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Viter A.V. (Ukraine, Kyiv)

CONCEPT OF THE METALANGUAGE FOR BIOLOGY FROM VIEWPOINT OF NATURALIST: 2. SPECIFIC FEATURES OF SYNTAX AND PUNCTUATION

There exist the diverse concepts of the syntax phenomenon (Сизова, 1966; Палагин и др., 2012; www.merriam-webster.com), however herein we conceive the syntax as the system of ideas about which function of the sign unit of lower level acts in the construction – in the sign unit of higher level. We propose the standard for knowledge presentation – «Metalanguage for Biology» (MB). It differs from the other sign system with the series of syntactic features. The last ones are highlighted below.

The 1st feature presents two possible manners (ways) of the inclusion sign units of the lower level into the structure of the higher level: a) strict hierarchical subordination; b) enclosure (attachment). If the realization of the syntactic unit (SU) of certain higher level is possible only under the presence of the set of all required names of syntactic functions (SFs) of one order lower level, then this is denominated as the strict subordination. In this case any SF belongs only to the certain level of SU. In the case of enclosure certain SU, having the same SF, can cover different levels dependently on the context. Thus, the principle of enclosure quite resembles a biological analogy: the cell can both belong to the level of the part of organism and be the separate organism. Besides the units-components with some functions can participate as the non-obligatory components in the constructions, like the attached files are included into e-mails optionally.

The system of constructions, which are realized in MB, is characterized by the multilevel organization. This is the 2nd feature. The first level is presented by a) body of expression – the consequent (obligatorily); b) conditions of the veracity of expression – the antecedent (optionally); c) rate of confidence and/or probability (optionally). The compilation, made with the consequent, antecedent, and confidence/probability, gives the expression of more complex – the second – level. In turn, the combination of the several expressions of the second level by means of the mathematical or logical relation results in the expressions of the third level of complexity, and so on.

Each of those natural languages, which we know, uses the single type of the formation of clauses. This feature differentiates them from MB. We propose as the 3rd feature for MB to have not one, but two types of the formation of the body of expression: a) declaration of the properties of object; b) declaration of links between objects. Saying in terms of computer data structure, the first one of these declarations consists with the description in the form of two-dimensional tables with the diverse data formats in the different cells. The second declaration rather follows the functions, the production rules, etc. In our elaboration we propose the clear idea of the syntactic structure for the both types of the declaration. The declaration of links enables to formulate not only the body of expression, but also the conditions of its veracity. Although this paper is about the syntactic principles of structures, which are under consideration, (not for their meaningfulness), but we'd like to note: the SF of object can be filled with the one of three sense group, which are a) subjects; b) states; c) processes.

The 4th feature. The expression of the declaration of link strictly hierarchically includes ≥ 2 units with the SF of object and the unit with the SF of dependence. The last can be also denoted as the character of link. There is the peculiarity – dependence, written in the text of program, does not look like the monolithic structure, but rather the skeleton, formed with ≥ 1 operator. This skeleton is meant to be filled with the names of objects. The set of the declaration of links, that put into database, can be visualized by the method of semantic net. In contrast to the numerous conventional information systems, based on the semantic nets or on the frames, MB supports the expression not only binary, but also ≥ 3-nary links. This option rather agrees with the biologists' ideas of the worldbuilding.

Herein we interpret «operator» as the syntactic structure, consisting of ≥ 1 simpler unit with the SF, called «identifier».

MB has got the non-trivial idea of SFs. To cope with the distinguishing of the signs with the different SFs in program text, we think it reasonable to propose the collection of the punctuation procedures for notification: a) every name of object is put in < >; b) every identifier – in | |; c) every attribute of object and attribute of operator – in { }; d) every variable in the role of the SFs, which are the parts of the characteristic of the attribute of object – in [ ]; e) consequent, antecedent, confidence/probability apart – in \ \. The tags #begin# mean opening and the tags #end# – closing of the constructions of the third and higher levels. MB offers one more important procedure: the declaration of any object in general (indefinite) sense can be distinguished from the declaration of the same object in particular (definite) sense. This is close to the idea of the quantifiers $\forall$ and $\exists$ respectively, and is the same with the idea of «a» and «the» (as the articles in English). This is achieved by means of putting sign «_» before the object, which is meant in the definite sense.