From Biosemiotics to Semiotics

Gathering in Biosemiotics 2 - Tartu, Estonia June 2002 -

Christophe Menant

Abstract:

Biosemiotics and Semiotics have similarities and differences. Both deal with signal and meaning. One difference is that Biosemiotics covers a domain (life) that is less complex that the one addressed by Semiotics (human). We believe that this difference can be used to have Biosemiotics bringing added value to Semiotics. This belief is based on the fact that a theory of meaning is easier to build up for living elements than for humans, and that the results obtained for life can make available some tools for a higher level of complexity.
Semiotic has been encountering some difficulties to deliver a scientific theory of meaning that can be efficient at the level of human mind. The obstacles come from our ignorance on the nature of human. As it is true that we do not understand the nature of human mind on a scientific basis.
On the other hand, the nature and properties of life are better understood. And we can propose a modelization for a generation of meaningful information in the field of elementary life. Once such a modelization is established, it is possible to look at extending it to the domain of human life.

Such an approach on a theory of meaning (begininig in Biosemiotics and aiming at Semiotics), is what we present in this paper. Taking an elementary living element as reference, we introduce the bases of a systemic theory of meaning. Using a simple living system submitted to a constraint, we define a meaningful information, a meaning generator system and some elements related to meaningful information transmission. We then try to identify the hypothesis that need to be taken into account so the results obtained for living elements can be extended to human.

Keywords:

biosemiotics, semiotics, information, meaning, generation, constraint, efficiency

Content:

I) Semiotics and Biosemiotics. Information and Meaning

Semiotics and Biosemiotics entertain multiple and complex relations. Several definitions are available for these two words (1) (2), but there is a characteristic we would like to underline. It is about the domains covered. Semiotics address information and meaning for human. Biosemiotics address information and meaning for non human living elements.

In terms of evolution, the Biosemiotics domain appeared on earth billions of years before the Semiotics domain. On an evolutionary stand point, Semiotics is rooted in Biosemiotics. So Semiotics can be looked at as a branch of Biosemiotics, as human is a branch of animal life. And this parallel is interesting because of the difficulties encountered in the understanding of the nature of human. Indeed, the nature of human is today out of reach of scientific knowledge. Despite the efforts of philosophy, psychology, anthropology and neurosciences, the nature of human mind is currently unknown. (The "Hard Problem").

On the contrary, the nature of life is rather well understood on a scientific basis. And, as Semiotics is a result of Biosemiotics evolution, we want to believe that modelizing some functions in the field of Biosemiotics will provide models that could find interesting application in the field of Semiotics. In other words, evolution from Biosemiotics to Semiotics can be an interesting window on the transition from animal to man.

Biosemiotics and Semiotics cover many parameters. And we need to make a choice in order to work on a practical example. The concept of meaning is a good choice, as it is of some interest for both fields (3).

We are going to build up a modelization of meaningful information generation for Biosemiotics. More precisely, we will analyze meaningful information generation for simple living elements in order to make available a model that could shed some light on the understanding of meaningful information generation for human (Semiotics).

II) A Theory of Meaning for Biosemiotics

Looking for a simple living element that is well known, we can choose the paramecium.

Many behaviors of paramecia have been studied, and some can be looked as displaying the existence of meaningful information generation.
Take for instance a paramecium living in water, and assume that the water becomes acid in the vicinity of the little animal. The paramecium will rapidly move away towards a less acid area. It seems quite obvious that the presence of acid has participated to the build up of some meaningful information in the paramecium. Meaningful information sounding like: "the environment is becoming incompatible with survival". And the paramecium to react correspondingly by moving away from the acid location.

Basically, three elements have participated to the creation of this meaningful information within the paramecium:

- The constraint of staying alive.
- The acid water becoming close.
- The incompatibility between the satisfaction of the constraint and the acid water

This example of a paramecium building up "meaning" from the presence of acid water can be represented as a system (Fig 1), the meaningful information being the connection existing between the constraint of the system (to stay alive) and the received information (acid in water).

The meaningful information (acid non compatible with staying alive) will be used by the system to participate to the determination of an action aimed at the satisfaction of the constraints (move away from acid area).

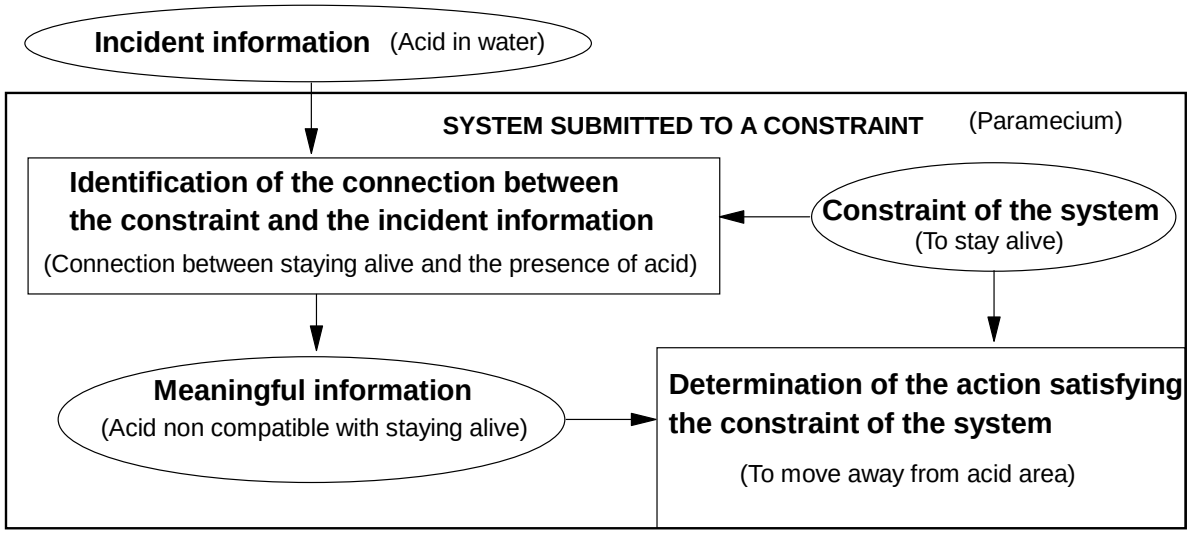

Fig 1 CREATION OF A MEANINGFUL INFORMATION

Such a modelizion brings up the definition on a meaningful information, with corresponding properties:

"A meaning is a meaningful information that is created by a system submitted to a constraint when it receives an external information that has a connection with the constraint. The meaning is formed of the connection existing between the incident information and the constraint of the system.
The function of the meaningful information is to participate to the determination of an action that will be implemented in order to satisfy the constraint of the system".

(Properties of a meaningful information are detailed at I.1 in (4)).

III) Towards a Theory of Meaning for Semiotics

The generation of a meaning in a simple living element as introduced here above can be generalized into a Meaning Generator System (MGS) built up with the following elements:
- A system submitted to a constraint and able to receive an incident information.
- An information incident on the system.
- An information processing element, internal to the system and capable of identifying a connection between the received information and the constraint.

An MGS is represented in Fig 2 where a system submitted to a constraint S generates a meaningful (S) information that will be used to satisfy the constraint of the system.

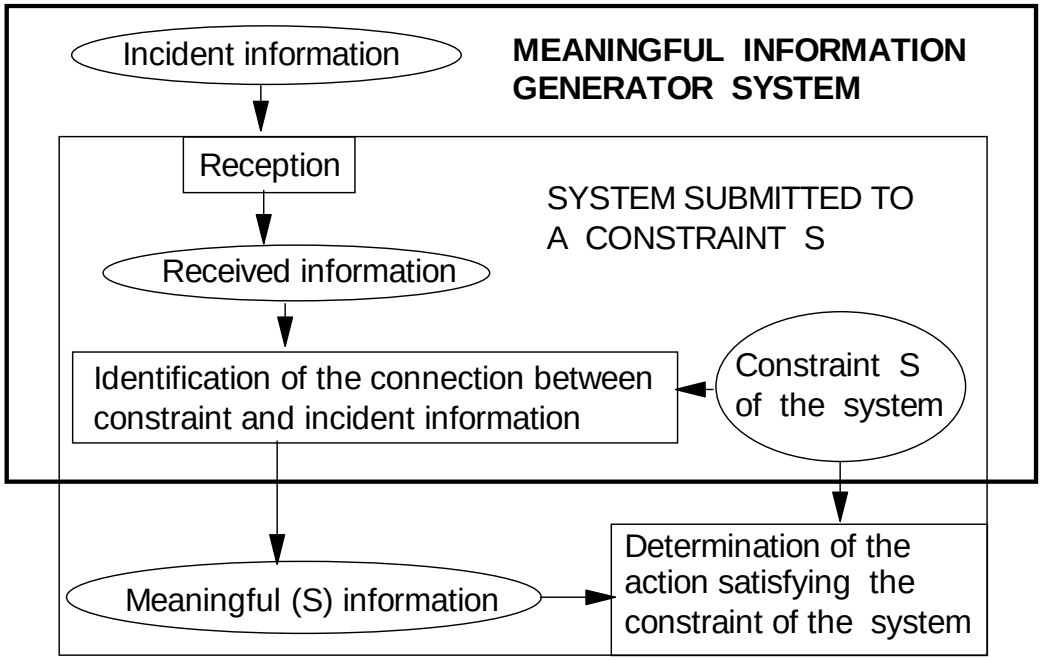

Fig 2 MEANINGFUL INFORMATION GENERATOR SYSTEM

It is to be noted that the meaningful (S) information created by a system S can exist for some usage internal to S, but can also be transmitted for usage by other systems.

Let's assume that the system (S) generates and sends out a meaningful (S) information, and that this information is received by another system (S') submitted to the constraint (S'). What will be the effect of the meaningful (S) information in he system (S')?
In order to address this question, we need to define the "domain of efficiency (S) of a meaning" as being the domain where the meaningful (S) information is capable to participate to the determination of an action aimed at satisfying the constraint S.
We state that the meaningful (S) information is efficient (S) in the domain of efficiency (S).
These elements bring us to define and analyse different cases where an information can be meaningful (S) and efficient (S) or not, depending upon the location of the signal carrying the information vs the constraints S.
(These cases are analysed at I.3 in (4)).

Meaningful information processing in a living element (Biosemiotics) has allowed us to build an MGS. Next step is to see how this MGS can be used to shed some light in meaningful information processing in human (Semiotics).
This subject being currently under analysis. We will only present here some first directions of investigation.

First, our hypothesis that the MGS is a general system and that the proposed modelization can remain valid for complex systems, assuming we locate the complexity within the elements that constitute the system, and assuming that several systems can work together (we keep in mind that this hypothesis has to be validated).

Then, regarding the case of human, we consider that at least two interacting MGSs have to be taken into account.
- The MGS applied to the living aspect of human where the constraints will be the ones existing for all living elements (vital constraints: survival and reproduction).
- The MGS applied to the psychic aspect of human where the constraints are the ones made available by psychology and psychoanalytic theory (combine pleasure and reality, valorization of the ego, combine impulses of life and death, limitation of anxiety...).
Much work is to be done in this last field, looking at the new constraint as they could have appeared during evolution from animal to human.

Even if the understanding of these new constraints deserves significant effort, it is possible to propose today a simplified draft of MGS for human (taking into account the two intricated MGSs with the set of corresponding constraints). Fig 3 illustrates this very preliminary version.

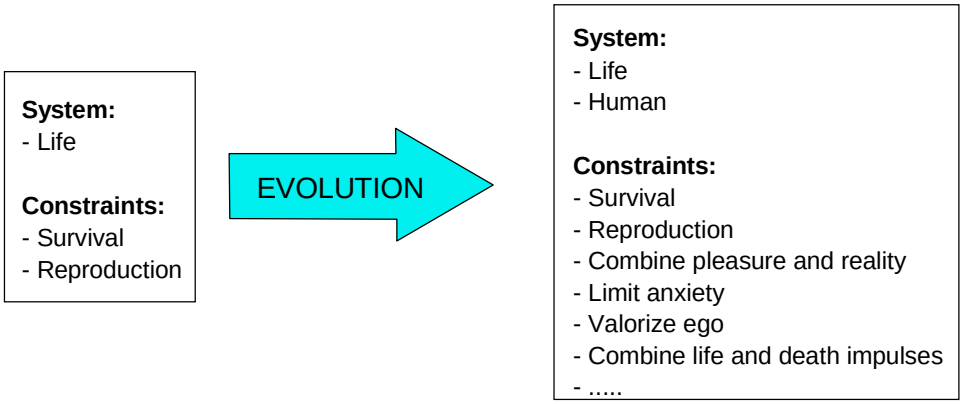

Fig. 3 Evolution of Meaning Generation Systems

IV) Conclusion

We have tried in this short paper to show how a modelization in the field of Biosemiotics could provide a tool having possible usage for studies in Semiotics.

With an example of meaningful information generation in a simple living element, we have built up a model of a Meaning Generator System (MGS) that can find some application in the field of meaningful information generation in human. Work is still to be done in this last area, but the proposed MGS is an example of Biosemiotics added value to Semiotics.

V) References

(1) A. Sharov: What is BIOSEMIOTICS ? http://www.zbi.ee/~uexkull/biosem.htm

(2) http://www.indiana.edu/~educp550/define.html

(3) Claus Emmeche: The chicken and the Orphean egg: On the function of meaning and the meaning of function.
http://www.nbi.dk/~emmeche/cePubl/2002a.OrpheanEgg.htm

(4) C. Menant: http://crmenant.free.fr/uk/