

# ARE ECOLOGICAL CODES ARCHETYPAL STRUCTURES?

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Developing an ecological perspective is both a big challenge and a necessity for biosemiotics. Without an ecological account, biosemiotics as a paradigm would remain incomplete, but the semiotic approach could in turn also offer a fresh perspective for understanding ecological processes in natural sciences. In 1981 Bernard C. Patten and Eugene P. Odum described an informational layer in an ecosystem of local regulatory capacity, without which the ecosystem would fall into a mass of chaotic processes. In 2007 Søren Nors Nielsen proposed that this sphere of semiotic functions in ecosystem could be called semiotype, referring to the parallel with genotype, phenotype and envirottype. Kalevi Kull has in his several writings (Kull 1998, 2008, 2010) expressed the view that ecosystem is semiotic by its nature, or that semiotic processes have much to do with the integrity of ecosystems.

However, semiotic processes taking place on the level of ecosystem are not sufficiently understood in biosemiotics today. Jesper Hoffmeyer (2008: 189) proposes the concept of *semethic interactions* to denote the habitual relations based on semiotic processes that take place between different species. Kalevi Kull further suggests four concepts relevant for developing semiotic ecology: *consortium*, *umwelt*, *biophony* and *ecological code* (Kull 2010). In the present paper I examine the last concept by asking what the properties of ecological codes could be and how they function. Kull

gives an initial direction by stating (with reference to Alexander P. Levich) that: “ecological code [...] can be defined as the sets of (sign) relations (regular irreducible correspondences) characteristic to an entire ecosystem, including the interspecific relations in particular” (Kull 2010: 354). It is, however, not entirely clear, what the relationship between “the sets of (sign) relations” and local semiotic processes is, or to put it in other words, how exactly semiosis and communication can take part in large-scale ecosystem regulation. My initial suggestion is that the properties and functioning of codes on the ecosystem level are rather different from the ways how codes regulate human communication or any other intraspecific communication.

### **Problem of coded communication**

Codes and coding are a much discussed topic in biosemiotics (e.g. Barbieri 2008). This tendency can be seen as a residue of linguistic heritage in biosemiotics (Maran 2010; Cobley forthcoming). The understanding of the concept of code has been derived from the studies of human communication, specifically, of a special type of human communication – linguistic and technically mediated communication, which is thus an idealization even in the context of human species.

In animal communication and especially in interspecific relations, codes cannot act in a way similar to human linguistic codes. This is so first because of the lack of lexical syntax in animal sign systems, which bars the use of code and coding in the specific sense of combining elements of sign systems to produce new meanings. According to another possible meaning, a code is a system of correspondences between messages and their significance or behavioural outcomes. But here emerges a problem: messages in animal communication are not as systemic as in human language. For instance, in birds it is not one and the same code that operates in phatic calls of migrating flocks and in courtship songs as these

utterances cannot be used in the same spatio-temporal context.<sup>1</sup> Basically, if there is no choice between alternatives for the animal, then there is nothing to code.

Especially problematic are instances of interspecific communication, such as warning coloration, mimicry, communication in symbioses, etc. A prerequisite for the concept of code appears to be that it is shared by the participants of communication. In interspecific communication this requirement is generally not met. For instance, in the warning coloration of the ladybird *Coccinella* sp. there is no shared code between the insect and the insectivorous bird as the ladybird does not have perceptual access to the link between its red-and-black warning pattern and unpalatability. Therefore, when using the concept of code with regard to interspecific communication that is based on ecological relations, certain concessions need to be made about its meaning. It is plausible to assume that codes on the ecological level are not strict regulations, but rather ambiguous and fuzzy linkages based on analogies and correspondences.

An example of such interspecific bond, taken from my own research, would be eye-marks on moth wings, an image that binds together a number of moth species, owls and insectivorous birds. The relation is, however, not specific because of the variability of the image of the eye and the diversity of species involved – being thus legitimately called *abstract mimicry* (Pasteur 1982: 192–193; Maran 2011: 252). What is often astonishing in such phenomena is the correspondence between the physical forms in different animals, their sensory capacities and behavioural expressions – which resembles Uexküll's (1982: 41–44, 65) amazement over the correspondences of a spider web and a fly or that of an eye and the sun.

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<sup>1</sup> Mammalian social communication would be an example of a relatively more unified communication system.

## Properties of the ecological code

In the following, three basic properties of the ecological code are proposed:

1. Ecological codes are distributed and open. Ecological codes involve different species, for some of them involvement being obligatory and for some occasional. The involved species have different perceptual organs, umwelten and relation to the environment. Therefore, *no single individual or species has full perception of an ecological code*. Instead, an ecological code forms as the sum of memories and experiences of corresponding perceptions. Every single species and organism involved in an ecological code has a partial variation of the convention. Having once emerged, an ecological code is open to new species becoming involved.
2. An ecological code is built upon and incorporates the consistencies, constraints and habits existing in a particular ecological community. An ecological code rests on indexical relations as it is in these that representamen – object relationships surpass and remain independent of any specific interpreter. An ecological code also uses habitual semiosis, behaviour and action of animals.<sup>2</sup> *With regard to living agents and environment, ecological codes are communal and disperse*. Cognitive capacities of organisms (i.e. semiotic thresholds) act as passages to an ecological code but do not include or determine the content of the code.<sup>3</sup>
3. An ecological code uses different memory types (following Jablonka, Lamb 2005), that is, *an ecological code has both*

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<sup>2</sup> The first possibility is expressed in John Maynard Smith's concept of *indices* (Maynard Smith, Harper 1995: 306), the second in Hoffmeyer's concept of *semethic interactions* (Hoffmeyer 2008: 189).

<sup>3</sup> This is so because of the third property: ecological codes use different memory types including evolutionary regulations. In some cases semiotic thresholds can also be bypassed or counterfeited. The story of Clever Hans is, among other things, an example of how limited cognitive capacities do not restrict an animal from becoming involved in complex semiotic phenomena.

*cognitive and non-cognitive (or conscious and unconscious) aspects.* A regulation can simultaneously be fixed in different memory types: for instance, it can be fixed partially in physical regularity, partially in genetic memory of a species, and partially in cultural memory of another species. For the regulation to become effective, all these different types need to come into contact.

To sum up the three proposed characteristics, ecological codes do not resemble human linguistic codes or algorithms, but are rather like archetypal imagery<sup>4</sup> or patterns – dispositions in animals to establish certain types of meaning relations in ecological communities and to link sign processes with actions in particular ways.

## **Carl Gustav Jung and biosemiotics**

The reader may have deduced already that the “archetypal structures” in the title of this paper is a reference to the works of Carl Gustav Jung. Indeed, I argue that an approach similar to the one described above with the regard to ecological codes can be found in Jung’s account of archetypes of human psyche. He writes in *The Archetypes and the Collective Unconscious* that “the archetype is essentially an unconscious content that is altered by becoming conscious and by being perceived and it takes its colour from the individual consciousness in which it happens to appear” and that “so far as the collective unconscious contents are concerned we are dealing with archaic or [...] primordial types, that is, with universal images that have existed since the remotest times” (Jung 1981: 4–5). I am aware that referring to Jungian psychology in the context of contemporary biosemiotics is walking on thin ice. But if we replace in the citation given above “collective” with “interspecific” and “individual” with “species-specific”; if we take “unconscious” in Sebeokian sense, that is, as a reference to many nonlinguistic

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<sup>4</sup> I use here the concept of “imagery” to stress the analogical fuzzy nature of ecological codes.

layers in the semiotic self; if we interpret “altering” and “taking color” in Uexküllian way as references to the conditions of the *umwelten* of specific animal species, then the connection between Jung and biosemiotics may just appear to be reasonable.<sup>5</sup>

In the book *Jung and the Post-Jungians* Andrew Samuels presents a list of main features of the archetype theory:

[...] (a) archetypal structures and patterns are the crystallisation of experiences over time, (b) They constellate experiences in accordance with innate schemata and act as an imprimatur of subsequent experience, (c) Images deriving from archetypal structures involve us [animals] in a search for correspondence in the environment. (Samuels 1986: 22)

In my understanding these three properties would suit as well for describing ecological codes. My replacement in square brackets in the quotation points to the essential difference between Jung’s archetypes and ecological codes. Jung’s theory is originally aimed to describe the psychological content of human species, whereas in the study of ecological codes archetypes should be widened to include *umwelten* of other animals as well as interspecific semiotic and ecological relations.

Making a connection between Jungian psychology and biosemiotics may appear more justified, when one considers that there already exists a tradition in theoretical biology that has found inspiration in Jung’s works. Most notably the Swiss zoological philosopher Adolf Portmann refers to Jung, interpreting, for instance, rituals and instinctual life of higher animals as an archetypal imprint (Jacobi 1959: 41). Czech historian of biology and polymath Stanislav Komárek specifies that “the psychological content of animals is composed of archetypes – think only of the [...] Lorenz baby

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<sup>5</sup> By including Jungian archetypes in the treatment of ecological codes I do not propose any larger synthesis between biosemiotics and psychoanalysis. Apparently, there are also unsurpassable differences between those domains, for instance the concept of “collective unconscious” being relatively problematic.

schema or animals' innate images of predators" (Komárek 2007: 22). Even the concept of *seme*, proposed by Karel Kleisner and Anton Markoš (2005) to decipher a certain type of mimicry in which the characteristic signs of a charismatic species (for instance, ants) are imitated by several symbionts, can be interpreted as a special kind of archetype. Kleisner and Markoš write: "*Seme* should be understood as a sign originally developed by one species or group of organisms and consequently extended to the other often unrelated groups that were able to receive (or imitate) and built it up on their bodies or environment" (Kleisner, Markoš 2005: 218). In *seme* it is predominantly one species that defines images or signs that are later used in interspecific communication. But there are many other examples, in which the origin and placement of a sign complex is not so clear, and which can be considered to be real archetypes floating in the intermediate semiotic space between participating species.

### **Archetype of fear – an example**

Most likely, one of the strongest archetypes in interspecific communication is related to fear. After all, all animals in ecological networks are in danger of getting consumed by some other animals, and therefore anticipating and perceiving signs of potential predators are vitally important. Signs of fear cannot be rigidly defined (except in close coevolutionary relations) as there exist various possibly dangerous species, communication contexts are always different and therefore also signs of fear remain ambiguous. We can distinguish general characteristics of the fear archetype, such as unfamiliarity, unexpectedness and a sudden change or movement; and specific characteristics that are preferably used in certain relations and animal groups. Specific characteristics can include: the image of eyes, fangs and other means of attack, large body size, low and loud sounds, and fast-moving shadows.

For many ground-living mammals, for instance, an essential part of the fear archetype is a “shadow from above”<sup>6</sup>. This sign relation can also be put to practical use, as I have found out thanks to the wisdom shared by an old friend and nature observer. To avoid confrontation with an angry dog or another mammal of a similar size, waving a jacket or some other garment above one’s head is an effective strategy. Seeing a fast-moving shadow above, an animal develops an irresistible urge to hide, since a fast-moving shadow is a sign standing for an aerial predator in the animal’s *umwelt*.

Signs and properties that accompany the archetype of fear are employed by nature in phenomena known as deimatic displays: for instance, colourful spots demonstrated during escape behaviour in stick insects and praying mantises (Edmunds 1976). The human version of how the archetype of fear is represented can be seen in a gamut of signs that are used in literature, art and movies to depict monstrous creatures. Scales, mandibles, slimy skin and other properties of reptilian or insectan origin are not meant to trick our cultural knowledge but refer back to much more ancient and general conventions.

In conclusion I turn back to the question posed in the title: are ecological codes archetypal structures? I have treated the topic in a somewhat speculative and playful manner, but the possibility seems worth at least considering. Analogy-based imagery is structurally simpler and thus its existence in ecosystemic relations is more probable when compared to the type of codes derived from strictly regulated intra-specific communication. We can also recall here the claim of Gregory Bateson (1969: 21–30): the closest resemblance to animal communication in humans can be found in dreams.<sup>7</sup>

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<sup>6</sup> But see also Jakob von Uexküll’s example of the “shadow from above” in the sea urchin’s *umwelt* (1992: 345–346).

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