

Ecological Semiotics: A Set of Problems and Some Biosemiotic Traditions

Elina Vladimirova
Department of Zoology
Samara State University
Academika Pavlova St.
Samara, Russia 443011
elvlad@newmail.ru

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The biological stability of natural groups (populations) of mammals under natural conditions is maintained by behavioral mechanisms based on the information-communicative interactions of individuals. Small predator mammals leading a lonely life, such as the red fox (*Vulpes vulpes*), and the marten family representatives – pine marten (*Martes martes*), ermine or short-tailed weasel (*Mustela erminea*) and least weasel (*Mustela nivalis*), rarely initiate direct contact with each other; they exchange their sign information via the environment. The present paper is based on the empirical material collected during many years of observations under natural conditions (Mozgovoy and Rozenberg, 1992). Species studied include *Vulpes vulpes*, *Martes martes*, *Mustela erminea* and *Mustela nivalis* living near the city of Samara and near the southern part of the Urals. Some material on the environmental information exchange of animal populations of these species and co-adaptive complexes have been accumulated in the course of ecological research conducted by Zoology Department of Samara State University. We applied the conceptual themes developed in biosemiotics to process this empirical material to create a taxonomy (Mozgovoy and Rozenberg, 1992; Mozgovoy, Rozenberg and Vladimirova, 1998; Vladimirova, 2001).

Why does an ecologist take biosemiotic advice? First, to become aware of the methodological preconditions of theory-making in ecological sociobiology. “A constant investigation dealing with interdiscipline spheres inevitably provokes the researcher to return to the structure of notions used, and to think over the essence of methods,” writes Frumkina, a famous Russian linguist (Frumkina 1995:81). Second, modern semiotic theories make it possible to develop and organize new knowledge about animal information-

communicative activity with the help of the completed notational system. Our practice has proved that the semiotic approach to ecological objects makes it possible to consider the specific character of information-communicative processes in ecosystems as well as their role in maintaining intermediate properties of over-organism life-form organization. Biosemiotic theories seem suitable for ecosystem functional descriptions, explanation, and – what is even more important – their forecast or predictive capacities. Furthermore, these eco-semiotic axioms are not given *a priori*, but are defined by the ways and means of analyzing the empirical material, and this material is itself organized within modern ecological theories.

The exact problems of language model-making of an object of investigation in a number of cases contradict the scientific traditions which always deal with some correlation of innovative and generally used codes as well as with the sphere of their application. In every epoch discourse is known to have some traditional “regulating codes”, and these codes should be adhered to if people want to express themselves clearly (Foucault 1994:33). Otherwise, as Sebeok (2001:68) wrote, “untutored readers may flounder for

It is necessary to point out that in modern zoosemiotics, sign information activity of a sender has been studied much more thoroughly than that of the recipient. In our opinion, we shall be able to cope with ecological problems better if we overcome this stereotype. An innovative approach is to be dealt with separately. Thus, Rudnev, a cultural-studies scientist, characterizing Wierzbicka’s “universal semantic primes” investigation as “a pragmatically-oriented theory which has greatly changed our notion of meaning”, marks “unusual” Wierzbicka’s texts (Rudnev 1999:263). We became interested in Wierzbicka’s approach because her semiotic position is sign information recipient-oriented rather than sender-oriented. Such a perspective seems more up-to-date, especially in ecological semiotics.

The biosemiotic subject matter is a sign set of natural origin. In the spring of 2001 in Copenhagen a Scientific Congress took place, where a number of currently relevant problems were discussed. In the integration of both semiotics and biology we can see at least three main directions. The first of them is engaged in a biological paradigm formation, which may be characterized as: a) nature investigation “through the prism” of semiotic context; b) raising some theoretical biological problems and resolving them by means of semiotics instrument apparatus; c) life processes, adaptation and evolution progress interpretation in the terms of “meaning”, “sign”, “aim”, “value”, “information”, and “coding”;

d) perception of semiosis as a process inherent to living beings; e) reflection dealing with new biological opportunities resulting from application of semiotic metaphors. The second biosemiotic direction is devoted to the genetic code semiotic status investigation. The biological information encoding and decoding processes on the biochemical, biophysical, molecular-genetic and cell levels are explained in the semiotic context or through notions that are currently widely used both in semiotics and in the natural sciences. According to Sebeok's point of view, this subdivision may be named "endosemiotics" (1976:149-188). The third direction deals with some experimental and explanatory model construction in ethology, animal communication theory and ecology in the field of semiotic notions. In Sebeok's classification, this branch may be named "exosemiotics" (1976:156).

It is too early to speak of biosemiotics as a "normal science" as Kuhn use the term (Kuhn 1975), since metascientific discussions still prevail over the methodological problems of the object of investigation, construction and experimental organization in this admittedly natural science. The term polysemy, unfortunately, often remains the main discussion subject of biosemiotics scientists, for example, one can recollect the discussion of such pivotal terms as "Umwelt" and its correct rendering into English, as described by Sebeok (2001:75).

Besides, biosemiotics, being a new discipline, has already acquired a vague tradition that may be rooted in the famous discussion between Roman Jakobson, an outstanding linguist, and Francois Jacob, the Nobel laureate (1965) geneticist (Jakobson 1996:199-222; Jacob 1977). According to the tradition "a genetic code / other biosemiotic codes" opposition proves to be marked and non-equalized: a kind of structural isomorphism between genetic code and some simplified linguistic codes is taken as the basis to build other biosemiotic concepts.

The idea of Sebeok is the following: endosemiotic codes should be transferred into exosemiotic ones (2001:62). This problem can only be solved in the future. Nevertheless, in the real ethological, ecological and sociobiological researches "the black box of animal communication can be opened on the "exit" level, without turning to specific codes of instinctive, i.e., the given animal species behavioral responses and the genetic code as a whole. On the molecular-genetic level we deal with nucleotide sequences that encode the synthesis of this or that ferment. On the ethological level there is a "genetically programmed" perception of both the environment and the behavior as a whole characteristic of the particular animal species. In other words, the problem of "possible simple conformity of a genome characteristic of the given animal species and species limited behavior

form,” was not raised in real ethological investigations, but we mean this conformity in our experiments, and “species behavior stereotype” is applied in the course of theoretical modeling.

Semiotic terms in their common meaning and application do not guarantee any mutual understanding by scientists. The situation created in biosemiotics enables us to follow the merits and drawbacks of conventional-traditional and innovative uses of the semiotic terms. The process of text comprehension is known to include a simultaneous specification of both the message context and the information coding rules. New contexts formulate the new aims of biosemiotic investigations. Obviously, we should not demand any unification of the terms that we use to discuss, firstly, the genetic code semiotic status; secondly, sign processes modeling in living organisms and their environmental interrelations; in the long run, an explanatory principle claiming to be a new theoretical biology paradigm is being created.

We believe that an attempt to elicit some “objective” sense of semiotic notions, e.g. “sign” definition, shows only the incomprehension of scientific terms functions and indicates that some researchers dogmatically follow the traditions of a scientific school which tries to find out the “semiotics limit” (Nikitin 1997:3-14). In addition, we believe that a language existing according to “symbolic conversion laws” (Todorov 1999:283) does not reflect the world in a language “mirror” with any degree of objective correctness, but it correlates with a referent, sends away to it (him/her), defines it (him/her), points it out (him/her), hints at referent by “its own trope and paraphrase language means” (Sorokin 1988:A-2). You should look for a referent structure indication in the sign motivation directly connected with the implementation of some particular function in creating a scientific scheme.

Nowadays biosemiotic terminology regulation is going on in two directions. First, the scientists elicit and discuss more general animal properties opposite to traits of non-living natural objects, and taking these descriptions into consideration they, step by step, create a non-conflicting conceptual system. This approach implies that animal sign systems and human natural languages are interrelated. Secondly, the scientific objectivity of the application principle of semiotic notions traditional for the given school is being supported. When such a job is carried out as if out of some necessity to defend “the only correct solution” of a problem, it’s clear that we are dealing with some ideological aims, but not with cognitive ones. We suppose that various factors and approaches, and an integration based on the same scientific idea should be welcome, e.g. in the papers raising some epis-

temological problems. Nevertheless, in Russian history we may find many examples of a “fight” of a concept and its corresponding notion system for domination in science. This strife impedes the progress of biology and language study. The mythical Marr’s “New Japhetic Linguistics” and the anti-scientific Lysenko’s “Agricultural Practice” might serve as a sufficient example of such phenomena.

We were witnesses to heated discussions concerning a certain scientific school's adherence in the late 1960s while terminological polysemy prevailed in Russian semiotics. In this situation a more productive research treatment of semiotics stated that it, “doesn’t demand throwing away the definitions and notions that fail to correspond to an author’s postulates,” and his advice I to “patiently to observe the concepts existing in reality various, sometimes contradictory definitions and notions; to systemize them, and if it is possible, to show the system of the initial notions (postulates) underlying them” (Stepanov 1967:73). The recommendations are applicable to the modern biosemiotic situation. Words have the common property of changing their meaning with use, and the semiotic terms are no exception.

In our opinion, any attempt to create a common set of biosemiotic terms adequate for the description of sign phenomena in all of biological science, from molecular biology to biogeocenology, is fraught with a certain danger: too global a statement inevitably leads us to some general conclusions which won’t be informative enough to solve specific problems.

Discussions pointing out the necessity of some methodological reflections over biosemiotic notions correspond, we think, to the status of biosemiotics as a highly creative science. The traditional context of scientific methodology as well as the established common use of language elements, operate as a stable scientific schemetic frame, and will conflict with new theoretical models. This inevitably causes discord. The problem can be solved if we explain aims, tasks, and application limits of the concepts used in a definite scientific approach.

One of the main modern semiotic problems, we believe, is the genetic code transformation problem. The transformation is directed to semiotic codes of a higher degree of freedom and takes into account the life experiences of an individual. A high degree of semiotic freedom means that the ways of information encoding imply a reactive surplus that depends on the context and the connotation reference to the meanings that accompany the main one.

The way of behaviour stereotypical for a certain animal species differs from the learned way of behaviour gained through the life experience of an individual. A behavioural response to the instinctive releasers' action (Lorenz 1978, 1984; Tinbergen 1974) and "bee language" (Frisch 1966) are registered officially as an information system in which decoding processes are not being corrected by any creature's sign connotations.

We shall enumerate semiotic traits of innate behavior borrowing their characteristics from "Similar and Different" written by Vincent Descombes, a modern French philosopher and science methodology specialist (Descombes 2000:90-93), who writes that, a) "a code precedes a report"; b) "a code denotes the situations where it may be used"; c) "a code is independent from a message"; d) "a code is independent from the transmission party"; e) "a report can't bear anything unforeseen". The demands enumerated above, in Descombes's opinion, may be put as claims by "the communication engineers" to sign systems, practically oriented to transmitting such a report, the sense of which has been set beforehand, and therefore "has already been accumulated in the language" (Descombes, 2000:93).

Passing to studying the acquired in ontogenesis, learned, but not inherited animal behavior forms we should take into account the following things. We differentiate the concept of "information" from "semiotic information". While considering a language as a code system, as Frumkina says, we may get "a withdrawal from the meaning to information, from the very signifying process examination to an information treatment process" (1995:103). Frumkina thinks that "information processing doesn't get anything new but those things we had at the entrance, the things set by the exit operation rules" (ibid:103). Besides "new units", "the sense of which would be interpreted", are not created (ibid:103).

The other approach, by means of which we may solve a number of animal ecology problems, allows the use of the concept of a "report" without code limits for the transmitting party. Eco, an Italian scholar of semiotics, supports the idea; he differentiates the concept of "information transmission" from "sign report transmission" "because a sign report possesses connotation properties emerging when the recipient addresses his/her life experience, while "any kind" of information may be received by a non-living mechanism tuned (adjusted) in a proper way. If "the report itself has no indication of what kind of code was used by the report sender," the report meaning may be understood by means of "the report inner context" or "the general communicative situation" (Eco 1998: 48, 70-73).

Mammals that live alone and inhabit the wild often communicate by means of reports without any address “recorded” in the environment objects and events. The report is transformed into a successively read text in the process of the recipient animal’s movements in the environment. Sign information, in the perception process, is actualized by the recipient in the form of a chain of motion elements. The report may be polysemic in the limits determined by actual motivation and the recipient animal species affiliation.

Inborn behavior mechanisms and specific experience acquired in ontogenesis ensure some animal motion response to the environment signals perception. These experience boundaries are determined genetically, yet they vary widely. It is at the expense of the “learned” behavior component that one mammal individual’s subjective world differs substantially from that of the other individual. Behavioral polymorphism of the individuals, comprising mammal populations, ensures more stable ecosystems in the long run (Mozgovoy 1976; Panov 1983).

The semiotic systems dealing with the information recipient’s priority, are more suitable for the investigations of mammals’ communicative processes in the wild, since communication value is measured by the receiving party. Mammals’ signal field ecological theory, the elaboration of which was started by a Moscow zoologist Naumov in 1977 and was developed in Mozgovoy’s and Rozenberg’s research (Mozgovoy and Rozenberg, 1992), that assumes the possibility of building a semiotic system, oriented to the sign information recipient.

Can we speak of Ecological Semiotics and Biosemiotics as two separate disciplines? Perhaps we should restrict ourselves to the expression “semiotic metaphor” in ecology and biology? We shall leave the question unanswered. If we draw a line between the subject matter of linguistics and that of ecology, following the tradition established in Russian science, the problem raised in the present paper may be formulated as “What is the role of semiotic metaphor in ecological concepts describing information-communication processes in mammals populations?” If we believe that natural language and other human sign systems are related to mammals sign systems, then the given paper topic is zoosemiotic modeling of mammals interpopulation communications.

Despite a widely spread belief that there is no room for the metaphor in the science apparatus or its application is limited and deals only with the scientist’s terminology reflection, there is another point of view which seems to be more convincing. Descombes, a French philosopher, writes: “Every time when a speaker faces something unknown he fails to find the right words, since there are no reports in the code that correspond to that

unfamiliar situation, and he is not able to complete it. If “what to say” means to express something worth saying, who will agree to be satisfied with the code version and denote his/her observations and wishes using a report the code already has to transmit it? The speaker then decides to render a different message which differs from that suggested by the convention, he/she is made to produce other ideas or to use the words denoting other notions different from those which exist in the language treasury” (Descombes 2000:94-95). The metaphoric character of the scientific terminology in this “new word meaning appearing under the shelter of exchanging one sign field for another one” is not only a term but an essential condition for describing the unknown (ibid: 95). This aspect has received attention in biosemiotic literature. The most complete coverage of this problem is found in “*From Language to Nature – The Semiotic Metaphor in Biology*” (Emmerche and Hoffmeyer, 1991). We may consider the biological signal field notions to be such metaphors.

The terminological polysemy problem we observe now in biosemiotics is transformed, we may say, into the definition problem of the basic postulates set regarded as key notions in biological and semiotic scientific models.

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