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FORMALIZATION OF LANGUAGE AS ENCODING OF IDEAS ABOUT THE WORLD

Nekipelova I.M.

The article is devoted to researching of formalization of language, which is viewed as the main way of natural and artificial encoding by human and society of conceptions and knowledge about the world. Formalization is been due to realization in human's mind such logic operation as synthesis and analysis. Realization of these processes need first of all for expression of human's thoughts within the bounds of subjective (private) language and standardization of objective (general) language. As a result of the realized research the fact that all significant conceptions about the world are fixed for language constant in language system (constants are related by regulated rules of handling) has been revealed. In whole, there are many algorithms, which ensure work of language and lay a main way for deployment of language rules. There are no universal algorithms. Therefore any consistent formalization of theory is in essence incomplete. Although language is not only something that present in language actually, but something that present in language potential. Only material expressed constants and assertions can be formalized.

Keywords: formalization of language; natural formalization; artificial formalization; objective and subjective language; standardization of language.

ФОРМАЛИЗАЦИЯ ЯЗЫКА КАК КОДИРОВАНИЕ ПРЕДСТАВЛЕНИЙ О МИРЕ

Некипелова И.М.

Статья посвящена исследованию процесса формализации языка, который рассматривается как основной способ естественного и искусственного кодирования человеком и обществом представлений и знаний о мире. Формализация обусловлена осуществлением в мышлении человека таких логических операций, как синтез и анализ. Реализация этого процесса необходима прежде всего для выражения мыслей человека в рамках субъективного языка и стандартизации объективного языка. В результате исследования было выявлено, что все значимые представления о мире закрепляются в языковой системе за языковыми константами, между которыми установлены отношения, регулируемые правилами оперирования. В целом, в языке действует большое количество алгоритмов, обеспечивающих работу языка и задающих общее направление развёртывания правил языка, но универсальных алгоритмов нет. Следовательно, любая непротиворечивая формализация теории оказывается принципиально неполной. Несмотря на то, что язык представляет собой не только то, что представлено в нём актуально, но и то, что заложено в нём потенциально, формализованными могут быть только материально выраженные константы и утверждения.

Ключевые слова: формализация языка; естественная формализация; искусственная формализация; объективный и субъективный язык; стандартизация языка.

Language is direct reality of thought.

Karl Marx

Introduction. About continuity of objective reality and thinking had spoken ancient Greek scientist Parmenides. Indeed, a human learns the world, mentally verbalizing it, and produces the result of cognition by speech. However, detecting of the process of cognitive transition from image to word is still a riddle to scientists.

Discussion. The speech producing and perception correspond to processes of coding and decoding of mental messages by language. Language is a system of interrelated materially (in sound or written forms) expressed elements, which people associate with certain mean. As a result, the elements carry a certain meaning. Producing of speech is accompanied with *verbalization*, expression of human's thought by words, i.e. using language units. It is known, that the process is associated with sinistrocerebral activity and clarified by cognitive analytical thinking. Verbalization is opposite to *empathy*. Empathy is emotional and motivational expression something, which meaning a human does not know. High and low degree of verbalization is bound with correlation between displayed and nondisplayed thinking. High degree of verbalization is characterized with external expression of thinking, low degree – with internal expression. So, spoken thought is more understandable to subject of speech than thought, that appeared in his thinking with no verbal expression, except cases, when the subject of speech realizes purposeful internal communication, oriented to himself. Verbalization intensifies self-exploration - psychical human's self-expression by means of speech, increase of content of subjective modality in speech. Empathy is bound with creativity – creation of ideas, which a human seems unable to express for others and understand, designate it for himself. Creativity is bound with activity of right-brain and determined by cognitive nonanalytic thinking. It should be noted, that processes of producing and perception of speech are possible when cerebral hemispheres work simultaneous.

Therefore, the cognitive image precedes the language expression. However this process researching is so complicated that nowadays scientists find difficulty in telling how working human's thinking. Thereby the research of cognitive mechanisms of human's language activity and speech is very urgent.

In whole a human uses language not only in speech, but in thinking, i.e. a human thinks by means of language. It means external and internal verbalization, having to a greater or lesser extent concretization of thoughts expression. In that case verbalization is formalization the world image by means of natural language. *Formalization* (lat. *forma* – form, image) is “reflecting of the results of thinking in exact conceptions and affirmations” [1]. In the process of formalization “studied objects, its characteristics and relations are associated some stable, good observable and identifiable material constructions, which make it possible to reveal and fix important aspects of objects” [1]. So, the world is presented in a language in compliance with native speaker's view. Even so the main categories of the world (significant for a national community) correspond to the main semantic-grammar categories of a national language. The world exists “a priori”: independently from a human and independently from human's knowledge about the world. Every community describes the world as sees it, but does not describe as it really is. People “a posteriori” ascribe to objects of the world characteristics and qualities, which can exist, because the Nature does not submit to logical laws. There are not any other ways for human's idea about the world, because human's thinking is managed by synthesis and analyses algorithms. Edward Sapir affirmed “incommensurability of languages” and it is really true, because every collective national mind produces unique models of the world, fixed it in language.

On the basis of language specificity the results of formalizing can appreciably differ (by the level of adequacy) from reflecting reality.

In whole “formalization specifies the content by means of detection of its form and can be realized with various degree of completeness” [1]. This is associated with

the fact, that individual peculiarities of perception phenomena of the world and urgency of analytical type of thinking are an individual indicator of thinking of each separate person – the subject of speech. That is why one of the same thought can be expressed by means of one language differently by different people.

Earlier we approve dividing of language system to set into subjective languages and objective language. “For more exactly and completely expression of a picture of the world human uses creative abilities and language potential. Exactly forming of individual language furthers self-expression of individual. Thus, we can talk of the subjective picture of the world and about subjective language, in which individual author’s view is realized. Set of subjective language pictures of the world and subjective languages form objective the language picture of the world and objective language, being for the most part national” [2, p. 215]. In whole “the subjective language as the result of cogitative action is subjective reflecting of the material and spiritual world; the objective language is the result of generalization by convention the set of subjective languages” [3, p. 160]. To that end, it is necessary to distinguish between subjective and objective formalization. *The objective formalization* touches upon general processes, acting in the language system and is caused by action of collective thinking. *The subjective formalization* is process and the result of subjective modality, language and speech activity of an individual (native speaker). Undoubtedly, subjective and objective processes are crossed and superimposed, because individual activity and community activity are bound. In the logic, along with scientific, natural formalization is marked out. “Natural formalization is reflection of objects by means of one or another natural language” [6]. In the opinion of scientists as an object of logical formalization can be any ordinary knowledge (semantic content of natural language), including language systems, and the formalization allows to systematize various knowledge about the world by the means of its verbal expression. However language formalization can be realized by natural or artificial ways. The natural formalization expresses language as

self-organizing and self-regulating system. It actualizes potentially probable in language as a result of spontaneous speech and presupposes compliance with language orientation of an individual and his society. Artificial formalization is associated with human's activity. It is directed to language standardization, because society partly organizes language and regulates its functioning and development. Artificial formalization is caused by purposeful orientation by society of an individual by the way of assumption of conventionalized and standardized language decision and knowledge.

Formalization is caused by realization of logical operations in human's thinking and, first of all, operations of synthesis and analyze (synthesis through analyze and inversely), classification and analogy, interpolation and extrapolation. Linguistic competence (acquaintance with language) is based on analytical cognitive activity, so, it is logically, that "expression of thinking in natural language can be the first step of formalization" [1]. It is known, "the simplest type of formalization – direct representation (designating, naming, describing) objects by means of terms" [5]. However, some things in logic, which is presented in the simplest type of formalization, in language are not simple process. Separate words and phrases in natural language execute the representation function. Such type of formalization also is named descriptive formalization, which directed to describing of objects of the system.

Formalization is always presupposes presence of object as system (totality of interrelated elements, functioning as a single unit) or structure (units and bonds, filling the system). Due to represented data the following may be concluded: formalization works on some unity to be applied system view. "Formalizing knowledge must be fixing totality of affirmations". Of course, the conception about the world expressed by language in the language picture of the world is thinkable unity, which has an anthropocentric character.

Developed system (explicitized sufficiently) can be formalized. Every language system consists of explicitized elements, but there is implicitized too. Formalization possibility increases when the system is decidable, i.e. possibility of doing the process of having an answer for question about belonging any elements to the system. In that case the natural language is symbolical system, because it allows giving a meaning some material-expressed shell. That language allows writing in symbolical form any statement. For that process need use symbols (constants). Formalization codes conceptions about the world in the form of language system. All meaningful conceptions about the world are assigned to *language constants* – language units (there are relations between it). In the objective language all of it has been verified and approved by members of collective; in the subjective language they are understandable and habitual to an individual. Language units are language constants, because they cannot be changed spontaneously, as well as collective conceptions about objects of the world cannot be fixed for some of them. Relations between constants are regulated by rules of handling, without any doubt understandable for an individual and conventionalized in society. Using of language units is an axiom (a condition, which does not need of proving) of resume from an axiom (a condition, obtained from a condition, which does not need of proving).

Formalization is realized on the assumptions of:

- 1) formalized language must make it possible to express any thought by means of using rules of handling by language units within the binds of language system, which will be agree with initial in the process of interpretation,
- 2) language constants, which can be worked as axioms (speaker does not think why he associate phonetic sounding with only that meaning, he just only reproduce it), a chains of symbols appear, used according to fixed rules (the chains are apprehended as theorems need in proving and verifying),
- 3) between chains of symbols and true affirmations must be appointed relation, making it possible to fix of formalization.

Formalization is not only producing of language symbolic chains – speech. Also it “detects and reflects logic, which will satisfy statements” [4]. Interpretation rules do not determine all logical relations of statements and language constants. Logical difference in explication of statements makes it possible to create for the same meaning a set of alternative formalizations. So the meaning will change depending on what formalization will be considered adequate. Possible alternatives can be more habitual, preferable, and exact. Discussion about language, i.e. detecting its consistency, fullness, provability presupposes using of metalanguage. All true statements refer to metasytem.

Formalization is realized in a language totality of language constants and statements, creating by means of those constants by existing in language rules of construction of statements. Without any doubt, language is not only an object, realized by system, existing actually, but the object existing potentially. Language facilities are its potential, which can be realized in any period of language development. But all, that are not expressed materially, not presented as constant or statements, not named, are not formalized.

Problem of formalization can be solved if coincides coding and decoding of information, producing and interpretation. Thus, it works not always. In that case we can speak about incompleteness of formalization consistency. Kurt Friedrich Gödel (1931) was the first who say about it. “Some formalized theory G can contain such rich by expressive possibilities language, within the binds of the language can be build statements about formalized the language FG system and, it means, reflecting in FG . There is shorting a language and metalanguage” [4]. We speak about mathematics. Any consistent formalization of theory is in essence incomplete, because any change creates a new class of substantively truly offers. It is found the formula, affirming self unprovability. It does not eliminate total formalization of more narrow areas. Language is such system, which trends to total formalization and at the same time impedes for its expression of reality of the world.

Formalization plays an important role not only in forming, but in elaborating of conceptions too. Without it many language problems cannot be solved and preconceived, until will not be formalized views and discourses. With that question associated the question of existing of algorithmically unsolvable problems. Many numbers of algorithms act in language; they set the direction of development of language rules, but there are not any universal algorithms. As a result of it none language cannot suggest single-valued universal algorithms, which can unify people's thinking and their language activity.

It should be noted, that “adequate formalization of any deeply rich in content theory has unconventional character and ordinary is complicated by various logical mistakes and paradoxes” [6]. If we attentively look at languages, we can see in every language that language constants. Their form and use do not be standard. It is about logical mistakes in language, non-topical traditions, saving unproductive processes and other.

Formalization is associated with some limitations and difficulty. So, in every age unformalized remainder remains, because language is not elementary system with simply logical structure, but complicated system with logical mistakes. Language cannot be formalized totally. Inner source of development consists in dialectical antagonism becoming as a result of discrepancy between aspiration for formalization and its possibility. Formally unprovable and substantially truly statements come into existence, for example metaphors. That discrepancy always goes off and appears again. Thus, formalization of language does not mean of stopping in its development.

Summary. Formalization plays an important role in explication of conceptions about the world. Implicative, but yet have not formalized conceptions are potential of language. All important conceptions about the world are fixed in language system for language constants, relations regulated by rules of handling are established between the conceptions. In whole, there are many algorithms in language ensuring functioning of language and setting the general direction of development of language

rules, but there are not any universal algorithms. Therefore, any consistent formalization of theory provided to be incomplete. It should be noted that none of any formalization cannot exhaust all wealth of natural language, it can only brings closer to scope of language expression in everlasting process of world cognition.

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DATA ABOUT THE AUTHOR

Nekipelova Irina Mikhaylovna, associate professor of philosophy department,
Ph.D. in Philological Science, Associate Professor

M.T. Kalashnikov Izhevsk State Technical University,

7, Studencheskaya street, Izhevsk, Udmurt Republic, 426069, Russia

e-mail: irina.m.nekipelova@mail.ru

ДАнные ОБ АВТОРЕ

Некипелова Ирина Михайловна, доцент кафедры философии, кандидат филологических наук, доцент

Ижевский государственный технический университет им. М.Т. Калашикова

ул. Студенческая, д. 7, г. Ижевск, Удмуртская Республика, 426069, Россия

e-mail: irina.m.nekipelova@mail.ru