
JOURNAL CLUB

WHAT IS INFORMATION?

The search for a non-anthropomorphic definition and meaning

by

Juan G. Roederer
Professor of Physics Emeritus

ABSTRACT

If we want to understand the role of information in Nature, particularly in the biological world, we must find an appropriate definition of this omnipresent and seemingly trivial concept – a definition that is objective and independent of human actions and human-generated devices. Conventional information theory works mainly with computers and technological communications systems; in general it considers two types of information: Shannon’s “statistical or semantic information” represented by statements that describe the outcome of expected alternatives in the behavior of a system, and “algorithmic information”, defined as the minimum-bit statement that describes a given thing. In recent times physicists, geneticists and cyberneticians have been interested in the existence and meaning of “information” as a concept that is unrelated to human communication, and that is not based on any formula. This is not a trivial matter. Information is not like mass or energy: you cannot tell by looking at a molecule or at a slice of brain tissue whether it has it or not – as yet there is no “information dynamics” comparable to the dynamics of matter.

I have been trying to accomplish the “de-humanization” of the concept of information by turning to the process of “interaction” as the fundamental starting point. I will formulate the necessary basic formal definitions, examine the various classes of “information-based” interactions, and identify the two, and only two, distinct types of natural (not man-made) information: biomolecular information linked to Darwinian evolution and neural information linked to perception. Several examples will be discussed. I will also repeat some points made in an earlier Journal Club presentation positing that in the inanimate world information plays no role whatsoever – until a human being puts it there through an information-based interaction.

Friday, October 26
Room 417, IARC Bldg
3:45 pm