

## Information

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Information is often said to be as fundamental a building block of the universe as matter and energy is. So far, however, there is no common agreed-upon concept of information. There is a multiplicity of different approaches including different ranges. Despite this, there are recent monographs aiming at the single integrated theory of information (e.g. H.C. v. Baeyer: *Information, The New Language of Science*, Weidenfeld & Nicolson 2003; C. Seife: *Decoding The Universe, How the New Science of Information Is Explaining Everything in the Cosmos, From our Brains to Black Holes*, B&T 2006; S. Brier: *Cybersemiotics: Why Information Is Not Enough*, University of Toronto Press 2007).

The best reviews of the different approaches have been R. Capurro, B. Hjørland: *The Concept of Information*, in: *Annual Review of Information Science and Technology (ARIST)*, Medford, NJ, Vol. 37 (2003), 343-411, and J. Mingers: *An Evaluation of Theories of Information with Regard to the Semantic and Pragmatic Aspects of Information Systems*, in: *Systems Practice*, Vol. 9, No. 3 (1996), 187-209.

It will be argued that a categorisation of information concepts or theoretical approaches towards information carried out from a complexity point of view will regard different ways of relating entities of different complexity. Thus, there are objectivistic approaches, originating from the so-called "hard" sciences, that consider information a substance because of its ability to be received and processed in cognitive contexts, to be transmitted in communicative contexts, and to be stored and retrieved and distributed in co-operative contexts. On the other hand, there are subjectivistic approaches, originating from the so-called "soft" sciences, that believe information to be a mental construct produced by human actors internally, or interactively, or externally according to the context.

From the scientific and technological perspective computer science is the template for the concept of information. Information is, therefore, something objective that can be independently measured. This suits the predominant analytical-empirical approach. It is the view of objectivism. This first approach is inclined to be reductionistic by method. It reduces different qualities of the phenomena under investigation to one and the same quality which is the most simple as a rule. It can be said it looks upon information as something that can be received, stored, processed, exchanged, used, and so on, as if a thing. This shall hold for cognition, communication and co-operation processes in society and for natural domains as well.

In the perspective of the humanities, information is considered to be subjective, that is, inextricably linked to a human subject. This is the hermeneutic-phenomenological approach. It is subjectivism. This second approach is biased, too, insofar as it takes as point of departure the stance of humanities. Methodologically, there are two possibilities. Either it projects one particular quality in question which, as a rule, is the most complex one onto phenomena which do not possess this quality, and pretends to be able to discover them there. Properties of information in nonhuman domains are usually extrapolated from properties of information in the human domain (anthropo(socio)morphism). Beyond that, properties of cognition may be extrapolated from those of communication, and those of communication in turn from those of co-operation within the human domain itself. Or the attempt at a subsuming, though unifying, solution is given up and it is argued in favour of a lack of comparability of the given phenomena in nature and society. This dichotomising view ascribes information exclusively to the human domain. Beyond that, it may exclusively be ascribed to particular incidences within the human domain. In both cases, information is basically considered a human construction.

The objectivists properly regard information as a real phenomenon instead of a mere figment of the human imagination. The subjectivists properly expect information only where there is freedom of choice when information is generated and disposed of. However, the objectivists have to limit the scope of the objects with which they claim to find information to those objects that assume the role of subjects. The subjectivists, on their part, have to expand the sphere of subjects beyond that of humans to include non-human ones as well.

According to this reconciling perspective, information emerges when evolving systems cognise their Umwelt, when they communicate with each other, and when they co-operate while establishing a metasystem and suprasystem. That is, information is a relation of self-organising systems to their environment (cognitive context), to their co-systems (communicative context), or to the system they give rise to (co-operative context). This holds for different evolutionary levels like the physico-chemical, biotic, social. Information society is just the most advanced information-generating system we have knowledge of so far.

This is the contribution complex system methods, principles and concepts can make to bridge the chasm between the two camps.

In this vein, the history of the information concept can be re-read: there is a historical movement from a broad and encompassing concept which anticipates modern notions of self-organisation in antiquity through a step-by-step narrowing-down of its meaning until World War 2 to the quest for a unified theory of information that goes beyond syntactical, semantic, and pragmatic concepts.

Contributions are linked to the names of

- Morin
- Haken
- Ebeling
- Kornwachs
- Fuchs-Kittowski
- Hofkirchner
- Stonier
- Brier
- Kauffman et al.
- Moreno et al.

to name but a few.

The most recent ideas are the latter two. Stuart Kauffman, Robert Logan, and four other authors write in their manuscript from May 2006 "Propagating Organization: An Enquiry" that information is the constraint (known as downward causation) whose function is to propagate the organisation of a system. Alvaro Moreno and Kepa Ruiz-Mirazo describe "Information as a Decoupling Mechanism in the Origins of Life" (which is the subtitle of their article "The Maintenance and Open-ended Growth of Complexity in Nature", in: Capra, F., Juarrero, A., Sotolongo, P., van Uden, J. (eds.), Reframing Complexity, ISCE Publishing, Mansfield 2007).