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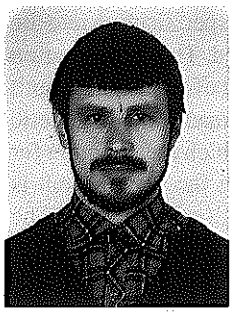
Organization of Substantive Scientific Knowledge



Victor F.Zhuravlev (b.1945) graduated from the Philosophical Faculty of Moscow University. The sphere of his interests includes logics, ontology, gnosiology, dialectics of substantive scientific knowledge.

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Discussion of ontological and logical structures of scientific concepts and descriptions, and of the respective relationships between units of knowledge on such levels as classification and category systems, the system of division of theory, theory, scientificfield, applied, scientific, general scientific and philosophical knowledge and the system of science as a whole.
The author also looks at methodological and methodical use of the concept of substantive scientific knowledge in the practice of standardization of substantive scientific vocabulary for the improvement of the quality of selection of specific substantive units of scientific knowledge in a certain scientific field, their explication and systematization. (Author)

Today, both in the Russian and foreign terminological schools, we see that the development of theory, methodology and methodics of standardization of terminology is aiming to more and more actively using the achievements of contemporary knowledge theory. In this connection the differential approach to knowledge, which exists and develops in two forms, the propositional and the substantive, is, in the author's opinion, very useful. The conception of substantive scientific knowledge, recently suggested by the author, can be viewed as an attempt to substantiate activity, involved with the explication of knowledge about scientific objects, the meaning of scientific terms and proper names, which is realized, for example, in the process of standardization of the latter.

The final objective of scientific cognition is identified with propositional scientific knowledge, i.e. scientific knowledge which has the form of true assertions that make it possible to explain the known manifestations of the studied subjects and foretell their yet unknown manifestations. In the natural language of science, propositional knowledge is expressed by narrative sentences, which can be interpreted as propositional functions proceeding from substantive arguments.

Substantive knowledge of a certain scientific field is presented in the natural language of this field by terms and proper names. This is implicitly prescribed by the system of assertions of the given field. The explication of this knowledge, realized in the course of standardization of substantive lexical expressions, is identified with the formulation of adequate descriptive substantive expressions: concepts and their descriptors. The purpose of these units of substantive knowledge is to single out the objects of scientific fields by their characteristics. The characteristics, the presence of which is asserted in propositional scientific knowledge, serves as the basis for the singling out of the appropriate objects in substantive units of knowledge.

From a functional point of view substantive units of scientific knowledge appear as functions which are inverse to the propositional ones, e.g. as substantive functions from predicative arguments. The correlation of the unit of substantive scientific knowledge, the unit of substantive scientific vocabulary and the singled out object may be represented by the following triangle:

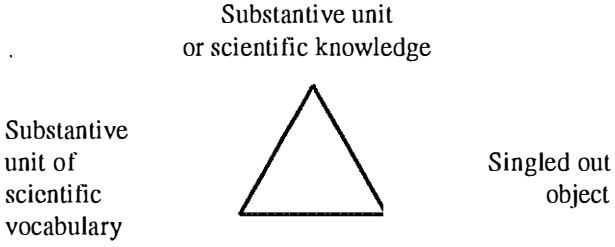

Fig.1

As the singling out of objects may be either identifying or generalizing, the singling out of a certain object with the help of a description, expressed in the natural language of science by a noun, and the singling out of the class of objects through a concept, represented in the natural language of science by a term, are distinguished. In this way we have two triangles:

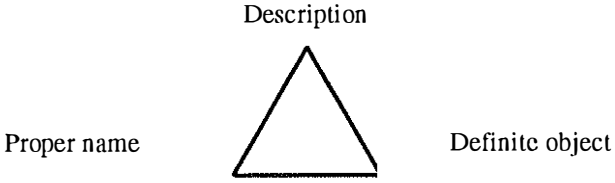

Fig.2

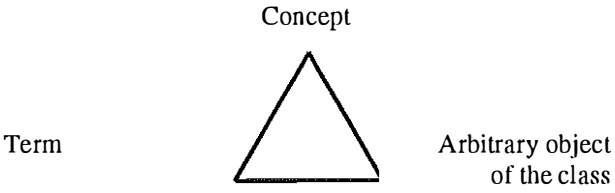

Fig.3

In connection with the functional interpretation of units of substantive scientific knowledge a specification into the concept of their contents is introduced. This specification is to the effect that a part of the content of a substantive unit of scientific knowledge, which is made up of generic characteristics, i.e. characteristics, which are common for all objects of the class out of which the singling out is accomplished, are presented in this unit substantively. The other part of the content of the substantive unit, made up of characteristics of the singled out objects, or their species difference is presented in this unit predicatively.

The interrelations of subtantive units of scientific knowledge, their contents and volumes are expressed in the following triangles:

Fig.4

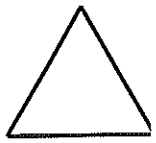

Fig.5

The organization of substantive scientific knowledge is a system of concepts and descriptions, which are connected by their content and by logics. The most important factors in this system are the specific content of scientific concepts and descriptions, and the specific content relations between these substantive units of knowledge. The content aspects of substantive scientific knowledge are stipulated by the laws of scientific fields, which prescribe a certain "picture of the world".

Apart from the specific content aspects, for the formation of substantive scientific knowledge, the ontological and logical aspects are equally important.

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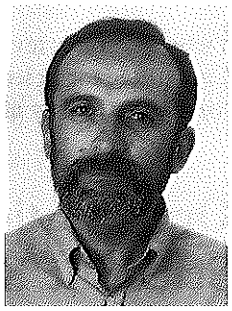

Dr. (Philology) Viktor N.Beloozerov is a senior scientist at VINITI. He specializes in the fields of classification, information retrieval and terminology.

The Linguistic Units Taxonomy as a Data Organization Problem in the Language Mechanism

The systemic approach to language makes it possible to view the problem of taxonomy of linguistic units as an establishing of a true organization of language mechanisms in the cognitive organs of man. Such an approach permits a conscious transition from the linguistic theory to the construction of artificial intelligence.

The hypothesis offered is to the effect that the language mechanisms in their material form realize those linguistic abstractions (lexemes, grammemes, phonemes, etc.), which support the observed language behavior with a minimum expenditure of physiological resources, of which the time spent on the processing of speech signals is the most important one. This approach permits us to design the procedure of search of taxonomy of linguistic units as an algorithmizable procedure of search of the extremum of a certain indicator of efficiency, which depends on the method of identification, classification, systematization and representation (copying) of speech units in the language mechanism. The procedure of search of optimal identification and classification of sounds of speech was realized in a computer experiment, where the researchers succeeded in achieving not only in attaining the final results, which was close to the usually accepted system of phonemes of the Russian language, but to observe some effects, which modelled the well-known regularities of development of children's speech, when the vocabulary of the machine was successively enriched.