

# Episode One Hundred Twenty-Seven - Letter to Pythocles 02 - The Formation of "Worlds"

Post by "Martin" of July 2, 2022 at 3:37 PM

Hi [beasain](#),

I think that you have already a good understanding of entropy except for some details affected by the inaccurate and misleading analogy between entropy and disorder. When I was an undergraduate student, that analogy considerably delayed my understanding of entropy. When ignoring that analogy and sticking to the definition of entropy as a measure of the probability of a thermodynamic state, I finally got a working understanding.

If you apply the analogy between entropy and disorder without consideration for the actual definition of entropy, you may easily get false conclusions such as "lower temperature is lower entropy". A counterexample for that false conclusion is the adiabatic process, in which the temperature changes but the entropy does not change. Another counterexample is that in the distant past, the universe had a higher average temperature and a lower entropy than today.

The interpretation of increase in entropy as destruction or an increase in disorder is subjective and not always obvious. Instead of thinking that the universe goes into disorder and destruction, we should more accurately think that it transitions from a less probable state to a state with higher probability, and that formulation should not trigger any depressive thoughts or cynicism, independent of what school of philosophy we prefer.

Whereas easy to understand analogies are a useful tool for the popularization of science, we need to be aware that the incurred simplification may mislead us when we draw our own conclusions.

What I wrote about entropy on my wall was not limited to our solar system but referred to the universe as a whole. The development of the universe and the expected future development appear to be contrary to Epicurus' concept that the universe has always been the same and will remain the same.

In its early stages, the universe has been very different from now. Many billion years into the future, it will be very different from now. In between, there are many billion years in which it is about the same, in particular as it appears to us on Earth. Therefore, from a practical perspective for us humans now, Epicurus' concept of a constant universe is reasonably correct unless we are professional astrophysicists.

On this limited time interval (of nevertheless billions of years), the increase in entropy is good to know to understand nature and to develop technology and is no reason to feel depressed.

Epicurus' philosophy helps us to focus on the generations currently alive and the next few generations. It makes sense to put reasonable effort in mitigation of climate change, preservation of biodiversity, sustainable agriculture and industry, avoidance of depletion of limited resources and whatever else helps to make survival not too unpleasant for the next generations. Beyond that reasonable effort, it is up to the future generations to deal with the problems they will face.