The program of advanced empirical research based on formalization of system-object method of knowledge representation

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Abstract. The program of advanced empirical research described in the article reflects relevant linguistic and IT methods for monitoring the language situation in a selected aspect (political, social, lingvocultural), as well as for studying language changes, taking into account the development of the current sociopolitical situation in the world. The presented results, the program of advanced empirical monitoring itself, the principles of organizing the mental structure have a certain theoretical significance, since they can be used in scientific research of this and relevant format, taking into account the adaptation of their principles. The resources obtained in identical studies in diachrony will allow to determine the dynamics of semantic modifications in the future and outline the prospects for scientific forecasting. In the applied aspect, it is possible to introduce the results of research and development into the educational process in the form of an information resource and didactic virtual development, which will contribute to solving the problem of intercultural competence. The base developed in the project aims to provide the most complete and objective data on linguistic changes and indicate unchangeable units in lingvoculture, which will become a verbal monument of the state of the language system for the period under consideration.

1. Introduction
The program of advanced empirical research suggested by the authors of the article is a complex of relevant methodology for conducting language monitoring mainly in the synchronous measurement and fixation of some diachronic language changes, taking into account the development of the current sociopolitical situation in the world. In verbal and documentary embodiment it can be identified with a strategic scientific position including the prognostic aspect of research work (hypothesis and goal-setting), a general scheme of scientific measures to solve the assigned tasks, subordinate to the goal, justification of the relevant methodology and interpretation of the information obtained, establishing a correlation between hypothetical and obtained results, describing research prospects. Thus, the program, in general terms, includes the following components: theoretical interpretation (descriptive, structural, factorial), methodological base and tools, logical structure of research, consistent with the previous stage, and analytical-predictive attitudes.
2. Materials and methods
Due to the multidisciplinary character of the ongoing research the authors stick to linguistic and extralinguistic (computer) methodology. Thus, linguistic and lingvocultural changes can be traced taking due to anthropocentric scientific paradigm, linguistics, psycholinguistics, anthropology, psychology, ethnopsychology, axiology, cultural linguistics, the methodology of synergetics.

Accordingly, a comprehensive study is possible due to traditional linguistic methods in combination with cognitive methodology, including conceptual analysis combined with computer science methodology. So, the creation of a method for representing organizational knowledge in terms of “Node-Function-Object” (NFO), the models obtained by the system-object NFO approach are adapted to the requirements of organizational knowledge models using the capabilities of traditional knowledge models (semantic, production and frame) due to the correspondence of each of these are individual elements of organizational knowledge.

For this, an algorithm for modeling knowledge with the use of system-object method of knowledge representation (SOMKR) is considered. The whole process of building a knowledge model in terms of SOMKR is conditionally divided into several stages: building a hierarchy of streaming objects (similar to the procedure for building a hierarchy of links in NFO analysis); development of models of organizational, production and technological processes (similar to building a NFO model); description of final methods of node objects using a scripting language; use of the model (implementation of logical inference on the model). The analysis of the results of adaptation of the NFO approach to describing the structural, functional and object characteristics of organizational knowledge using examples of the representation of traditional knowledge models in terms of “Node-Function-Object” showed that the NFO-model of an organizational system (or organizational knowledge) can act as a network, both production and frame models, which allows us to consider the way of representing organizational knowledge in terms of the NFO approach as an integral system-object method of knowledge representation (SOMKR), which integrates both logical, structural, and procedural paradigms of knowledge representation [1, 2, 3].

3. Results and Discussion
The stage of theoretical interpretation implies an unambiguous and clear description of those concepts and terminology that are relevant to the study, correspond to the construction of a theoretical model or research template. The establishment of links and the classifying the concepts under consideration, the construction of a model of their relationship and interdependence is carried out with the help of the structural interpretation in this block. Factorial interpretation, in turn, is aimed at identifying the relationship between the original concepts and the available variables.

In developing a program for advanced empirical research we proceeded from the theoretical foundations, which focus on language as a colossal informational historical component. According to this approach, knowledge about the evolution of the human community is objectively stored in a language that can rightfully be called a verbal monument of a particular era, a base of knowledge and wisdom of mankind, dynamic to reflect social and historical metamorphoses, a translator of cultural heritage, a specific system of linguistic signs as the embodiment of cultural signs charged with lingvocultural meanings.

By itself, linguistic culture as a combination of the linguistic and non-linguistic factors in the consciousness of the nation a priori cannot be studied one-sidedly either in the linguistic or non-linguistic paradigm without a firmly established relationship between them. Thus, understanding the complexity of the structure of lingvoculture with specific levels of human consciousness included in it, from epistemic models of knowledge, generalized concepts, taking into account their cultural marking, to the metaphorical level encoding the language of lingvoculture, reference and symbolic strata). Based on the works of V.A. Maslova, V.N. Telia, S.G. Ter-Minasova, N.M. Shanskiy, E.M. Vereshchagin, V.G. Kostomarov and other authoritative scientists, in this study we focus on the understanding of lingvoculture as a reproducible entity in the complex of all the listed components. This situation is supported by the verbal embodiment of lingvocultural concepts and representation in
figurative-semantic epistemic structures of knowledge. Accordingly, the search for an answer to questions about the cultural heritage of the nation and the cultural labeling of information is possible through the analysis of empirical material, which is the lexical and / or phraseological linguistic stratum. Accordingly, work towards the study of factual material in combination with the principles of an interdisciplinary scientific paradigm will provide access to consciousness and will allow describing fragments of linguistic evolution, providing variability and invariance [3].

In comparison with traditional linguistic research, we understand the term variability somewhat differently: not in terms of dialectal language variants, but in terms of the evolution of the language as a whole. In this case, we believe that any language that coexists with a person objectively, always plays the role of knowledge accumulator being a litmus test of public opinion. The latter, as a rule, is reflected in words, grammatical constructions that carry a positive or negative connotation. And no matter what event occurs in the life of a nation, it always finds a linguistic response in the form of new dictionary meanings of already existing words or in neologisms. New meanings appear, as a rule, first in informal communication, then become more widespread, penetrate the official media. Accordingly, variability for us is not only the primordial linguistic understanding of the problem, but also a kind of linguistic synergy. Both concepts in our study can be considered as synonymous, their essence lies in a kind of tandem of language and culture, interrelated development over time, the influence of the mentality and culture of a nation on its language and vice versa [3]. Thus, for example, an illustration of linguistic metamorphoses, which can be perfectly observed in synchronicity, is, in our opinion, the current sociolinguistic situation in the United Kingdom, in which, for a number of political, economic and social factors, immigrants of different beliefs, primarily Muslims, are in search of a better and more peaceful life. And at the current moment, one can also record the aggravation of the already precarious position of the multicultural social model, which was so actively propagated by the British community, thanks to the evaluative attitude of the indigenous people, which is expressed in the change in the connotations of words when describing the refugees themselves and the aggravated situation. The issue of tolerance, so persistently instigated by the British government to the local population, at the moment characterizes only the situation in the official media, while the unofficial statements of the British on the forums and on social networks indicate a backlash. More and more often, the vocabulary that neutrally names the concepts associated with Muslims is acquiring a negative connotation, and more and more often the concepts of terrorism and recruitment, initially unrelated to Islamic culture, are heard in the context of describing the current situation. And even despite the absence of a description of changes in connotation in the semantics of vocabulary in all dictionary sources, users and native speakers of English clearly understand the attitude broadcast by the British community. At present, such a vast layer of vocabulary is a complex object of research. In its scientific interpretation, we refer to the living English language, which is available to us in the vastness of the global web. This is not only the print media, in which they continue to censor the information provided, these are forums, social networks, chats, comments and hashtags. As research material based on a continuous sample of electronic English-language media, we turn to the media (Al Jazeera, BBC, CNN, the Guardian, Los Angeles Times, News, New York Times, Taipei Times, United Nations, Wall Street Journal, Washington Post, etc.), lexicographic illustrative dictionary databases, electronic corpus BNC. At the same time in addition to the author's linguistic affiliation, the issues of his status, age, we take into account exclusively author's assessment of what is happening. This makes it possible to study the maximum amount of heterogeneous factual material and make its research assessment as objective as possible.

The general scheme of scientific activities for solving the assigned tasks is the following. A systematic analysis of previous linguistic and non-linguistic experience allows us to reflect the most objective picture of the research. In the present case, it becomes possible to say that the uniqueness of the religion of Islam lies in its ability to represent the maximalist paradigm, which predetermines the radicalization of the consciousness of society, projecting religion into all spheres of life of the society. Thus, Islam presupposes the use of religious canons in instrumental terms in the management of society. Due to this circumstance, Islam in most countries, primarily in English-speaking, is rightfully
considered as a so-called negative religion that brings humility and worship, on the one hand, and control of human consciousness, on the other. The basis for a variety of scientific research was the role of women in Muslim countries, the relationship between Europe and Muslim countries, the Muslim threat, terrorism, manipulation of human consciousness, etc. From a linguistic point of view, the representation of the Muslim world through language is of fundamental interest. In this case, the discursive environment plays a motivating role for the development and dissemination of knowledge about the Muslim world. Discourse itself, as a fertile ground for the objectification of a particular mental structure, is an interactive speech practice existing in the unity of communicative and cognitive processes associated with extralinguistic factors. Mental structures of a different order are reflected in the discursive space and unfold especially vividly in the media discourse. The mental structures themselves are variable in terms of structure and content. And if we approach the issue of describing mental structures from an ontological point of view, that we are talking about embodied understanding, their classification, criteria that allow them to differ from each other. Following Z.D. Popova and I.A. Sternin, a concept is a constituent unit of a concept system (a semantic model of the main worldview concepts), which is objectified in a word, language in the form of sensory and mental signs of a particular reality phenomenon and represents these signs through the text, as mental, historical and ethnic signs in the minds of the people, where “the core is gradually enveloped, enveloped in layers of conceptual signs, which increases the volume of the concept and saturates its content.” Such is the presentation of the concept is obvious at the level of consciousness, while in its real embodiment it is a kind of construct that unites a large layer of lexemes of different part of speech, thematic correlation. Such a group of vocabulary was originally, as noted above, obtained using a continuous sample and is a rather heterogeneous material for systematization. Its primary linguistic analysis made it possible to organize a database, which is a structured research corpus of lexemes that are part of the lexemes “Muslim world”, accumulated using a continuous sample from the relevant authentic sources and lexicographic sources. It also contains information about the meaning of the selected units according to English-language dictionaries, examples of the use of the selected lexical units are given, and an analysis of the estimated meaning is carried out.

The use of databases for factual material of a large volume makes it possible to store information in a convenient form for a linguist and process it thanks to the availability of special tools. In our case, the database is used for the convenience of working with heterogeneous vocabulary during its processing and verification with a mental structure, a model, in a multimedia didactic resource and will be relevant in the future for creating a virtual dictionary.

In order to develop a model of the influence of non-linguistic factors on the transformation of the semantic field of meanings of the studied elements of the concept “Muslim World” in accordance with the developed program of advanced empirical research based on the study of the functioning of lexemes-structural elements, non-linguistic conditions of influence on the variability of the semantics of lexemes were revealed. These conditions are political, social and lingvocultural factors.

Political factors are presented as a result of the study of the functioning environment as a condition of influence, which manifests itself in the formation of native speakers (through linguistic and extralinguistic factors) of a certain point of view on the problem of adaptation of migrants that fits into the dominant political picture of the world. This happens through public speeches of politicians, their participation in various political rallies. In addition, modern politicians successfully master the Internet space, including the Internet media and social networks.

The social factor of transformation has something in common with the political factor. It has established the development of invariants in texts functioning in social networks, oral messages broadcast during rallies and various actions. In social networks, two aspects at once increase the level of significance of this factor: it is the possibility of expressing personal assessment, and expressing, on the contrary, silent support through reposts and retweets, and, in addition, the Internet provides users with an environment of conditional anonymity that provokes users to express emotions and opinions.

The concluding condition for the development of invariant meanings, according to our data, is the lingvocultural factor, which, as a result of the research, we describe thesis as “the disunity of
Europeans and, in contrast, the unity of Muslims, greater adherence to their beliefs, the mass character of such beliefs, tolerance of other people's traditions and the inability to express their negative perception. This thesis formulation stems from the identified aspects of transformation processes. First of all, it is the difference of cultures. The tendency to blur the boundaries of emotional assessments in the perception of certain situations has led to the fact that ordinary speakers of linguistic culture are simply not able to fully express their rejection of certain negative events for themselves. Hence, freedom in the perception and self-assessment of the sources of such events from the other side. That is, some of the immigrants who cause certain conflict situations feel more relaxed, since they are not on their own land.

Thus, as a result of the application of the program of empirical research of the selected factual material, its grouping and specific weight, it was possible to proceed to the development and formation of a simulation level model of variability processes.

Let’s consider a simulation model that describes the process of influence of various non-linguistic factors on the semantic components of certain concepts and terms. The system-object model, in accordance with the provisions of the calculus of functional units, is represented in the form [1, 2]:

\[ M = (L, S), \]  

where: \( M \) is a system model;  
\( L \) is a set of stream model objects, the elements of which are an object that has no methods and only fields (2):

\[ l = [r_1, r_2, \ldots, r_k]. \]  

where: \( l \in L; \) \( k \) is number of streaming object fields \( l; \) \( r_1, r_2, \ldots, r_k \) are stream object fields representing an identifier-value pair. \( S \) – set of nodal objects of the model, the elements of which are described by the following form (3):

\[ s = [U, f, O], \]  

where: \( U \) is a set of fields for describing interface stream objects of a node object \( s; \) \( f \) is a method of the nodal objects that describes the transformation function of incoming interface flow object \( s \) (incoming connections of the system) \( L^k \) in the outgoing \( L^k \). \( O \) is a set of fields for describing the object characteristics of the nodal object (system) \( s \).

Moreover, the nodal objects of the \( M \) model represent the key elements of the model, and the set of stream objects defines the relationship between the nodal objects of the model.

In this case, the set of stream objects will be represented as:

\[ L = \{ \text{Level}, \text{VSF}, \text{VSF2}, \text{VSF3}, \text{VLF}, \text{VLF2}, \text{VLF3}, \text{VPF}, \text{VPF2}, \text{VPF3} \}. \]

Where the stream object \( \text{Level} \) has one field \( \text{value of the level} \) and reflects the degree of dependence of the child on the parent, and the stream objects \( \text{VSF}, \text{VPF} \) and \( \text{VLF} \) each contain two parameters: \( \text{value} \) and \( \text{sign of influence} \) and correspond to the influence of social, political and lingvocultural factors, respectively.

The set of node objects will look like this:

\[ S = \{ \text{Social Factors}, \text{Linvocultural Factors}, \text{Political Factors}, \text{Level Model of Language Invariants} \}. \]

Let’s take a closer look at the nodal objects of the model. In terms of the calculus of functional nodes, each node object has the form:

\[ s[l?, l!; f(l?)l!; o?, o!, of], \]

then:

Social Factors=[l?, VSF!; f(l?)VSF!, o?, o!, {rallies and actions, social networks, internet }];

Linvocultural Factors=[l?, VLF!; f(l?)VLF!, o?, o!, {cultural difference, religiosity, long-term existence of political correctness }];

Political Factors=[l?, VPF!; f(l?)VPF!, o?, o!, {rallies and actions, social networks, internet mass media }];

Level Model of Language Invariants =([VSF?, VLF?, VPF?], l!; f(VSF?, VLF?, VPF?) l!; o?, o!, of].
As can be seen from the description above, the nodal elements imitating factors of various origins are generators, the output of which is a stream object with corresponding values. Each separate block contains weight coefficients as object characteristics determining the degree of influence of the corresponding factors on the linguistic environment (based on statistical information obtained as a result of applying the program of empirical research). The function of such a node object is implemented as a script.

Next, we will consider a nodal object – a level model of language invariants. The node object method contains the lower level structural model

Consider the key elements of the above model. The set of nodal elements at this level takes the following form:

\[ S = \{ \text{Macroculture}, \text{Muslim world}, \text{Koran}, \text{Sharia}, \text{Radicalism}, \text{terrorism}, \text{Human}, \text{Middle Easterner}, \text{Muslim}, \text{Immigrant}, \text{Islamist}, \text{Terrorist}, \text{Features of religion}, \text{Jihad (fighting with oneself)}, \text{Jihad (war against infidels)}, \text{Clash}, \text{Terrorist attack}, S, S_2, S_3 \} \]

The set of nodal objects of the model under consideration can be divided into two parts, the first part is the elements of the semantic network, the second part is the meta-objects, which play the role of nodes of distributors of influencing factors on the elements of semantic networks.

Let us consider the structure of nodal objects that make up the semantic network:

- **Macroculture**: \{VSF?, VLF?, VPF?\}, 1: f(VSF?, VLF?, VPF?) 1!; o?, o!, o;
- **Person**: \{VSF2?, VLF2?, VPF2?\}, 1: f(VSF2?, VLF2?, VPF2?) 1!; o?, o!, o;
- **Religious Features**: \{VSF3?, VLF3?, VPF3?\}, 1: f(VSF3?, VLF3?, VPF3?) 1!; o?, o!, o;

The above node objects are the root elements of the corresponding semantic networks, all sub elements which have the same structure.

Thus, the presented system-object simulation model allows simulating the influence of various factors on changes in the semantic networks of individual concepts.

3. Conclusion
The considered method of describing organizational knowledge is universal, since it allows to describe object characteristics, structural characteristics and functional characteristics of the studied subject area, however, and in no less an innovative way of implementing the presentation of research results. An information system based on this method of storing organizational knowledge allows you to store and process the organization's experience in a convenient visual form, which is not possible to implement traditional methods of knowledge representation. Within the framework of the SOMKR, we can store the structural, functional and object characteristics of knowledge. Moreover, one SOMKR model has the ability to use products, frames and networks, which makes the model very informative.

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