

SYMMETRY AND SEMIOSIS

(An Introduction)

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The founder of geochemistry and biochemistry, Vladimir Vernadski, has written the following lines about the interest the sciences have demonstrated in symmetry:

"The principle of symmetry has penetrated and will continue to penetrate many more realms in the 20th century. From the realm of matter it has entered that of energy; from crystallography and the physics of the solid state it has moved over to chemistry and the treatments of molecular processes and nuclear physics. No doubt we shall find manifestations of the principle of symmetry even at the deeper level of the relations surrounding us – at the level of electrons, and the realm of quanta will be subordinated to it. This principle will incontestably and diversely encompass the phenomena of life and cosmic universe." (Vernadski 1975: 23.) Vernadski was right. His universalism (including his ideas about symmetry) was far-sighted and pioneering with respect to methods.

The aim of this presentation is to point out symmetrical processes in sign creation (semiosis), which Vernadski left aside when focusing on natural sciences. This aspect should add a new dimension to the semantic analysis of verbal discourse and culture.

The range of forms of *s y m m e t r y* and their manifestations is surprisingly wide. The most elementary understanding of symmetry can be found in the empirical truth that symmetrical things, images and phenomena are mutually invariant, i.e. they are similar with respect to certain relations and/or characteristics. Restrictions based on congruence (correspondence in size and shape) could be added to invariance. The sequence of invariant and congruent images on some straight or curved line creates *t r a n s l a t i v e s y m m e t r y* (an ornament); the positioning of images that correspond to the same criteria on a cir-

cle yields in radial symmetry. Naturally, the same stands for the translation of the spatial equivalents of plane images.

But some symmetrical phenomena cannot be subordinated to the restrictions based on congruence. When looking into a mirror, nobody questions the symmetry between him and his image. Yet there is no congruence here: if we fit the mirror image to the original image, it does not correspond with it – the right side has changed into the left side and vice versa. Such a type of symmetry is called *enantiomorphic* or *mirror symmetry*. Mirror is not the only means of achieving mirror symmetry. For instance, a butterfly's wings are enantiomorphic, too. Vernadski has emphasised that there exists a deep dissimilarity between the frozen symmetry of crystalline polyhedrons of inanimate nature and the complex (largely unexplained so far) dynamic symmetry of living organisms, one manifestation of which is just the phenomenon of *left* and *right*, meaning the very persistent dominance of enantiomorphic symmetry in the organic environment (Vernadski 1975: 56, 57).

Whereas the reflection of a human face can never be congruent with its original, Winfred Nöth points out that enantiomorphic congruent symmetry can still exist. For instance, the right and left sides of capital letters 'A' and 'O' are – naturally, in case of some certain fonts – both enantiomorphic and congruent. Such reflective symmetry is called *bilateral symmetry* (Nöth 1994: 48).

Still another type of symmetry – *antisymmetry* – can be found besides translative, radial and mirror symmetry. We should distinguish between the reflective and translative forms of this type (Nöth 1994: 98). Figurally symmetrical things (translation) can have (accentuable) contrasting additional characteristics, such as the case of black and white chessmen. But the phenomenon of the colour of human skin has caused antisymmetrical psychological and social collisions. The contrary scale of values – the contradictory oppositions *yes/no* or *and/or*, which can symbolically be expressed by *plus-minus* valuations – is also of an antisymmetrical nature.

Hermann Weyl has correctly written, "the idea of symmetry can by no means be exhausted with spatial objects." Its "synonym is harmony." Harmony becomes apparent in correlation, congruousness, proportionality, correspondence or accordance and measure. All these words can be brought back to a German word, *Ebenmass*. Weyl conceives this as "what, according to Aristotle's *Nico-*

machean Ethics, a virtuous man has to strive for in his actions, and what is described by Galen in his treatise *De temperamentis* as a state of spirit, which has equally been removed from both extremes" (Weyl 1968: 35, 36).

In the most general sense, symmetry, as explained in commonly used reference works, denotes "the quality of an object formed of elements of some set (e.g. an algebraic equation formed of variables x_1, x_2, \dots, x_n) to transform into itself in case of a number of transformations different from the identity transformations (EE *sub* "symmetry"). Or as defined by M.A. Melvin: symmetry is a quality to remain unchanged in the course of one or several different operations (Melvin 1960: 481). The essence of symmetry is repetition in a very broad sense of the word: physical, including topological (also gravitational) or rhythmical, tonal, mathematical, psychological (e.g. emotional), evaluational, phonological and semantical repetition – a very wide range of repetitive variations.

S e m i o s i s as the capability to create signs and understand them has been interpreted, largely under the influence of Thomas A. Sebeok's works, as a neurobiological capability in biosemiotics. Such a neurobiological capability regulates the sign creation starting from a simple physiological signal up to signs that hide the symbolism under multiple codes. Marcel Danesi and Paul Perron contrast such conception of semiosis to representation. The latter is interpreted as an intentional conventional use of signs by these authors (Danesi, Perron 1999: 68, 69).

Danesi and Perron illustrate the development of semiosis and representation based on Jean Piaget's works on child psychology. During the first months of life, a child gets acquainted with the world without using signs. He touches, smells, chews and licks, listens to, throws and gazes at things. This is the "immediate" perception of the world through the senses. Further on the first elements of semiosis arise in the child's perception of the world. First, he instinctively starts imitating sounds and rhythms, emitted by an object that has come under his attention. Thus, the ability of representation starts revealing itself – at first, naturally, on the grounds of iconic likening. At the same time the child starts to mark a connection with some object in his field of vision, pointing at it with his forefinger, thus expressing indexical semiosis. Verbal creation of signs – both in the iconic and indexical form – is soon added to the physical strategy of reproducing sounds and pointing at things with a finger. But "the instant children start to represent the world with signs, they make a vital psychosocial connection between their sensory states to their conscious thoughts about the world.

To put it figuratively, signs constitute the "representational glue" that interconnects their bodies, their minds, and the world around them in a holistic fashion." (Danesi, Perron 1999: 68.)

We need to note that the important transition in a child's ontogenesis from the development stage preceding signs to that of using signs does not give us grounds to separate the conscious and unconscious semiosis as a whole. Neurobiological capability becomes intertwined with the manifestations of conscious and/or automated and unconscious representation: "...on the conceptual level at least, internal representations constitute a mosaic of innate and learned forms" (Bickerton 1990: 23). And as Derek Bickerton points out, the genetically hereditary forms of semiosis already become apparent at the lower levels of animal kingdom (Bickerton 1990: 75–104). Bickerton's, Konrad Lorenz's (see Lorenz 1966) and others' research is complemented by experimental works concerning the asymmetry of cerebral hemispheres. These works indicate that in semiosis the pronouncedly symmetrised forms are related to the work of the right cerebral hemisphere (Ivanov 1983: 12). Considering the above, semiosis and representation should be treated as a unified phenomenon – the creation of signs. The present state of experimental knowledge does not allow us to draw a clear line between neurological and conscious processes.

We shall now move to the question of whether and how symmetry becomes evident in the process of semiosis.

Semiosis can be defined as "several types of relations between *signans* and *signatum*" (Jakobson 1985: 323). Below, we shall examine only the iconic forms of manifestation of these relations. But besides the iconic relations between *signans* (signifier) and *signatum* (signified), which are of exophoric or referential character, it is possible to describe the relations between *signans* and *signatum* within the discourse. Here lies the possibility for the so-called endophoric iconicity in the form of phrases, repetition of lexemes, anaphors, parallelisms, references within texts, etc.

Charles S. Peirce has defined the iconic relations between *signans* and *signatum* as an elementary coincidence based on some certain characteristics (Jakobson 1985: 322). The repetitiveness of coinciding elements both at exophoric and endophoric levels creates either a symmetrical or an antisymmetrical relation. As much as this relation is marked with signs, at least one of the repetitive elements or their relation is either an immediately or imaginarily sensual phe-

nomenon. This aspect lends semiosis its spatial dimensions. (In a wider context we should indicate that every linguistic utterance can be conceived as a spatial-temporal act (Ivanov 1978: 130), and that man's worldview that is marked with signs "unavoidably has the characteristics of space" (Lotman 1969: 463).) The spatiality of semiosis is structural for at least two important reasons. First, semiosis is an intentional act, which is unavoidably related to the existence of a point of view; the space-designing character of the point of view becomes actual especially in case of communicational (including autocommunicational) semiosis. Second, semiosis has some certain forms, where *signans* and *signatum* or *signans* and *signans* are positioned reflexively (e.g. in a palindrome) and have semantical polarity.

Analysing symmetrical forms of semiosis we should keep apart two levels of analysis, which are, on the one hand, the spatial-symmetrical structure of semiosis and, on the other hand, metalanguage-models, describing these structures.

The iconic relations between the signifier and the signified can be revealed in the suchness of the so-called "genuine icon," where the sign and its object merge into a single identity, creating the so-called 0-symmetry (Nöth 1999: 616). Roman Jakobson pointed out that iconic symmetry can be expressed by "conditional suchness," which characterises the relations between *signans* and *signatum* in music; but, for instance, in abstract art, a partial similarity of a hypoicon to its object exists, where the symmetrical repetitiveness is complemented by asymmetry (Jakobson 1985: 327). Mirror projective relations between *signans* and *signatum* create antithetical iconicity, provoking a topologically and semantically symmetric positioning (Jakobson 1983: 113). ("In reality" the two *signatums* can be totally different from each other.)

Following the symmetrical repetition schemes of semiosis at the level of metalanguage-models, we can state that the forms of symmetry expressing 0-symmetry – "conditional similarity" – and identity (congruence) are characteristic to a mythological worldview (cf. Lotman, Uspenski 1973: 282–293; Lotman, Mints 1981: 35–41). Antithetical symmetry has been dominant in Russian (Lotman, Uspenski 1994) and Soviet Russian culture (Lepik 2000: 727–754). Baroque, symbolist and aestheticised worldviews are based on metaphorical semiosis.

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