Review of: "Towards a Comprehensive Theory of Aligned Emergence in AI Systems: Navigating Complexity towards Coherence"

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The autonomy and complexity of artificial intelligence systems poses new challenges, for the solution of which the author successfully combines complexity theory and emergence theory. A number of the author's ideas and results contribute to a broader understanding of the characteristics of AI dynamics, among which it should be noted:

• the dynamic nature of coordination, depicting it as a continuous and evolving process;

• a new framework that recognizes the diverse dynamics and complexities observed at different levels of abstraction;

• time-dependent nature of emerging behavior and coordination.

This holistic view emphasizes the interconnectedness that gives rise to higher-order complex phenomena. To study them, the author pays special attention to:

• the impact of potential positive and negative feedback loops on consistency,

• the need for early detection and correction of misalignment to prevent adverse cascading effects.

• Complexity and nonlinearity of system equations to study the behavior and consistency of AI.

An interesting idea is "distributed emergence," which essentially reflects the fractal nature of nature. This, on the one hand, indicates the significance of the idea, and on the other, opens up new opportunities. Indeed, not only mathematical fractals are most suitable for dynamic coordination, but also natural fractals, the number of which is three orders of magnitude greater.

To study the structure of dynamic fractals, the transdisciplinary cognitive space of dynamic events is most suitable, in which a time series of various natures is transformed into an individual cognitive graphic image (1st and 2nd order signatures) (DOI: 10.1038/srep29512). In this space, statics are transformed into dynamics (DOI: https://doi.org/10.15407/fm24.02.212). To identify transitional functional states, signatures of fractal signals of various natures are of interest (https://doi.org/10.21272/jnep.12(6).06018). The development of these ideas for artificial intelligence is given in DOI: 10.26855/er.2022.04.001.

These tools allow the theory of the transition from complexity to coherence in artificial intelligence to be supplemented with

empirical data. In my opinion, their complementarity will contribute to the search for hybrid research methods.