Review of: "Micro- and Macroevolution: A Continuum or Two Distinct Types of Change?"

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Potential competing interests: No potential competing interests to declare.

The present work is about the relationship between microevolution and macroevolution in evolutionary biology. The authors represent an organism by a state vector which can suffer two kinds of changes: in its parameters or in its dimension. They call "first-order evolution" the change in the values of the parameters and "second-order evolution" the change in the dimension of the vector. The authors also distinguish between phenotype-based analysis and genotype-based analysis of evolution, and consider the first one as subjective, while the second one can be described in mathematical terms.

I found the work very interesting, and I think it is a good contribution to the discussion about the microscopic mechanisms of the evolution of living beings.

Questions:

1) About changes in the dimensions of the vector: Are those changes always an increase, or can they also be a decrease?

2) In section 5.3 (Computer simulation of first- and second-order evolution): Lotka-Volterra simulations of evolution.

For me, it is not clear if the present model of a vector that can change in its parameters or in its dimensions applies here. As I understand, there are only two parameters, one representing the population of prey and the other one representing the population of predators. The change in the parameters is related to the change in the population of each species, but what about the change in dimension? Is it associated with the extinction or emergence of new species? I think this example is rather different from most of the cases that are addressed with this model, which applies to the evolution of an organism at the genetic level.

3) Is it possible to completely identify the genome of an organism and follow the real changes over time, be they first or second order? Are there studies done on that, or is it still a hypothesis?

Minor remarks:

1) In section 2 (Methods-A: first-order versus second-order change), I would better write the vector S(t) in the following way:

S(t) = (s1(t), s2(t), …, sn(t)).

instead of:

S(t) = (s1t, s2t, …, snt).

2) Figure 1 is the same as that in reference 25. If the figure remains here, I suggest putting all graphs on the same y-scale (0 to 100%).