# Review of: "Self-Replication, Spontaneous Mutations, and Exponential Genetic Drift in Neural Cellular Automata"

Li Zunxian

Potential competing interests: No potential competing interests to declare.

Actually, I'm not familiar with this subject. The reason why I accept the invitation of the review is that I'm interested in the dynamics of the self-replication for some deterministic models. I believe that there lies some intrinsic relations between the dynamics and its performences of NCA. From the point of view, I propose the following two suggestions.

1. It is known that there are lots of patterns in the nature, such as the formations of animal coat pattern, self-replication, spiral waves and so on. Nowadays, there are also lots of rigorous mathematical theories to illustrate theses phenomenons. For example, the diffusive Brusselator model can generate abundant dynamical behaviors.To name a few,

Entropy 2016, 18, 64; doi:10.3390/e18030064(spot self-replication ),

Nonlinear Dyn (2023) 111:713–731 https://doi.org/10.1007/s11071-022-07863-z (Turing instability and Hopf bifurcations).

Hence the first question is whether the author can show the differences between the dynamical analysis and the NCA method when both the two methods are used to illustrate the formation of patterns?

2.The author says that "The synchronous models fail to converge much more of ten, however when they converge, the results are quantitatively similar to the asynchronous models, if pro- ducing qualitatively smoother images transitions. " Hence the second question is whether the author can give the convergence conditon? Does it depend on the initial values or some things else?

Of course, the two questions are proposed from the point of view of dynamical behaviors. Hence these questions may not have strong correlation with the NCA method in this paper. It is only my intend to know if there are some relations between these methods.