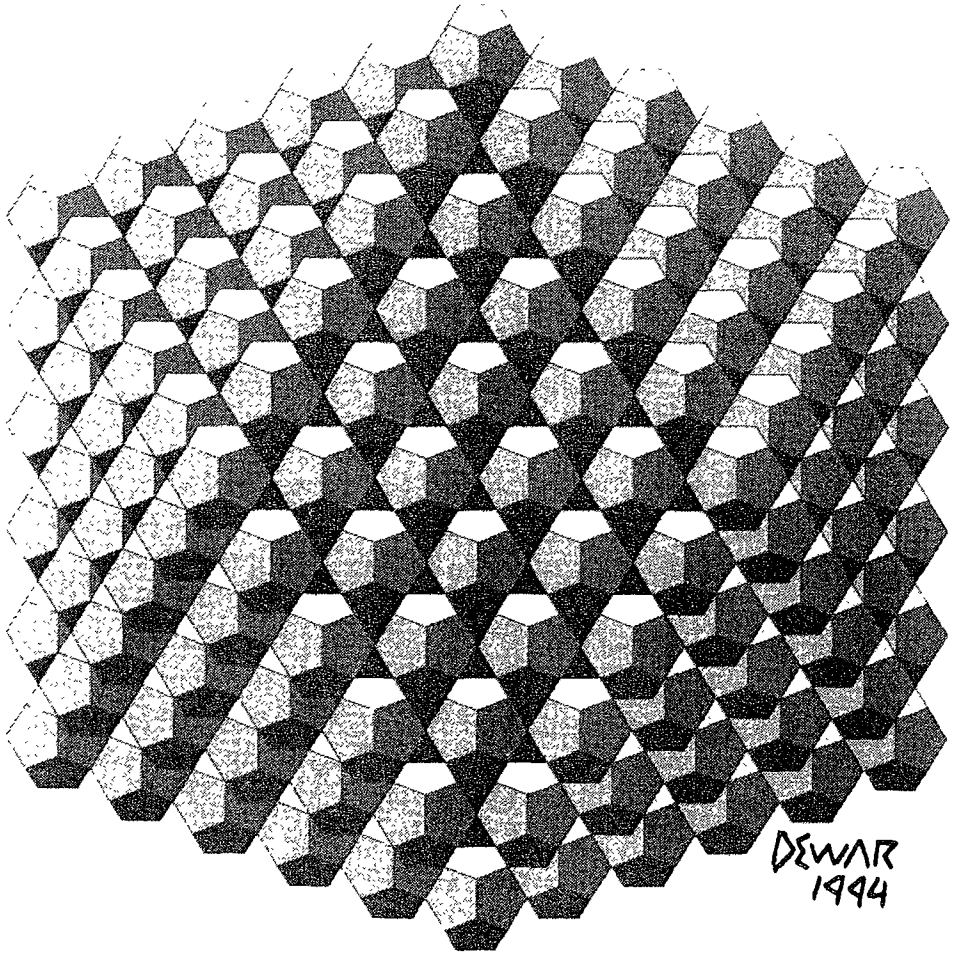
Symmetry: Culture and Science

Symmetry:
Natural and Artificial, 2

The Quarterly of the
International Society for the
Interdisciplinary Study of Symmetry
(ISIS-Symmetry)

Editors:
György Darvas and Dénes Nagy

Volume 6, Number 2, 1995



Third Interdisciplinary Symmetry Congress and Exhibition
Washington, D.C., U.S.A. August 14 - 20, 1995

SYMMETRY AS AN EMERGENT PROPERTY OF INFORMATION

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Temporality of information is either diachronic or synchronic. Shannon's information theory refers exclusively to synchronic information in the sense that the source matrix of messages or information is given as a temporally invariant entity. No historicity is taken into account within the framework of synchronic information, in which events as basic ingredients for counting the information quantitatively are synchronic, that is to say, they are concerned with those events existing in a limited time period and ignoring historical antecedents. Synchronic events preserve a certain symmetry property among themselves just for the sake of being synchronic.

In contrast, diachronic information is the one met in a historical context relating to phenomena as they occur or change over a period of time. We shall in the present article refer exclusively to diachronic information when information is mentioned in view of the fact that synchronic information can be an abstract form of the former at the hypothetical limit of being able to ignore the historicity of events.

Information concerned with evolutionary processes at large is only that which produces information after Carl Friedrich von Weizsaker (Die Einheit der Natur, p. 351). What is focused upon is the significance of a process having the capacity of transforming the possible into the actual while prohibiting us from employing any of static categories. This view radically differs from

the one available to mechanics, in the latter of which any dynamic process is a form of symmetry-preservation to be deciphered in terms of the definite transition of static states in the globally synchronized manner. Information admits in itself that what might be implies more than what is does, in which the future is in the possibilities in the present. A key to information is events being local both in space and in time. It is measurement or detection proceeding internally purely on material grounds (Matsuno, 1989). Historicity of events prohibits any of material participants from claiming the global perspective of the whole system in an atemporal manner.

Once it is duly admitted that any detection can be communicated at a finite velocity internally, every material participant, whether it may be a molecule or a human being, can be only in one place at a time and not everywhere at once. The internalist perspective grounded upon the impossibility in attaining simultaneous communication over the whole contemporaneous participants urges us to recognize that there inevitably arise internal conflicts among the participants in the manner of detecting others. How to detect others depends upon which path the communication would take and the detections of the same local object through different paths would give different results depending upon the times required for the communication. This kind of conflicts is inevitable to whatever detection proceeding internally. Nevertheless, these internal conflicts have not been passed onto the causal past because what has been accomplished remains consistent in itself and unchangeable by definition, otherwise the notion of the definite causal past would lose its observational underpinning. Internal conflicts among the preceding contemporaneous participants are constantly passed onto the subsequent contemporaries as leaving behind the definite causal past.

Information in the eyes of the participants is no more than a dynamic attribute of internal measurement or detection proceeding internally as constantly passing internal conflicts over to the subsequent contemporaries

on and on. If one looks at the causal past, there can be compilation of choices and selections made in the past. In contrast, the contemporaneous participants in the process are necessarily and constantly incomplete in generating internal conflicts. As a matter of fact, it is internal conflicts which is responsible for generating information.

Information of material origin is certainly a descriptive object, and any description of a dynamic object requires two different attributes. One dynamic attribute is the dynamic identification or detection proceeding internally, and the other is the dynamic realization of their movement in time.

One of the established characteristics of any physical realization is the observation of the empirical principle of the conservation of energy. It is measurement internal to interacting molecules that detects and realizes the conservation of energy, since the global characteristic is not something to be imposed externally but the one to be constructed internally. Internal construction of the conservation of energy on the global scale is actualized through asynchronous updating locally, instead of the global synchronization, because of the absence of any material means for the synchronous updating on the global scale. The empirical certitude of the conservation of energy is only within the global characteristic of the finished detection and realization through local processes, that is to say, the conservation of energy emerges through asynchronous local processes of internal measurement. The inevitable posterior reference to the global conservation of energy lets internal measurement be semantic in relating itself to the much wider context within which it is embedded.

Semantic nature of internal measurement is most visible in fulfilling the conservation of energy in the posterior record. Fulfilling the conservation internally comes to imply that each agent of internal measurement acts toward the outside from its inside for the sake of the conservation. Internal measurement is thus the agency having the capacity of either wanting energy

from its inside or being exploited energetically by others from the outside having the similar capacity of wanting. Physical implementation of the semantic nature of internal measurement is thus visualized in the material embodiment of the agent of wanting or yawning energy, or simply in the form of energy consumer. Information generation due to internal measurement renders energy consumers of material origin to inevitably come into being.

Cohesive interaction due to energy consumption is specific to internal measurement, but its consequence can be described in terms of a pair of mechanistic terms, that is, a flux and its conjugate generalized force. The present mechanistic description, though of externally imposed character, does not assume that the underlying dynamics would also be mechanistic. To the contrary, the mechanistic and external description is an artifact derived from the consequence of internal measurement. At best, mechanics on the global scale is viewed as a posterior phenomenon emerging from the more fundamental local dynamics of internal measurement.

Information as the basic attribute of local dynamics of internal measurement can relate itself to the form of global dynamics such as mechanics as an emergent phenomenon. Mechanics preserving a symmetry property within itself is simply an emergent property of information. However, information is more than what it generates afterward. Information is also the ceaseless local generator of what looks like an emergent phenomenon on the global scale. The present perspective of information letting global dynamics be an emergent property of local dynamics can become feasible only when external description of internal measurement is duly attended.

References

Matsuno, K., 1989. Protobiology: Physical Basis of Biology. CRC Press, FL.