Question Re Thermodynamics And Deductive Reasoning v. Empiricism

Post by “Martin” of October 4, 2019 at 11:41 AM

Godfrey:

I do not have a simple reference but maybe my approach helps: The analogy between chaos and entropy was an obstacle to my understanding of entropy during my study. When ignoring that analogy and instead concentrating on the definition, which means that entropy is a measure of the probabilty to observe a particular combination of the states of many particles in a system , we should expect that the development with time goes toward combinations with higher probability, that is higher entropy.

In a system consisting of 2 sub-systems, it should be possible to get a decrease in entropy of one sub-system if the entropy in the other sub-system increases at least as much as the entropy in the first one has decreased.

To make sense out of empirical data, scientists build a model because observations without a model hardly lead to any understanding and there is no justification to extrapolate the data or to trust their reproducibility without a model.

The model gets tested with more empirical data, preferably from systematic experiments designed to refute the model.

If a model passes the tests and there is no better model at hand, this model eventually becomes part of scientific knowledge but might later on be refuted (or more often just abandoned) when contradicting data or a better model are found.

Speculation comes in if models have no strong empirical base and are not tested or are possibly not even testable, e.g. string theory or the multiverse as of now.