

Information Ecology

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Extended Abstract

The purpose of the paper is trying to make a strong appeal to information researchers for taking serious concern with the issue of scientific methodology employed in the discipline so far. Whether it is appropriate? Or it is needed for changing?

Why Is Methodology Concerned?

The first issue for any fundamental scientific study would be to make check on whether the scientific view and the associated methodology employed being proper or not. This is because of the following facts. (1) Scientific view is the general understanding on the discipline over which the study is carried on. (2) Methodology is the general guideline, which is derived from the scientific view, giving to the study on the discipline. The appropriateness of scientific view and methodology gives good guarantee of effectiveness to the specific research.

The study of information discipline is really a fundamental one in contemporary time. Therefore, it is necessary to check whether the scientific view and the methodology employed being proper or not. Only both the scientific view and the methodology employed for information study are well appropriate, could the specific study of information discipline be guaranteed effective and promising. Otherwise, the study may have risks involved in one way, or others.

Considering the fact that the methodology is derived from, and is the representative of, the scientific view, the methodology can well be regarded as the embodiment of the scientific views. For saving the time, we will discuss only the issue of methodology below without mentioning the scientific view at the same time.

Reductionism? Or Ecology?

As is well known that the methodology of reductionism featured with “divide and conquer” has been proved the most successful one in matter science study in modern

times and thus has become the dominating methodology in modern time.

Because of its domination, the methodology of reductionism has also been widely and thoroughly applied to the study of information discipline. This leads the information discipline being gradually divided into a great number of mutually isolated pieces. As results, there have been number of different understandings over the fundamental concept of information and many different, and also inharmonious, theories existed in literature, losing its generality. This is the situation that information study has been facing for quite long time.

Whether or not the methodology of reductionism should be employed for information discipline? There have been different opinions among scholars worldwide. Through the investigation and analysis of the macroscopic history of science development, we may be able to draw some conclusion by ourselves.

(1) Determinism and Reductionism: The Classical View

During the period of the Newtonian time, all things in physical world had been considered as passive and deterministic that were determined by the physical laws (see Laplace Demon for the typical example). At the same time, physical thing was considered as the one that can eventually be reduced to atoms. Thus, the methodology of reductionism featured with “divide and conquer” was absolutely valid.

(2) Natural Selection and Reductionism: The Modern View

During the period of Darwinian time, living things in natural world had also been regarded as passive and were determined by the law of natural selection. In the mean time, all living beings were also considered as the one that can be reduced to neurons (see, Francis Crick, *The Astonishing Hypothesis, The Scientific Search for the Soul*, Charles Scribner’s Sons, New York, 1994). With such a kind of point of view, the methodology of reductionism seems also valid.

(3) Autonomic and Ecology: The Contemporary View

There have been innumerable information existed in reality. However, from the point of view of scientific research, the only information of meaningful is the one closely related to living beings through the subject-object interaction, as is seen in Fig.1.

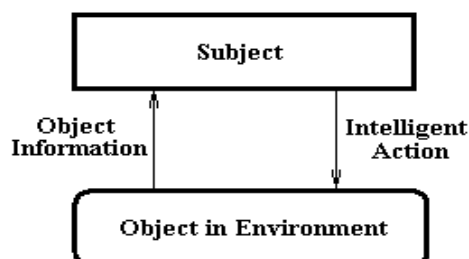


Fig.1 Information involved in Subject-Object Interaction

As is seen from Fig.1, the object information presented by object in environment is exerted on the subject and then the subject will create an intelligent action reacting on the object, completing a basic cycle of subject-object interaction. The action should be intelligent so that the subject could live a good, or even better, life. Within the framework of subject-object interaction, the process from the object information to the intelligent action does form an ecological chain.

So, the information process (from object information to intelligent action) is no longer regarded as the passive one but rather is realized as an autonomic one. The autonomic information process would be externally determined by the law of natural selection on one hand and should also be internally determined by its autonomous factors – the inherent goal for better living – on the other hand. Between the external and internal deterministic factors, the latter plays the leading role. For realizing the better life, each of the information process should make itself optimization via evolution on one hand and handle the interrelationships with all neighbors on the other hand. This is just the concept of “ecology”. In the meantime, the information process related to the living beings via subject-object interaction cannot be reduced to each of the individual information. In other words, in information discipline, the proper methodology should not be the reductionism but the ecology.

The Concept of Information Ecology

According to the analyses of the history of science development in (3), each of the information process should first make itself being optimization via evolution. This process could be clearly explained by using the model shown in Fig.2, which is the expanded version of Fig.1

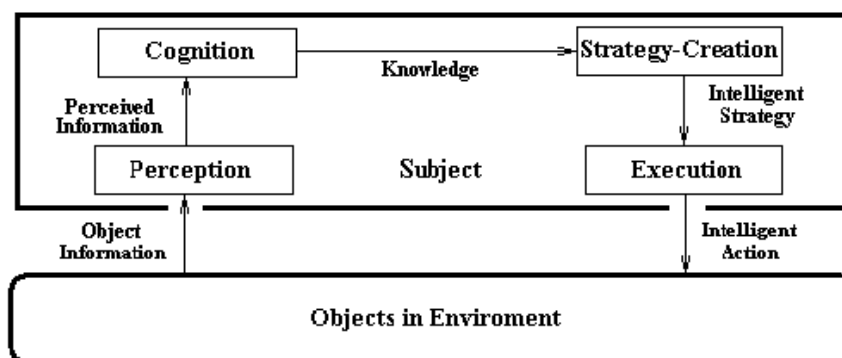


Fig.2 Model of Information Ecology

As can be seen from Fig.2, the lower part of the model represents the objects in environment while the upper part stands for the subject. The subject-object interaction is carried on via object information generation and intelligent action creation.

By information ecology we refer to the following points. (1) From the viewpoint of

subject-object interaction, information alone is not a complete information process. (2) Any completed information process should consist of not only information but also its products, knowledge (the higher product) and intelligence (the highest product). (3) Such information process is also named an information system. (4) Different areas have different information systems. (5) All the information systems together with their environment constitute the information ecosystem. (6) Information ecology as a methodology is to emphasize the study of the interrelations among all information systems and their environment.

Progresses Achieved by the employment of Information Ecology

Under the guidance of the new methodology, the methodology of information ecology, a number of good results have been achieved:

(1) The Definitions of Information

Various information definitions could be unified.

(2) The Model of Ecological Information Processes

The model of ecological information processes has been established.

(3) The Links within Ecological Information Processes

The ecological information processes have been harmoniously linked together via information conversions.

(4) The Principles of Ecological Information Processes

The harmonious links include the object information is converted to the perceived information via perception, the perceived information is converted to knowledge via induction operation, the knowledge is converted to intelligent strategy via deduction operation, and the intelligent strategy is converted to intelligent action via execution, all can specifically be seen from Fig.2.

(5) The Law Governing The Information Discipline

A fundamental law that governs the entire information discipline, namely the law of information conversion and intelligence creation, has been discovered, which is as essential as the law of energy conversion and energy conservation.

Key words: Methodology, Mechanical Reductionism, Information Ecology,
Law of Information Conversion and Intelligence Creation