SELF-ORGANIZATION AND EMERGENCE ARE SOME IRRELEVANT CONCEPTS WITHOUT THEIR ASSOCIATION WITH THE CONCEPTS OF HETERO-ORGANIZATION AND IMMERSION

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ABSTRACT

There are many reasons for questioning the relevance of the concepts of self-organization (SO) and emergence. By studying three types of SO, respectively related to ontogeny, phylogeny and formalized models, we show that we always have to suppose an associated hetero-organization and preconceived immergence, unconsciously present in the authors mind. In order to understand how these unusual couples are working, they must be considered as 'agonistic antagonist' couples. Hetero-organization and immergence put constraints on the system so that SO and emergence will produce new patterns and forms, depending on these constraints. Besides, such couples (SO and hetero-organization, emergence and immergence) seem to belong to a series of couples of the same type, allowing us to define a kind of 'model of life'.

The concept of self-organization has been presented as the main concept defining systemics, and second order cybernetics. This concept has been accepted also in general Biological Theory (BT) where authors endowed the key to many phenomena until then poorly understood.

Nevertheless, we question the validity of this concept, or more precisely point out that the concept contains 'non explicit' elements which were neglected. We propose a frame in which this concept - and the associated concept of emergence - remains available, but can no longer claim to give an account for the features they are said to explain by themselves alone.

1. THEORY OF TYPES AND THEOREM OF GÖDEL

The self-organization (SO) concept could partially have originated in the Theory of Types (TT) by Russell, at least there is in this theory the notion of 'level' - a notion that the concept in question makes a wide use.

TT may be considered as an attempt to resolve paradoxes that the set theory gave rise to. Let us recall that the password for the mathematical 'planning' at this time was proposed by Hilbert: to include all the types of mathematical correct reasoning in a formal system where one could demonstrate that they were sheltered from every contradiction. Russell believed he could avoid paradoxes - of which the example proposed by himself about the
set of the sets which did not belong to themselves - by 'stratifying' the logical levels in order that a higher level could not be under the influence of the inferior level. So, to give another example, the Epimenide paradox, the level of the enunciator, Epimenide the Cretan, was separated from the level of the statement: 'All the Cretans are lying', in order that interactions between the statement and the enunciator be suppressed. Of course, self-reference was forbidden in TT - a fact which could disturb a second order cybernetician.

In the case of the concept of SO, we find again, so to speak, the hierarchy of the levels, although some differences could be noted. Translations through the levels is upward in SO (ascending hierarchy), it was rather downward in TT (descending hierarchy), but both lines of reasoning worry about a kind of 'impermeability' or partitioning between the levels: the higher level has always 'something more', whose mechanism of appearance - we will see later - does not really receive a valuable explanation from theorists of SO. Passing towards a higher level, in the case of SO, would be performed by means of a process called 'emergence'.

So a logical problem in TT turned into an organic or genetic problem in SO. Nevertheless, the difficulties elicited by this approach did not give rise sufficiently to careful remarks, more especially as the concept of SO has been accepted with a kind of enthusiasm which damped more or less critical examinations. Of course to some people, challenging the notions of SO and emergence levels seems to be a retrograde position which would impede new advances (new emergences!) of our cognitive faculties.

Now, Gödel discoveries seem to go in the same sense as TT, and to justify indirectly the perspective of SO. The first theorem of Gödel, that of the incompleteness for every formal system, is based on the fact that one may find a true statement which cannot be proved (neither demonstrated nor refuted). And if this statement was introduced as an axiom of a more potent formal system, it seemed that a cure could be found against such an unbearable situation, except that one finds for this new formal system a new 'statement of Gödel', and so on, with, each time, the occurrence of the so-called 'gödelization' of the formal system.

Here are a series of events which seem to refer to the idea of multiple levels in SO. Nevertheless, such 'stacking' of more and more potent formal systems, did not prevent Gödel to respectfully criticize TT. Firstly, because he did not consider self-reference as offending the reason (Gödel, 1944) (without self-reference, Gödel's theorem would not have been asserted). On the other hand, what mainly interested Gödel in TT, was the repetition, at every level of this theory, of an identical phenomenon: That is to say, the mechanism of interface between two adjacent levels, therefore an invariant. In the same manner, the 'gödelization' also constitutes a kind of invariant which allows us to escape the inconceivable and staggering continuity due to the infinite sequence of superimposed formal systems. As an example in the present modelling, let us mention the ecological hierarchical models of Auger (1989), which attach a increasing importance to dialectics between a group of variables - whatever be the level - and the variable representative of this group. Finally, Gödel considered TT as 'a stepping-stone' towards a more satisfactory theory.