What is Information? It is the Amount of Compressed Data

Shu-Kun Lin

Molecular Diversity Preservation International (MDPI)
Matthaeusstrasse 11, CH-4057 Basel, Switzerland
Tel. +41 61 683 7734 (office)
Tel. +41 79 322 3379 (mobile)
Fax +41 61 302 8918
E-mail: lin@mdpi.org
http://www.mdpi.org/lin

Abstract: Instead of reviewing all kinds of definition of information, I would like to give my own definition: Information (I) is the amount of compressed data. The total amount of data of the considered system, before any compression, is denoted as L. Entropy is denoted as S. For a 1.44 MB floppy disk, L=1.44MB whether the disk is empty or not. Let us use any available compression method to reduce the size of the original data to 0.40 MB. Then, I=0.40MB, S=1.04MB, L=1.44MB. If less information content corresponds to more entropy, as accepted by many authors, under certain conditions, the sum of entropy and information should remain conserved. Based on this definition of information, parallel to the laws in thermodynamics, I conceived the following laws. The first law of information theory: the function L (L=S+I, the sum of entropy and information) of an isolated system remains unchanged. The second law of information theory: Information (I) of an isolated system decreases to a minimum at equilibrium. The third law of information theory: For a most symmetric structure (e.g., perfect crystal, at zero absolute thermodynamic temperature), the information is zero and the static entropy is at the maximum (see Lin, S.-K. The Nature of the Chemical Process. 1. Symmetry Evolution - Revised Information Theory, Similarity Principle and Ugly Symmetry. Int. J. Mol. Sci. 2001, 2, 10-39. www.mdpi.org/ijms/papers/i2010010.pdf). After my revision with this clear definition and the three laws, it is possible to apply information concept and information theory to the consideration of system stability and process spontaneity in chemistry, physics and other research fields. The applicability of this revised information theory is obvious if the similarity (and indistinguishability) concept and its relation is clearly given. This is the criterion for stability and is called Similarity Principle: If all the other conditions remain constant, the higher the similarity among the components is, the higher value of entropy of the mixing (for fluid phases), the assembling (for solid phases) or any other analogous processes (of assemblage formation, such as quantum states in quantum mechanics) will be, the more spontaneous the processes will be, and the more stable the mixture and the assemblage will be.
