# Review of: "Evolution, Through the Lens of a Physicist"

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The article addresses how variations arise and are subsequently subject to selection. The author examines the potential contributions of physics to this topic, focusing particularly on two aspects of variation generation: its randomness and its reliance on the part-whole system (e.g., as per the Extended Evolutionary Synthesis framework). On the issue of randomness, the author asserts that neither natural science nor biology can differentiate between chance and intention. Concerning the part-whole system, the author argues that a biological system cannot easily be reduced to its individual components.

A substantial body of literature already exists on both topics, and it would be beneficial to incorporate some of this research into the discussion. Here are a couple of suggestions:

- In evolutionary biology, "chance" refers not so much to the randomness of variation generation but to the lack of correlation between the expected fitness value of a phenotypic variation and the probability of that variation occurring. When a new environmental challenge or opportunity arises, a beneficial mutation has the same likelihood of appearing as a detrimental one. For instance, a change in average environmental temperature might trigger a mutation through a non-random event, but the effect of the mutation on adapting to the temperature change is random. The emphasis is not on the probability of a mutation occurring, but on the absence of a relationship between the mutation and its adaptive value. Note that some authors argue that this is not always the case, e.g. (Jablonka & Lamb, 2005).
- The transition from simple parts to complex wholes is examined in various contexts, such as in the "Major Transitions in Evolution" proposal (J. M. Maynard Smith & Szathmáry, 1997) or within the framework of self-organized systems. For instance, see the work of Alvaro Moreno or Matteo Mossio, e.g., (Mossio et al., 2013). In this proposal, some parallels are drawn between physical and biological systems as to their ability to create structures more complex than the sum of their parts. A typical example of such self-organizing physical structures is Bénard's cell (Beloussov, 2012).

In conclusion, I think that the article could provide some interesting philosophical ideas, but it would need a deeper handling of what has already been said on the topics.

References

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