

Review of: "A Law for Irreversible Thermodynamics? Synergy Increases Free Energy by Decreasing Entropy"

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Potential competing interests: No potential competing interests to declare.

This study observes several behaviours of synergy in systems' trajectory under different surrounding conditions. The results propose a classifying frame that may be useful to study synergy in deeper detail.

General comments

I, however, do not feel comfortable with this conception of an "irreversible thermodynamics". In my opinion thermodynamics is a field offering ways to measure (or quantify) the irreversibility of a process taking place within a system. Thermodynamic laws prove that any process is possible if and only if there is a non-negative degree of irreversibility, which in turn can be quantified (or at least estimated) by the change of the system's entropy.

Whatever the non-conservativeness of systems that are conceived by focusing on its non-equilibrium condition is, this non-conservativeness as well as the implications of the non-equilibrium condition should be inserted into the system's balance equations. Walking in this difficult to draw line of open and non-equilibrium systems is risky because it may lead us to illusions that defy the thermodynamics second law.

All above refers to the thermodynamics of energy systems. It is interesting that when talking about "thermodynamics" of information systems, all these ideas of balance, conservativeness, and equilibrium become blurred. Perhaps the information of a closed system does not need to be constant and therefore the classical laws of thermodynamic and entropy acquire other plausible interpretation. I think this justifies the present study.

A minor detail:

"... complex system sciences has allowed us to tackle quantitative ..." should be: "... system sciences has allowed us to tackle quantitative.

Final remarks

This study offers interesting ideas for classifying systems according to their synergistic behavior, resulting in a useful frame to deepen into the study and quantification of systems' process synergy.