

Peer Review

Review of: "Aging as Cybernetic Attractor Decay: Beyond the Stochastic-Programmed Dichotomy"

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The preprint by J. Bhak addresses a very interesting question about the laws underlying the aging process. The idea proposed by the author looks interesting, logical, and plausible.

However, there are essential drawbacks in the text.

1. Strictly speaking, several pages of the manuscript lack any other content than the repetition in different ways of the main idea that “aging requires neither a “death program” nor “pure stochastic damage”, but instead reflects the gradual erosion of developmental control systems”.
2. A lot of statements use terminology that is not clear or is inappropriate,

or do not have the necessary definitions/explanations provided in the text.

Examples:

- “ I define biological systems as hierarchical information-processing networks” – why hierarchical?
- “developmental attractors” – definition?
- “developmental network dominance in aging signatures” – explanation and proof?
- “molecular aging clock sites (definition?) enrich for developmentally regulated genes” – statistics?
- “ Recent molecular aging clocks measure the predictable decay of developmental regulatory architectures” – recent??
- “ These architectures are “informational structures” established during development under host-environment intertwined computational states” – definition of “computational states”? Arguments for this statement?

-“para-determined”, “quasi-programmed” ??

-what is PRC2?

-“living systems are not merely doing computation, they are computation as “recursive information processing” that maintains far-from-equilibrium states by continuously transforming energy and matter into organized structure.” - why recursive? How is it connected with “far-from-equilibrium states”? How is the maintaining of “far-from-equilibrium states” connected with transforming energy and matter into organized structure?

-“ when computational fidelity degrades across this recursive and fractal stack” - ?? - - recursion does not necessarily lead to fractals; - what exactly is fractal? Stack?

-“ attractor drift without sufficient error correction” - needs explanation - as the whole sentence, so what is “sufficient error correction”?

- “attractor landscapes” -?

-“Developmental architectures establish regulatory capacities and network topologies (explains cross-individual similarity and developmental gene enrichment)” - what is “network topologies”? How does it explain cross-individual similarity and similarity in what? Developmental gene enrichment - where?

-“ Equilibrium attractors emerge from regulatory context (explains site-specific trajectories)” - which trajectories? Which sites?

-and many other cases of the use of uncertain terminology and phrases without a clearly understood meaning.

3. If this manuscript is just a commentary on the paper by Meyer et al., 2025, it should be much shorter and more condensed, while if this is an original manuscript providing and proving the novel hypothesis about mechanisms of aging, it should be done with all definitions of formulated statements, all necessary experimental and computational data, essential illustrations, and references.

Declarations

Potential competing interests: No potential competing interests to declare.