The Influencer Decade as Informational Thermodynamic Collapse:

Operational Closure, Knowledge Allostasis, and the Bifurcation of the Digital Ecosystem (2012–2025)

Carlos Eduardo Ravello Joo

Independent Researcher

ORCID: 0009-0007-5631-7436

carlosravello.com

Abstract

The contemporary crisis of information search and distribution systems is not a transient cultural phenomenon but the mathematically predictable output of a decade of massive low-epistemic-density input. This paper argues that the period 2012–2025 functioned as an uncontrolled experiment whose initial conditions — the algorithmic democratization of digital reach without epistemic hierarchization — produced chaotically amplified effects consistent with the sensitivity to initial conditions described by Lorenz (1963). The sustained decline of organic reach on Meta, from approximately 16% in 2012 to 1–2% in 2025, is structurally correlated with the parallel growth of its advertising revenues, from $4.28 billion to $196 billion over the same period (Meta Platforms, 2025). Although Meta consistently framed these changes as improvements to user experience, the data show a clear structural correlation between the sustained reduction of organic reach and the strong growth of advertising revenues. In parallel, advertising revenues represented approximately 59% of Alphabet's total revenues in 2025 — $237 billion of a total $402.8 billion — while the company projects capital expenditure of between $180 and $190 billion for 2026, nearly double the $91.45 billion invested in 2025, primarily directed at artificial intelligence infrastructure (Alphabet, 2026). This economic and energetic pressure reveals a structural contradiction: the systems that financed and scaled the mass content ecosystem must now purge that same ecosystem to guarantee the epistemic density their artificial intelligence models require. Drawing on Schrödinger's (1944) principle of negentropy and Varela and Maturana's (1980) operational closure, this paper argues that high-density knowledge did not disappear during this decade but underwent systemic allostasis — migrating toward lower-resistance structures such as open repositories like Zenodo, OSF, and ArXiv, and high-density closed communities, where signal does not compete with mass noise. This bifurcation is not a voluntary cultural decision but a predictable output of the system's mathematical, economic, and energetic incentives. The paper concludes that artificial intelligence, incapable of producing content of its own, requires precisely the difference that makes a difference (Bateson, 1972) that the mass influencer ecosystem was never able to generate. In

Dabrowski's (1964) terms, what we observe is not decadence but positive disintegration at systemic scale.

Keywords: digital ecosystem, operational closure, knowledge allostasis, epistemic density, platform economics, artificial intelligence, information thermodynamics

1. Information as a Mathematical Constant

Information is not neutral. It behaves as a mathematical constant: what the system receives determines what the system returns. Not as metaphor, not as narrative — as physics. Bateson (1972) formulated this with a precision time has not eroded: information is a difference that makes a difference. Without difference, there is no information. Without information with density, the system processes noise and returns noise.

The digital ecosystem between 2012 and 2025 operated as an uncontrolled experiment of massive low-epistemic-density input. Distribution algorithms were not designed to evaluate the quality of knowledge — they were designed to maximize attention time and, with it, advertising revenues. The result was predictable from physics: a system that receives low-differentiation signal returns low-differentiation signal, amplified to industrial scale.

Following Lorenz (1963), the initial conditions of that experiment — the democratization of reach without epistemic hierarchization — acted as a nonlinear initial perturbation whose chaotic effects have been amplified exponentially. Current times are not an unexpected crisis. They are the mathematically predictable output of those initial conditions. Understanding them requires reading them backwards: as consequence, not as origin.

2. Meta as Historical Case Study: The Commodification of Visibility

The case of Meta constitutes the most thoroughly documented historical record of how an information distribution platform transformed its internal logic from social network to advertising engine. The data are precise and verifiable.

The average organic reach of Facebook pages fell from approximately 16% in 2012 to 6.5% in 2014, continuing its decline to 1–2% by 2025 (Socialinsider, 2025). In terms of advertising revenues, the structural correlation is clear: from $4.28 billion in 2012 to $55 billion in 2018, $132 billion in 2023, and $196 billion in 2025, with advertising representing 97–98% of the company's total revenues (Meta Platforms, 2025).

Precision is required here. The data show a strong temporal and structural correlation between the sustained reduction of organic reach and the parallel growth of Meta's advertising revenues. While the company consistently framed these algorithmic changes as improvements to user experience — prioritizing 'meaningful social interactions' over page content, in the words of Zuckerberg (2018) and Mosseri (2018) — the net result was a massive migration of visibility toward paid content. The internal memo by Andrew Bosworth (2016), whose existence and content are verifiable through BuzzFeed News, captures the underlying logic: connecting people justifies any

means that expands that connection. Free visibility ceased to be a distributed good; it became a controlled variable.

The influencer did not die with this shift. It professionalized. The global influencer marketing industry grew from approximately $1.7 billion in 2016 to $32.55 billion in 2025 (Influencer Marketing Hub, 2025). Both curves — the decline of organic reach and the growth of the influencer market — tell the same story from two perspectives. What Meta eliminated as a free good, the market restored as a transactional one. Visibility did not disappear: it was privatized.

3. Google Trapped in Its Own Structural Contradiction

Google faces an unprecedented evolutionary trap. To complete its transition from search engine to AI-powered answer engine, it must actively reduce the noise generated by the mass low-epistemic-density content ecosystem it helped finance and scale for over a decade. This is not a free strategic choice — it is a structural contradiction that the numbers make irrefutable.

In 2025, advertising revenues represented approximately 59% of Alphabet's total revenues — $237 billion of a total $402.8 billion — a figure notably lower than the 70%+ of previous years, reflecting the accelerated growth of Google Cloud. In parallel, Alphabet projects capital expenditure of between $180 and $190 billion during 2026 — nearly double the $91.45 billion invested in 2025 — with $35.67 billion already deployed in Q1 2026 alone (Alphabet Q1 2026 Earnings Release). The majority of this investment targets infrastructure for Gemini and Google Cloud, which grew 63% year-over-year to $20 billion in Q1 2026, with a backlog that nearly doubled to over $460 billion. This diversification does not weaken the central argument — it sharpens it: the quality of the index becomes even more critical as Google's dependence on pure advertising revenue declines.

The energetic dimension of the problem is equally concrete. A traditional Google search consumes approximately 0.3 Wh. A median Gemini query consumes between 0.24 Wh and several Wh depending on complexity, with extended reasoning cases multiplying that consumption by a factor of 10 to 1,000 (Google Environmental Impact Report, 2025). At industrial scale, processing massive volumes of low-epistemic-density content to feed an AI system that requires precisely the opposite is not merely inefficient — it is thermodynamically unsustainable.

SpamBrain, launched approximately in 2018 and publicly disclosed in 2022 (Google Search Central, 2022), and the successive iterations of the Helpful Content Update from August 2022 through its integration into core ranking in March 2024, are consistent with the hypothesis that these mechanisms respond, at least in part, to real economic and computational pressure beyond the declared objectives of improving user experience. Google cannot eliminate the influencer without eliminating part of its advertising model. But it cannot feed Gemini with the content that influencer produces either. This is the trap: to preserve the organism, it must progressively eliminate the parasite it raised.

4. TikTok and the Human Bifurcation: Artificial Sophistication versus Authentic Primitivism

TikTok did not solve the digital ecosystem's problem. It reformulated it. Rather than eliminating organic reach as Meta did, it redefined which signals determine it. The system shifted weight from likes — an easily manipulable signal loaded with social pressure — toward saves and shares, which indicate genuine utility and intent to return (Sprout Social, 2026). The completion rate required to trigger viral distribution rose from 50% in 2024 to 70% in 2026 (PostEverywhere, 2026). The algorithm is attempting to separate real attention from manufactured attention.

The human response to this new environment has been a bifurcation that no platform engineer clearly anticipated. On one side, artificial sophistication: more elaborate scripts, higher-production polish, more carefully constructed narratives. The problem is that this content has acquired a recognizable texture — it smells like GPT because, in many cases, it is. On the other side, authentic primitivism: rawer, more physical, more instinctive content, as an unconscious response to the excess of synthetic production. Both are adaptations to the same stimulus. And the system, in its operational closure (Varela & Maturana, 1980), cannot step outside itself to distinguish between them. It only weighs signal mass.

The influencer is not, as has been superficially argued, a trend heading toward its end. The influencer is an anthropological constant: it existed in every culture before the internet as the shaman, the orator, the troubadour, the chronicler. What the digital ecosystem did was collapse the access barriers to relevance. Origin, appearance, class, geography — the algorithm democratized the possibility of reach. Whether this is good or bad is not a question this analysis is positioned to answer. What is observable is that the system's incentives have shifted: the 'not interested' button and content personalization controls are, in Friston's (2010) terms, mechanisms of surprise minimization. The system learns not to spend energy on predictions the user rejects. Every 'don't suggest this content' click is a signal that the algorithm failed. The ecosystem is training itself to predict with greater precision — and in that training, volume without difference loses ground continuously.

5. Knowledge Allostasis: Science Finds Its Own Channels

The contemporary crisis of the open web should not be read as a cultural phenomenon but as a thermodynamic collapse of information. Following Lorenz (1963), the decade's massive low-epistemic-density input acted as a nonlinear initial perturbation whose chaotic effects have been amplified exponentially. Against this entropic dispersal, the survival of knowledge does not occur in the mass but in the transition toward structures that operate under Schrödinger's (1944) negentropy. Contemporary dense communities function as open systems that import informational order to resist the thermal death of the digital environment. There is no metaphor here; there is the physics of information.

Scientific knowledge did not disappear during the influencer decade. It underwent what may be described as systemic allostasis: the maintenance of viability through a change of route, not of objective. In Varela and Maturana's (1980) terms, the living system does not alter its organization — it alters the means by which it maintains it. Zenodo, OSF, ArXiv, closed Discord communities, niche newsletters, preprint repositories: these are not phenomena of conscious cultural resistance. They are the predictable adaptive output of a knowledge production system that found that mass channels had ceased to be functionally useful.

An apparent exception must be addressed that the analysis cannot ignore. Channels like Kurzgesagt, Veritasium, or SciShow reached millions of followers during that same decade communicating scientific content through mass platforms. These channels do not contradict the thesis — they confirm it by contrast. Their survival in the mass ecosystem required adapting knowledge to the algorithm's format: specific durations, high-cost production, dramatic narratives, background music. They are not evidence that the ecosystem was compatible with epistemic density. They are evidence of how far knowledge had to transform itself to survive within it. They operated as negentropic anomalies — injecting real density into a sea of low signal — but at an adaptation cost that most scientific knowledge could not afford. Those without cinematic production did not exist, regardless of the quality of their content.

The open science movement — documented in UNESCO (2021) policy frameworks, the European Open Science Cloud, and the sustained growth of deposits in repositories such as Zenodo and ArXiv since 2018 — was not planned as a response to the influencer ecosystem. It was the autopoiesis of two systems that should have coexisted in harmony from the beginning: mass distribution and knowledge production. Their separation was not a failure — it was the recognition that their internal logics are incompatible over the long term.

6. The AI Diet: Difference, Not Volume

Artificial intelligence does not produce content of its own. It consumes differences that make differences. Bateson (1972) formulated this principle to describe information in biological and cognitive systems; its application to large language models is not forced — it is structural. A language model trained on massive volumes of homogeneous content does not acquire reasoning capacity; it acquires the statistical capacity to reproduce that content. The difference between the two is not one of degree — it is one of nature.

The extended sandboxes characteristic of large language model development — periods of months or years during which the system does not update its knowledge base — are not transient technical limitations. They are a direct consequence of the signal problem: when the volume of content available for training grows faster than the system's capacity to distinguish signal from noise, the system prefers to operate with what it already has. In Friston's (2010) terms, this is free energy minimization: the system reduces surprise by avoiding low-predictability input. The AI diet is selective by computational and economic necessity, not by philosophical choice.

This selectivity has a consequence that the analysis allows stating with precision: the future of the digital ecosystem is not artificial intelligence replacing the content creator. It is AI forming alongside those who produced real hard data — verifiable trajectories, operational knowledge derived from documented experience, processed and recorded errors. Not polished scripts. Not flawless edits generated in minutes. The difference the veterinarian accumulated across 34 FAVN serology cases. The difference the engineer built calibrating hydraulic brakes under real altitude conditions. The difference the entrepreneur documented operating three businesses simultaneously under real pressure.

The influencer who explained how to do something in front of a camera, with background music and high-cost editing, did not produce that kind of difference. They produced a representation of difference. It is proposed that AI systems in their increasing maturity will tend to distinguish with

greater precision between representation of difference and real accumulated difference. This hypothesis is verifiable in the medium term through the behavior of models against different data sources. What can be stated now is that epistemic density cannot be statistically simulated. It accumulates.

7. Conclusion: Positive Disintegration at Systemic Scale

Current times are the deferred outputs of precise initial conditions. Google's credibility crisis, the bifurcation of the digital ecosystem, the migration of knowledge toward high-density low-visibility structures, the thermodynamic pressure that forces mass platforms to purge their own ecosystems — all of this is the predictable output of a decade of massive low-epistemic-density input. There are no culpable actors in this analysis. There is physics.

Meta did not reduce organic reach out of malice — it did so because its model required converting visibility into a commodity. Google does not face its structural contradiction through design error — it faces it because it optimized for short-term metrics that proved incompatible with its long-term evolution. The influencer did not contaminate the index by intent — they did so by learning to give the algorithm exactly what the algorithm asked for. Every actor functioned rationally within their incentives. The problem is systemic, not moral.

Prigogine (1977) demonstrated that complex systems far from equilibrium do not necessarily collapse — they reorganize into higher levels of complexity through what he termed dissipative structures. The digital ecosystem, in its current perturbation, is consistent with that model: the disintegration of the previous order is not the end of the system but the condition for its reorganization. The thermodynamic pressure that makes the mass low-density content model unsustainable is, simultaneously, the force producing the bifurcation toward denser and more sustainable structures.

In the years ahead, we will observe how the positive disintegration of the algorithm generates Algorithm 2.0, and how knowledge allostasis finds its equilibrium in an ecosystem where epistemic density once again carries functional value — not merely cultural. Those who produced real difference during the decade of noise will not need to explain their trajectory. The trajectory will be the explanation.

In Dabrowski (1964), we will find the answer.

References

Alphabet Inc. (2026, April 29). Q1 2026 earnings release. https://abc.xyz/investor/

Bateson, G. (1972). Steps to an ecology of mind. Ballantine Books.

Bosworth, A. (2016, June). The ugly [Internal memo]. Facebook. Published by BuzzFeed News (2018, March 29). https://www.buzzfeednews.com/article/ryanmac/growth-at-any-cost-top-facebook-executive-defended-data

Dabrowski, K. (1964). Positive disintegration. Little, Brown.

Friston, K. (2010). The free-energy principle: A unified brain theory? Nature Reviews Neuroscience, 11(2), 127–138. https://doi.org/10.1038/nrn2787

Google Search Central. (2022, April). How we fought search spam in 2021. https://developers.google.com/search/blog/2022/04/webspam-report-2021

Google Search Central. (2022, August). What creators should know about Google's helpful content system. https://developers.google.com/search/blog/2022/08/helpful-content-update

Influencer Marketing Hub. (2025). Influencer marketing benchmark report 2025. https://influencermarketinghub.com/influencer-marketing-benchmark-report/

Lorenz, E. N. (1963). Deterministic nonperiodic flow. Journal of the Atmospheric Sciences, 20(2), 130–141. https://doi.org/10.1175/1520-0469(1963)020<0130:DNF>2.0.CO;2

Meta Platforms, Inc. (2025). Annual report 2024. https://investor.fb.com/

Mosseri, A. (2018, April). Bringing people closer together. Facebook Newsroom. https://about.fb.com/news/2018/04/inside-feed-meaningful-interactions/

PostEverywhere. (2026). How the TikTok algorithm works in 2026. https://posteverywhere.ai/blog/how-the-tiktok-algorithm-works

Prigogine, I. (1977). Self-organization in nonequilibrium systems. Wiley.

Schrödinger, E. (1944). What is life? Cambridge University Press.

Socialinsider. (2025). Social media industry benchmarks 2025. https://www.socialinsider.io/

Sprout Social. (2026). How the TikTok algorithm works in 2026. https://sproutsocial.com/insights/tiktok-algorithm/

Srnicek, N. (2017). Platform capitalism. Polity Press.

UNESCO. (2021). UNESCO recommendation on open science. https://doi.org/10.54677/MNMH8546

Varela, F. J., & Maturana, H. R. (1980). Autopoiesis and cognition: The realization of the living. D. Reidel.

Zuckerberg, M. (2018, January 11). Bringing people closer together [Facebook post]. https://www.facebook.com/zuck/posts/10104413015393571

Zuboff, S. (2019). The age of surveillance capitalism. PublicAffairs.