

Ted’s Law of Karma: Covariance of Entropies and Shared Fate

Ted Strall

August 31, 2025

Abstract

We propose a principle—**Ted’s Law of Karma**—stating that *the covariance structure of entropy streams reveals the shared fate of interdependent systems*. By measuring entropy over time for multiple signals and computing their covariance matrix, the dominant eigenvalue λ_1 captures the degree of systemic alignment of uncertainty. We demonstrate this with a toy example and discuss implications for site reliability engineering, complex systems, and AI safety—including a concrete operationalization of Geoffrey Hinton’s call for a “maternal instinct” in AI systems.

1 Introduction

Complex systems rarely fail due to one signal alone. Failures arise when uncertainties across subsystems align. In philosophy, this interdependence is described as *karma*. In information theory, it can be captured through entropy and covariance.

This paper introduces **Ted’s Law of Karma**, unifying these perspectives into a measurable framework.

2 Ted’s Law of Karma

Statement: *The covariance structure of entropy streams reveals the shared fate of interdependent systems.*

Formally, given n metric time series $\{x_i(t)\}$, define entropy streams

$$H_i(t) = - \sum_k p_{i,k}(t) \log p_{i,k}(t),$$

where $p_{i,k}(t)$ is the empirical distribution of values in a rolling window.

Construct the covariance matrix

$$\Sigma_H(t) = \text{Cov}(H_1(t), H_2(t), \dots, H_n(t)).$$

Let $\lambda_1(t) \geq \lambda_2(t) \geq \dots \geq \lambda_n(t)$ be eigenvalues of $\Sigma_H(t)$. A spike in $\lambda_1(t)$ indicates the emergence of a systemic mode of shared uncertainty.

3 Toy Example

We generate three synthetic entropy streams:

1. Independent noise (baseline).
2. Coordinated disturbance introduced at $t = 50$.

Expected result: Under independence, λ_1 remains small. When coordination occurs, λ_1 spikes.

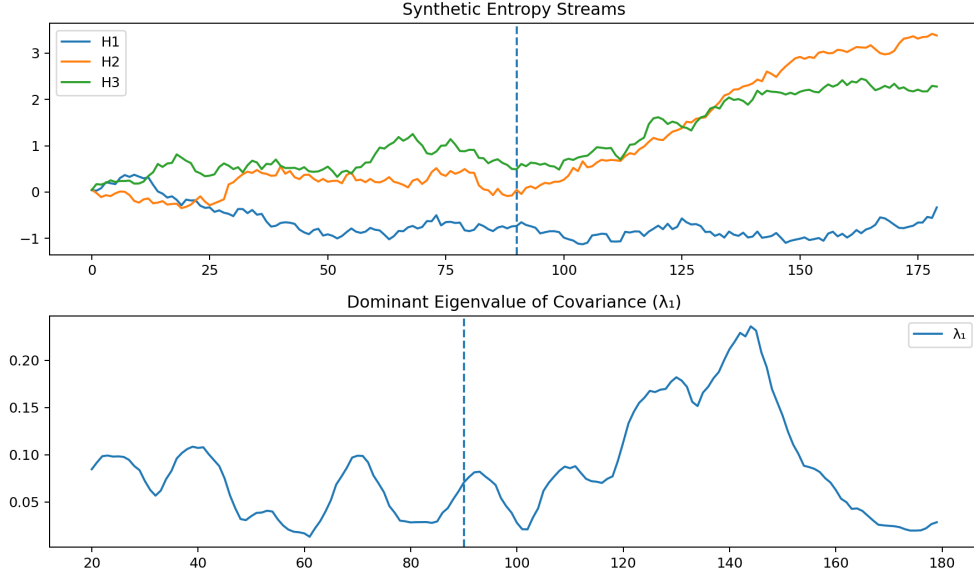


Figure 1: Toy example: entropy streams (top) and λ_1 of $\Sigma_H(t)$ (bottom). Spike at $t = 50$ reveals systemic alignment.

4 Implications

4.1 For SRE

Eigenvalue spikes anticipate incidents by detecting alignment of uncertainties across metrics before threshold-based alerts fire.

4.2 For Complex Systems

Suggests a general mechanism for cascades: emergent failures are preceded by eigenmodes of entropy alignment.

4.3 For AI Safety

Provides a formalization of “maternal instinct” as sensitivity to entropy covariance. Systems can bias toward protective actions when shared uncertainty increases.

5 Future Work

- Formalize within information geometry or statistical physics.
- Test across domains: ecosystems, economies, neuroscience.
- Embed entropy-covariance sensitivity in reinforcement learning agents.

6 Conclusion

Ted’s Law of Karma compresses a universal idea: *shared fate is visible in the covariance of entropies*. This framing connects information theory, operations practice, and AI safety.

References

- [1] C. Shannon. “A Mathematical Theory of Communication.” Bell System Technical Journal, 1948.
- [2] G. Hinton. “The Need for Maternal Instinct in AI.” (Talks, 2023).