

# *Informational Thinking and Systems Thinking: A Comparison*

**Wu Kun and Joseph E. Brenner**  
(Presented in Moscow by Professor Wu Kun)

## **1. Introduction**

At the 4th International Conference on the Foundations of Information Science in Beijing, August, 2010, I presented, for the first time in English, the results of thirty years of research on the theory and philosophy of information. My theory (The Basic Theory of the Philosophy of Information; BTPI) focuses on the ontological properties of information, and their importance for a proper understanding of the function of information in society. I would first of all like to thank Professor Konstantin Kolin for reprinting some of this work in the Journal of his Institute.

I also would like to thank Professor Kolin, also on behalf of Dr. Joseph Brenner, for this opportunity to present the results of some of our joint work on information that emerged after the Beijing Conference. Dr. Brenner and I discovered that his recent extension of logic to real processes (Logic in Reality; LIR), including information, supports and is supported by my approach to the philosophy and natural logic of information, to both of which the same normative principles apply. My philosophy and metaphilosophy of information position information as a critical component of all disciplines, beyond the scientific content specific to them. It describes an attitude or stance, which we have termed the Informational Stance, which requires attention to the informational aspects of complex processes as a methodological necessity, an attitude that I call Informational Thinking.

The meta-philosophical view of the central role of information in the reform and naturalization of philosophy itself is supported by the recent work of Deacon and others on the dynamics of informational processes. Dr. Brenner has discussed this elsewhere as a further contribution to the understanding of what information *is*. The focus of this paper is on the foundational *role* for information in science and philosophy.

Dr. Brenner and I thus offer this paper as an example of an application of our Philosophy of Information, namely, to the understanding of the concept of Informational Thinking in comparison with the more familiar one of Systems Thinking, based on systems theory.

## **2. Basic Theory of the Philosophy of Information**

My Basic Theory involves

- a new segmentation of the existential field
- a classification and structure of information based on that segmentation
- the essence of information described as levels and grades

### **2.1 The Existential Field**

In my concept of the existential field, information has an indirect existence that is both objective and subjective.

- Subjective indirect existence is derived from subjective unreality that is part of subjective existence (human individuality).
- Objective indirect existence derives from objective unreality that is nevertheless part of objective existence.

### 3. The Classification and Structure of Information

In my classification,

- In-itself information is objective indirect existence not mediated by any subject
- For-itself information is subjective indirect existence *via* processing by the “informational subject”
- Regenerated information is the consequence of creative informational activities operating on for-itself information by the informational subject
- Social information is dependent information constituted by the triple of in-itself, for-itself and regenerated information

### 4. Preferred View = The Informational Field

- Information is the energetic pattern of evolution of real processes, energy expressing itself in reality with its dynamics and its logic.
- In the informational field concept, energy is fundamental. Entities are seen in partial independence from the background, but not separate from that background.
- The field is multidimensional, including all the various functions, roles, structures and relationships involved in the production, transmission and reception of information. From the standpoint of LIR, all of these entities/ structures, are causally effective processes.

### 5. Problems with Existing Theories of Information

- There are two kinds of problems, physical and metaphysical: key dualities, in particular that of subject and object, have been defined solely by mutual exclusion and absolute opposition, without connection, transition and inversion between them.
- Attempts are made to define information in terms of static differentially measured bits and then derive real interactive processes from them.

### 6. From Phenomenology and Epistemology to Ontology

- My BTPI is not phenomenology. BTPI is an informational ontology: humans have access to “things-in-themselves”: the natural noumenon's own movement explains the world
- There is a fundamental shift of philosophy: “the revolutionary significance and value of information has gone beyond all previous theories of traditional philosophy”.
- Understanding knowledge/knowledge propagation requires a new epistemology, and Information provides it.
- Informational activities have their origin not in the pure “life world” of an idealized subject, but in the objective world of their own interactive existence and evolution.

### 7. Systems Theory

- The history of Systems Theory is well known. It goes from General Systems Theory to Dynamic Systems Theory (DST) to the Evolution of Cybernetics and the Autopoïesis of Varela and includes the concept of dissipative structures, self-organizing systems, non-linear dynamics, chaos theory, *etc.*
- It attempts to break the bonds of a classical logic of identity but is an inadequate philosophic foundation to the diversity of living systems.

### 8. Systems Science

- Systems science is a new discipline that combines theoretical, practical and methodological approaches relative to research topics too complex to be accessed in a reductionist fashion
- It addresses problems of 1) boundaries, relations, structure and laws or emergent properties characterizing systems and 2) modes of observation, representation and model building or simulation

## 9. Complexity Science

- Complex systems are defined as constructed by a large number of simple, mutually interacting parts, capable of exchanging stimuli with their environment and of adapting their internal structure as a consequence of such interaction.
- The non-linear interactions involved can give rise to coherent, emergent complex behavior with a rich structure.
- Key concepts in complexity science are:
  - the coexistence of diversity and stability
  - the dynamics of self-organized criticality

## 10. Systems Thinking

- The systems view reinforces a constructivist orientation to knowledge as a dialectical, pluralistic and participatory process that emphasizes the importance of mutual understanding, meaning and values.
- The primary challenge for systems thinkers in the 21st Century is integrate the insights emerging out of systems thinking over the past fifty or sixty years.”
- We propose that it is Informational Thinking that suggests new ways of accomplishing this integration

## 11. On Metaphilosophy

I now discuss my general basic theory of the philosophy of information as a metaphilosophy. At this level, there is a lot of work we should do to define the philosophical essence of information, the philosophical shape and form of information; the nature of the different levels of information; a philosophical measure of information; the relationship between information and various prior definitions of its scope; information ontology, information epistemology, information methodology; the evolution of the informational world; information in material and social evolution; informational sociology and psychology; informational esthetics: an informational theory of value ; .....and there are large number of branch issues in each of these fields.

## 12. Informational Thinking

Turning now to Informational Thinking (IT), all cognitive issues informational values, valence and social evolution, have implied the use of *IT* for their analysis.

- *IT* requires the abandonment of thinking in traditional, absolute material terms while retaining its commonsense foundations.
- *IT* is a methodological concept that, *via* the definitions of carriers and codes of information, enables *inferences* to be made about the historical and potential or probable future states of an information system.

- *IT* dialectically unifies energy factors and informational factors, determinism and indeterminism, internal and external feedback processes, independence (autonomy) and interdependence. LIR provides the additional *logical* basis for the dialectic interpretation of this unified approach.
- *IT* is the Metaphilosophy of Information in other terms.

### 13. The Comparison of Informational and Systems Thinking

I now make the comparison of Informational and Systems Thinking:

- Ontology: *ST* is basically descriptive, a way of looking at the properties of things in an integrated fashion. *IT* is basically constructive, establishing new divisions of the extant domain
- Epistemology: *ST* provides a methodology for grasping cognitive activities. *IT* embodies mechanisms for complex innovative thought.
- Theory of Evolution: *ST* makes useful contributions to biological evolution and in fact the evolution of the material world in general in terms of levels. *IT* provides broader, principled basis for the dual evolution of matter-energy and information.
- Space-time: *ST* uses essentially standard Einstein notions of background space-time. *IT* establishes a new internally unified view of space-time as the transformation and condensation of information in interaction
- Value: *ST* has no internally defined conception of value (no “best” system). *IT* is a natural duality theory of the value of information and matter
- Social Development Theory: *ST* captures much of the complex structure of society. *IT* has an interpretive function that integrates informational developments with the essence of human society and its evolution as informational activities
- Economic Development Theory: *ST* can describe informational activities as economic facts. *IT* can relate all aspects of information production and productivity to an underlying process of creating an informational world.

Systems Thinking (*ST*) is thus a valid way of focusing on and solving problems related to defined complex cognitive entities at biological, cognitive and social levels of reality. Informational Thinking is a global system of understanding the world in informational terms

### 14. Conclusion. The Informational Stance (IS)

I conclude by discussing the Informational Stance (*IS*). It is the philosophical position most appropriate for, and not separated nor isolated from, the emerging science and philosophy of information itself. *IS* requires attention to the informational aspects of complex processes as a methodological necessity. I and LIR support a metaphysical picture of the world to discipline scientific methodology, and consequently science and education policy.

*IS* means acceptance of non-separability of metaphysics, epistemology, value theory and social issues in an interactive process, a moral and political *engagement*. There is no absolute separation between the Informational Stance, Informational Thinking, and the Philosophy of Information and the ethical dimension.