Review of: "Thermodynamics of Scientific Ontology"

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Potential competing interests: No potential competing interests to declare.

0. At first, I wanted to support most of the points of the other reviewer, Noushin Azima - especially his first point regarding the precise title.

1. Keywords are poorly selected - they are too general and do not reflect the nature of the work.

2. We need a table with the correspondence of thermodynamic-statistical quantities with quantities related to the number of articles and concepts on arXiv - which will be like a legend. For the sake of clarity, fundamental thermodynamic-statistical formulas that a professor of statistical physics might consider obvious should be included here.

3. Is the basic assumption the canonical system and the statistical sum of type (2) (because it is not the microcanonical system, nor the grand canonical system), or rather the entropy of type (1)? Therefore, the transition to equations (3), (4), (5), (6) is somewhat unclear.

4. Beta should be defined in a separate numbered equation. A formula in the text like beta=1/kT is wrong because it means beta=(1/k)*T when it should mean beta=1/(k*T). Beta is called the inverse temperature - so is k=1?

5. In physics, it is like in healthy nutrition - less processed data are more valuable. Conventional temperature is already heavily processed, and beta may be less, or maybe more - still, it may be better to use simply 1/(kT).

6. According to point 5, the data is heavily processed, so one diagram in Fig.1 is absolutely not enough. More raw data graphs and intermediate data graphs are needed. Without this, there is no guarantee that the data is not simply made up.

7. The work contains many types of entropy, in order: Clausius, Shannon, Boltzmann, Gibbs-Shannon. How do they differ? It is worth providing formulas, not just references. As for Gibbs-Shannon and Shannon entropy, why is there no Gibbs entropy - he was the first of the two? I understand that information theory abuses the concept of Shannon entropy - that is why I think that only the term Gibbs-Shannon entropy (of the two) is permissible here. The argument is simple: the work contains no logarithms with base 2, but there are natural logarithms (polylogarithms are a different story). The lack of a constant k is too little to give up the name Gibbs.

8. It is also worth considering the formula for relative entropy (Kullback-Leibler divergence) - see the article Phys. Rev. E, 106:034102, Sep. 2022.

9. To draw attention to the superiority of entropy over other approaches (not the Carnot approach), using the example of the second law of thermodynamics, see my article: Entropy 2022, 24(3), 392.

10. The reviewed article is interesting and ambitious, so it is worth refining it.