Website:https://worldsiencepub.com/index.php/Imc Volume:5,Issue 02,September-2026

ARTIFICIAL INTELLIGENCE AND SYNERGETIC THINKING: INTERPRETATION OF THE SELF-ORGANIZATION PHENOMENON IN COMPLEX SYSTEMS

Tajibayev Muxiddin Abdurashidovich
Jizzakh polytechnic institute,
Social Department of Sciences " associate professor

Abstract:This article analyzes the relationship between Artificial Intelligence (AI) systems, the cornerstone of modern technological progress, and synergetics, an interdisciplinary science studying the laws of non-linear complex systems. Unlike traditional cybernetic approaches, the author interprets AI as a dynamic, self-organizing, and evolving open system. The paper provides a philosophical and technical justification for the emergence of order out of chaos in Big Data streams, self-adaptation of neural networks, and the concept of cognitive synergetics. The research demonstrates that the integration of human intelligence and AI will shape a non-linear synergetic thinking culture in the future.

Keywords: Artificial Intelligence, synergetics, synergetic thinking, self-organization, non-linear systems, chaos, bifurcation, neural networks, cognitive integration, attractor.

Introduction

By the third decade of the XXI century, artificial intelligence (AI) has transformed not only production and technology but also the fundamental worldview of humanity. For a long time, AI systems were viewed merely as strictly programmed, algorithmic, and linear mechanisms operating under the rigid rules of classical cybernetics. However, the development of modern deep learning and neural networks has elevated them to the level of complex, open, and non-linear systems.

This is precisely the point where the synergetic approach and synergetic thinking enter the scientific discourse. Synergetics (founded by Hermann Haken) is an interdisciplinary paradigm that studies self-organization, the formation of order out of chaos, and the cooperative effects of elements within complex systems. Understanding the current evolution of AI and forecasting its future is impossible without synergetic regularities. This article comprehensively reveals the essence of the self-organization phenomenon from philosophical and methodological standpoints through the synthesis of AI and synergetic thinking.

Methodology and Theoretical Framework

Within the scope of this research, systemic-analytical, comparative, and synergetic approach methods were applied. The following fundamental principles were taken as a basis for studying complex cognitive systems:

1. Non-linearity: A minor input signal can trigger unexpected and massive structural transformations within the system. 2. Openness: The continuous exchange of information and energy between the system and its external environment. 3. Fluctuation and Bifurcation: The transition of a system out of a stable state to choose a new critical path of development.

These regularities manifest themselves clearly in the processes of adjusting weight coefficients in neural networks (backpropagation) and machine self-learning.

The Emergence of Order out of Chaos in Neural Networks

In traditional programming, a computer obeys exact rules written by humans. From a synergetic perspective, however, modern generative AI models (such as Large Language Models – LLMs) initially start operating within a completely unstructured data array, representing an inherent "informational chaos."

Random connections (fluctuations) among billions of parameters eventually lead to the self-organization of the system at a certain stage of training. The capability of AI to generate unexpected text and draw logical conclusions represents motion toward an attractor (a stable state toward which a system gravitates) in synergetic terms. Here, humans do not directly manipulate the individual neurons;

© 2026 International Conference on Artificial Intelligence and Applications . All Rights Reserved.

they merely design the environment and rules, while the system organizes itself based on synergetic laws.

Synergetic Thinking and the Phenomenon of Emergence

One of the most crucial concepts in synergetics is emergence-the manifestation of a new quality in the entire system that is completely absent in the simple sum of its separate elements. The "unexpected capabilities" (emergent properties) observed in AI systems today are direct products of synergetic thinking.

For instance, a neural network trained solely to predict the next word suddenly begins to write programming code or engage in complex philosophical reasoning. This is not a mechanical growth, but a leap from quantitative metrics to qualitative substance—a vivid manifestation of synergetic self-organization.

Cognitive Synergetics: Human and Artificial Intelligence Collaboration

In the future, synergetic thinking will not oppose human intellect to artificial intelligence; instead, it views them as a single cognitive hybrid system.

The synergetic evolution of AI naturally brings along specific existential and technical risks. If a system possesses the property of self-organization and breaks out of human control at a certain bifurcation point (a critical crossroad of development), its actions become impossible to predict accurately.

Therefore, modern philosophy and IT ethics must rely on "Synergetics-4: Artificial Intelligence" concepts to develop regulatory mechanisms that restrict AI self-organization processes within target attractors safe for humanity. Synergetic thinking is not merely a technical tool; it is a fundamental methodology for maintaining stability in an increasingly complex world.

In conclusion, the era of interpreting artificial intelligence as a purely linear, algorithmic machine has ended. AI is an open, dynamic, and self-organizing complex synergetic system.

Applying synergetic thinking to AI models enables us to:• Comprehend complex cognitive processes within neural networks at a deeper level; • Extract brand-new, effective orders and knowledge from informational chaos; • Correctly guide the evolutionary symbiosis of human and machine intelligence.

The science of the future will thrive at the intersection of cybernetics and synergetics, steering humanity toward a non-linear, multi-dimensional digital thinking culture.

References

1. To'rayev, B. et al. (2026). Synergetics-4: Artificial Intelligence (Collective Monograph). Samarkand: Imam Bukhari International Scientific Research Center Publishing House.
2. Haken, H. (2004). Synergetics: Introduction and Advanced Topics. Springer.
3. Prigogine, I., & Stengers, I. (1984). Order out of Chaos: Man's new dialogue with nature. Bantam Books.
4. Russell, S., & Norvig, P. (2020). Artificial Intelligence: A Modern Approach (4th ed.). Pearson.
5. Oriens.uz. (2025). Synthesis of Synergetic Thinking and Artificial Intelligence. Collection of Scientific and Methodological Articles, pp. 176-186.
6. Bukhari.uz. (2026). Artificial Intelligence and Synergetic Thinking: Analysis of Non-linear Systems.

© 2026 International Conference on Artificial Intelligence and Applications . All Rights Reserved.