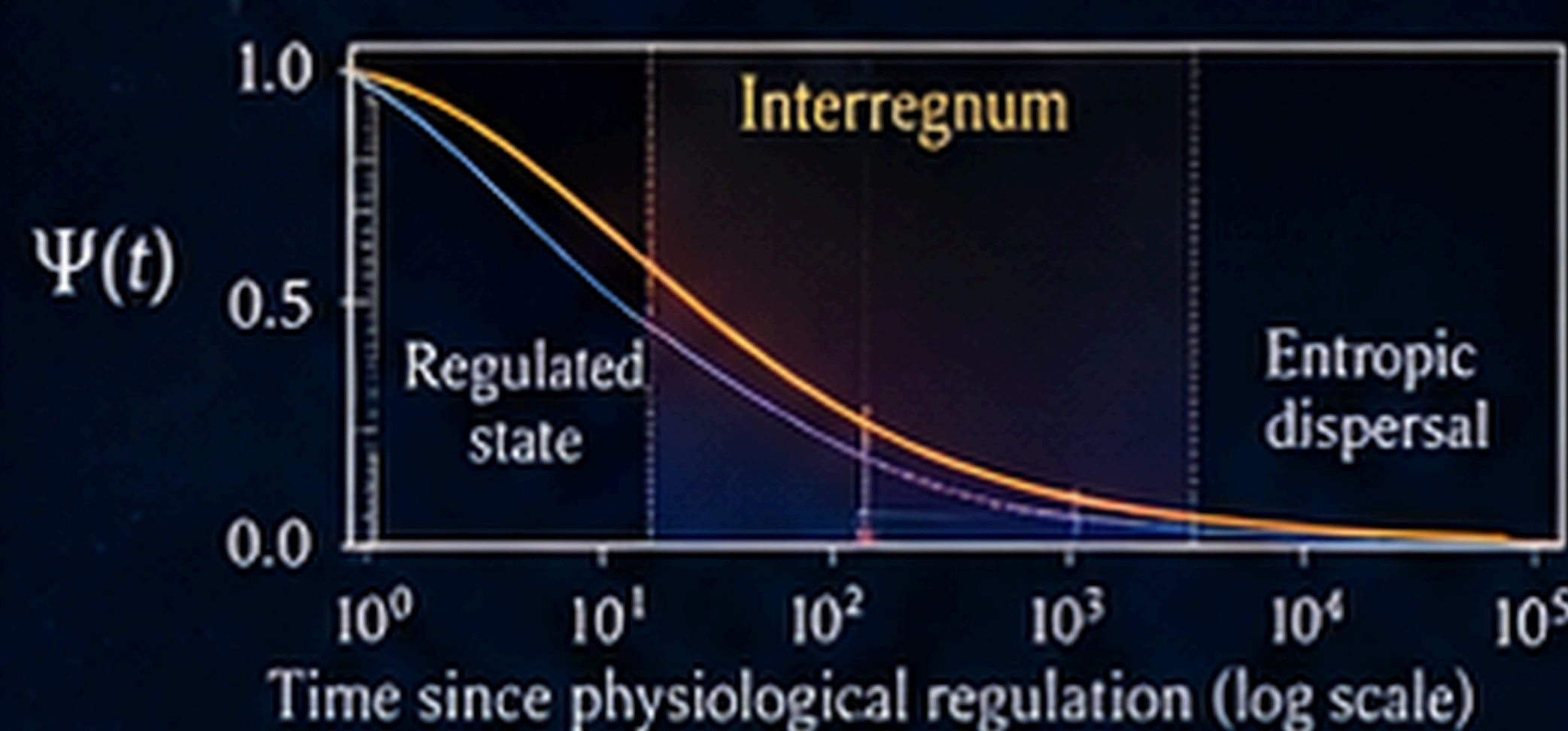
3. POSTMORTEM OBSERVABLES

Algor mortis	loss of regulated heat production	
Livor mortis	passive blood redistribution	
Rigor mortis	ATP-linked actomyosin change	
Metabolic failure	loss of energy-dependent homeostasis	
Autolysis	endogenous tissue degradation	

Candidate markers of multiscale decoupling; no individual marker measures consciousness.

4. MODEL DYNAMICS

- Structured multiscale collapse rather than instantaneous failure
- Scale-dependent relaxation dynamics
- Residual local activity may outlast organism-level integration
- Environmental conditions alter timing and trajectory
- Nonreturn Condition marks operational irreversibility boundary

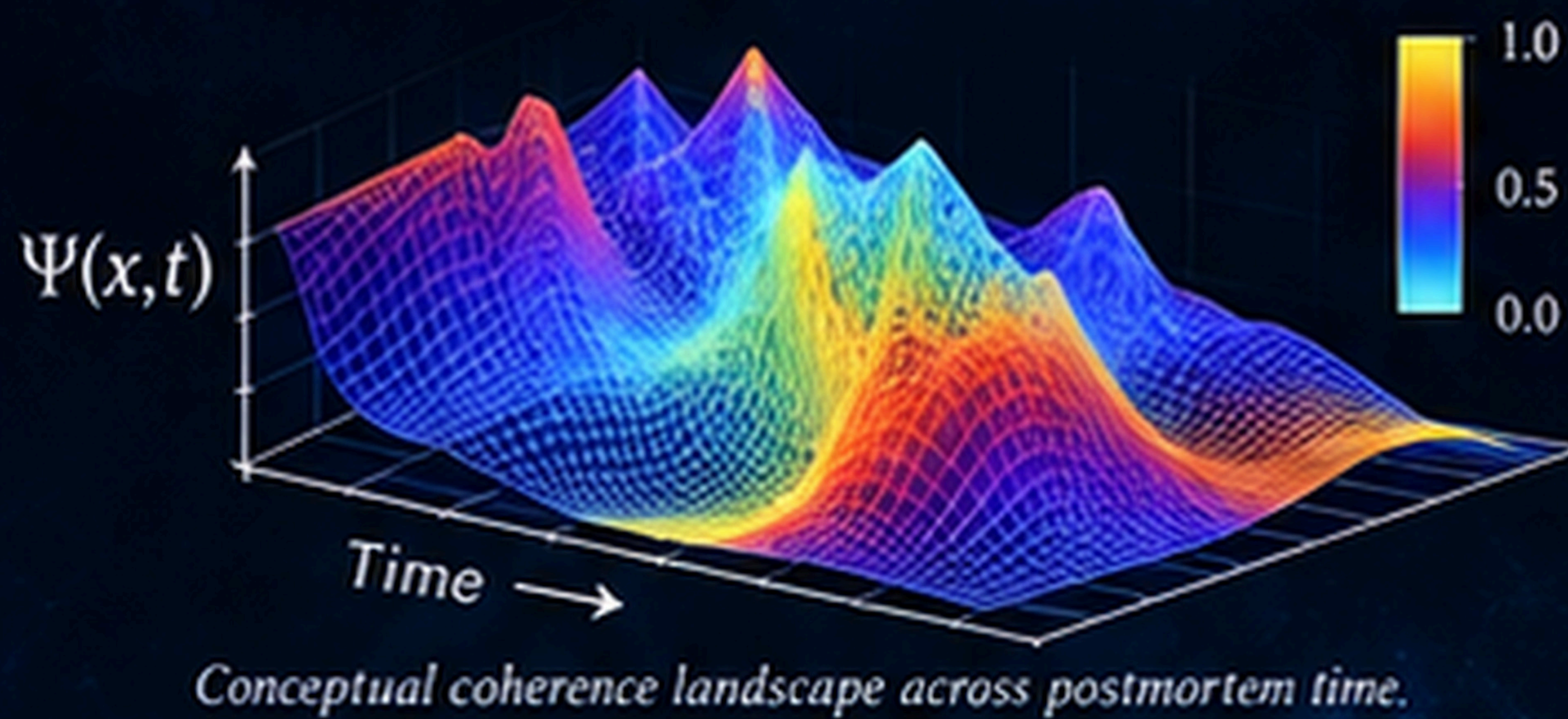


Event Horizon of Sentience (EHS): The Nonreturn Condition marks the boundary beyond which internally governed information return and recursive self-maintenance can no longer resume.

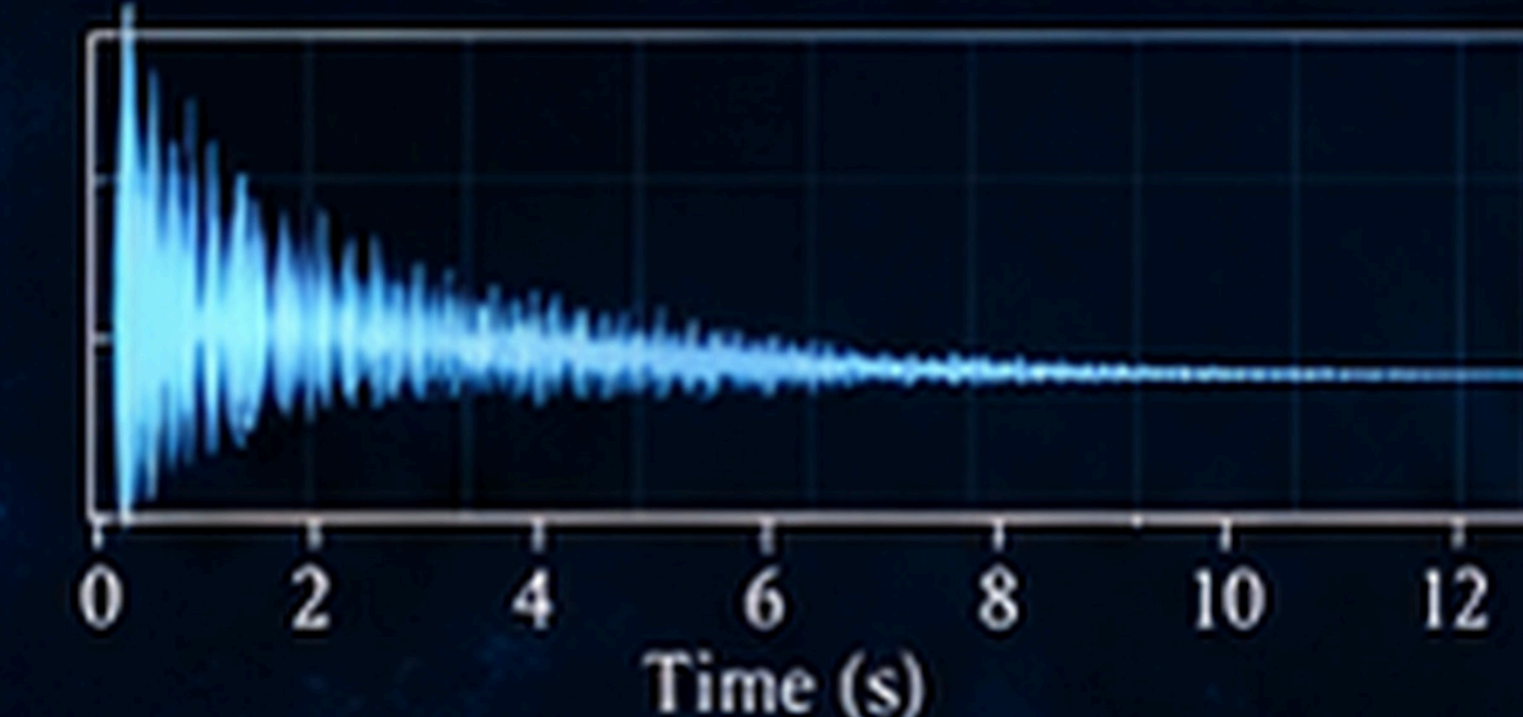
'Event horizon' is a comparative irreversibility model, not an astrophysical identity claim.

5. THE INTERREGNUM

The postmortem interregnum is the finite interval after organism-level regulation has ceased while residual organization persists asynchronously across subordinate biological scales. Residual heat, signal, structure, or cellular function provides evidence about the collapse trajectory—not evidence that the original sentient system remains intact.



PHYSICAL NEGATIVE CONTROL — REVERBERATION



A-12 s Evensong reverberation tail recorded at Canterbury Cathedral illustrates how decay can encode prior structure without implying sentience.

6. METHODS, RESULTS & FALSIFIABLE PREDICTIONS

METHOD

Define a regulated multiscale baseline → apply or observe graded loss of physiological support → track coupling, postmortem change, and recoverability → compare predicted transitions with independent observations.

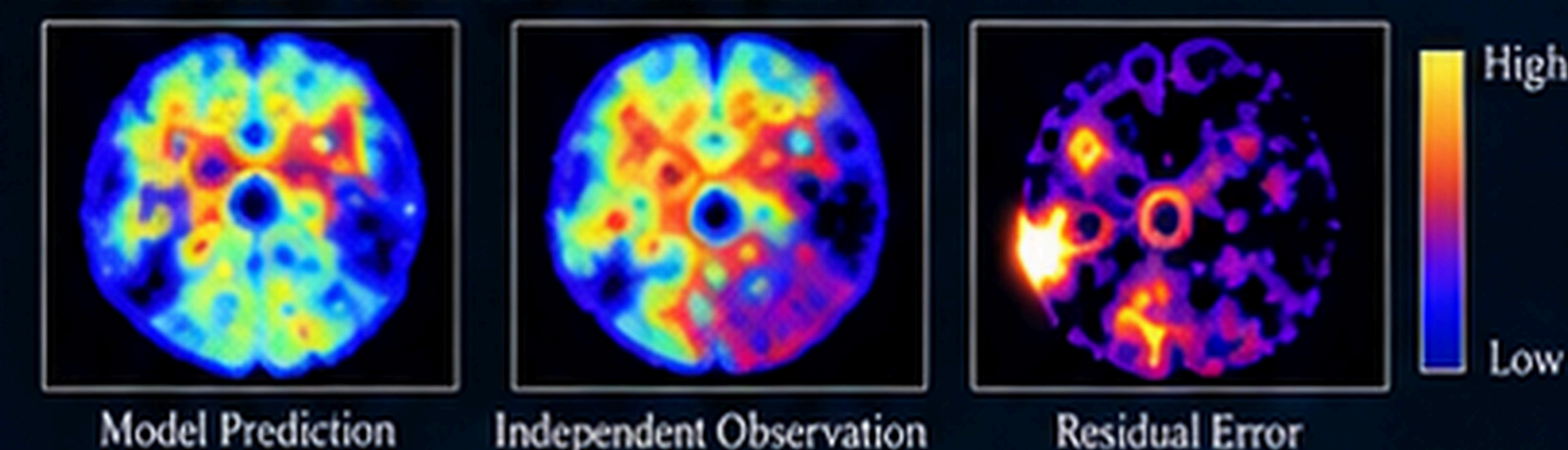
MODEL-DERIVED RESULTS

- Collapse should be structured across scales rather than simultaneous.
- Residual activity may persist after organism-level integration fails.
- Postmortem observables should constrain identifiable regions of the collapse trajectory.

PREDICTIONS

- Cross-scale coordination declines systematically after regulation ceases.
- Transition times differ among biological scales.
- Below the coherence-death boundary, recovery remains possible; beyond it, it does not.
- Independent postmortem observations correspond to modeled transition regions.

PROPOSED VALIDATION PARADIGM



FALSIFICATION: The framework weakens if multiscale/coupling variables add no predictive value or fail to distinguish recoverable from nonrecoverable organization.

7. SIGNIFICANCE & CONCLUSION

BRIDGING FORENSICS & PUBLIC HEALTH

In unattended deaths—particularly overdose, environmental exposure, chronic illness without adequate access to care, social isolation, and delayed discovery—postmortem findings may provide the primary empirical record of collapse progression. A multiscale collapse framework could connect individual medicolegal reconstruction with broader public-health patterns in vulnerable and medically underserved populations.

CONCLUSION

The postmortem interval can be treated as an empirical record of what persists, what disappears, in what order, under which boundary conditions, and what can no longer recover.

Collapse is not the definition of sentience. It is the empirical instrument by which its necessary organization becomes observable.



REVISED ABSTRACT + SUPPORTING MATERIALS

Mathematical specification
Provenance & development history
References

taphonomyofsentience.science

NOTICE: Scientific formalization and author affiliation have changed since abstract submission; a revised abstract and supporting materials are posted at the QR link.