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Model vs Prototype in Current Russian Computer Lexicography

Tatiana M. Sofronova*

*Krasnoyarsk State Pedagogical University
named after V.P. Astafev
89 Lebedeva Str., Krasnoyarsk, 660049, Russia*

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In the Russian computer lexicography, the term “model” encompasses a wide range of notions of both abstract and material nature. The presented analysis of the notions “model” and “prototype” in Russian and in English proves that the current Russian computer lexicography lacks the term “prototype” which is a common term in the international computer lexicography.

Keywords: model, simulation, prototype, prototyping, computer lexicography.

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Research area: philology.

Introduction: Modeling as an effective tool for the implementation of a systematic approach to language phenomena

In modern linguistics, there is a change of the vector from “description” to the “simulation” of linguistic phenomena and processes and as a result orientation towards reliability, quantitative character, and predictive nature of the generated models (Belousov, 2010:94). K.I. Belousov sees the prerequisites for the model linguistics emergence, the study of model language research. An increased number of studies proclaims simulation as their basic method, or state model construction of the research subject as their main aim. Geography of philological problems reflected in the models has become more detailed:

numerous models of individual fragments of the studied linguistic and cultural reality appeared in addition to the existing few generic “language models”.

The notion of language as a systematically organized relationship is mentioned by I.A. Baudouin de Courtenay, A.A. Potebnya, and Ferdinand de Saussure. Since the system of language lies in the human brain and cannot be directly observed, the researchers construct models in the form of diagrams and schemes for better understanding of the system. This was how the following models appeared: the level model of a language system (E. Benveniste, S. Lamb, D. Lockwood, G. Gleason, I.P. Raspopova, L.M. Vasiliev), the field model (V.G. Admoni, A. Bondarko, G.S. Schur), the multi-layered model (D.L. Spivak), the model of associative and

verbal networks (Y.N. Karaulov), the dynamic model (Z.D. Popova and I.A. Sternin).

The concept of a “linguistic model” emerged in structural linguistics, and was developed by linguists such as K.L. Buhler, Z.Z. Harris, C. Hokket, however, it became of common scientific use in 1960s – 1970s under the influence of mathematical linguistics and in connection with the penetration of cybernetics in linguistics.

At the beginning of 1960s, the notion of a “model” in linguistics was disclosed through 27 meanings in the paper by Zhao Yuan-jen (1965), “Models in Linguistics and models in general”, delivered at the International Congress of Logic, Methodology and Philosophy of Science at Stanford (Calif.), and later in A.F. Losev’s paper (2004:16).

Different meanings can be regarded as a differentiation of scientific knowledge when one and the same term characterizes different sides of the language that persists today. To illustrate this, we analyzed definitions of the concept “model” to show the comprehensive range of generic concepts and specific features (Table 1) disclosed in the following Russian explanatory, philosophical and linguistic dictionaries:

- *explanatory dictionaries* (Zakharenko, Komarova, Nechaeva, 2003; Muzrukova, Nechaeva, 1995; Ozhegov, Shvedova, 1999; Dictionary of Russian Language, 1981–1984; Explanatory Dictionary of Russian Language, 1935-1940; MultiLex, <http://www.multilex.ru/>; Webster’s New World College Dictionary, 1999);
- *philosophical dictionaries* (Philosophical encyclopedia, 1960-1970; Encyclopedic dictionary of philosophy, 1983; Encyclopedia of epistemology and philosophy of science, 2009);
- *linguistic dictionaries and linguistic papers and monographs*: (Apresyan, 1966; Akhmanova, 1969; Linguistic

encyclopedic dictionary, 1990; Losev, 2004; Piotrowski, 1966; Revzin, 1962, 1977; Dictionary of linguistic terms, 1976; Stoff, 1966].

The presented analysis allows us to conclude that the notion of “model” reflects the kind of “unity and struggle of opposites”: it may be artificial and natural, material and abstract, analytical and synthesizing, it can produce detailed or generalized objects which vary greatly in complexity and sizes. Most important properties of the model for scientific cognition are explanatory, predictive, and experimental validation.

Hence, simulation is a method of constructing the model, which assumes:

- 1) recording of facts that require explanation;
- 2) hypothesizing to explain facts;
- 3) implementation of the hypotheses in the form of models, not only explaining the original facts, but also predicting new, not yet observed facts;
- 4) experimental verification of the model (Apresyan, 1966:98).

If one chooses keywords that characterize the most modern spheres of human practical life, it will be the terms “computer technology”, “communication”, “society” (Baranov, 2001:343). Effective systematic and structural analysis of a language in the modern linguistic science is unthinkable without reference to the possibilities of a computer simulation. The computer simulation should not be simplistically and mechanistically interpreted as a way facilitating the work of a linguist. The use of computer modeling provides other important benefits:

- 1) possibility of operating data, which cannot be obtained “by hand”;
- 2) implementation of probabilistic and statistical analysis of existing data and building mathematical models;

Table 1. Systematic arrangement of generic notions and specific features of the concept “model” in the explanatory, philosophical, and linguistic dictionaries.

“MODEL” IN EXPLANATORY DICTIONARIES	
Generic concepts	Sample (13), man (9), item (6), type (5), scheme (5), trade-mark (5), reproduction (4), copy (2), description (2), image (2), drawing, system, object, model
Specific features	<ol style="list-style-type: none"> 1. Serving as a material, a model (8), servng as a form (4), serving for making copies (series) (3) 2. Reduced in size (5) 3. Serving as a replacement, analogue (3) 4. Enlarged (2) 5. Reproduced 6. Serving for clarification 7. Generalized form 8. Full-sized
«MODEL» IN PHILOSOPHICAL DICTIONARIES	
Generic concepts	Scheme (2), image, object, pattern, building, description, interpretation, analog, substitute for, representative, set, system, structure, axiom, assertion, equation
Specific features	<ol style="list-style-type: none"> 1. Mathematic (2) 2. Expressing relationships, relative (2) 3. Natural 4. Artificial 5. Logical, formalized 6. Of sign nature 7. Functional 8. Mechanical 9. Expressing relationships of equality 10. Resembling, imitating 11. Preconceived relationships, targeted 12. Conventional, conditional 13. Arbitrary 14. Special 15. Regulatory 16. Detailed 17. Consisting of elements 18. Of system nature 19. Storing information 20. Serving for design, for conversion, for management 21. Describing, reflecting important, valuable characteristics 22. Explaining, extending information. educational, predictive, heuristic
«MODEL» IN LINGUISTIC DICTIONARIES	
Generic concepts	Scheme (7), example (6), system (3), sequence (2), standard, structure, object, device, illustration, construct, design, image, program, copy, substitute, paradigm, operating tool, text, type, reproduction, construction, presentation, disposition, set
Specific features	<p>Reproducing (5) structure, properties, relationships, used for mass reproduction</p> <p>Scientific</p> <p>Displaying (4) system, subsystem, structure</p> <p>Consisting of elements (4)</p> <p>Hypothetical (3), logical, analytical, mathematical (2) Belonging to language, speech</p> <p>Created artificially (2), idealized (2), operating with concepts of ideal objects, mental (3)</p> <p>Abstract (2), formal (2), signed (2), symbolic</p> <p>Logical, sequential (4), ordered (2)</p> <p>Generalized, synthesized, holistic (2)</p> <p>Having a simple and coarsened form, simplified form (2)</p>

Continued Table 1

	Cognitive/ educational (2) Real, material Specified character, functional, adequate Replacing, imitating Separated (dissected) Systematic in representation, structural, having structure or behavior Reflecting relevant (essential) properties, inherent in the original, echoing the original, similar, serving as a functional analogue Regularly reproduced, embodied in another material (substrate) Serving as a form, serving as basis for simulation, serving as a standard Full-sized Reduced in size, compact Based on description, on image, shaped as a scheme, shaped as a physical construct Of activity Facilitating Amenable to interpretation Giving more information than a description, informative Explaining, having explanatory power Predictive Validated experimentally
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3) creating of opportunities for the exchange of experimental data (Belousov, 2010: 96).

Modeling is a universal method for making dictionaries and glossaries. As applied to lexicography, a model can be a scheme of a program (plus a generated product), which simply and roughly reflects and reproduces structures, properties, interconnections, and relations among its elements. Prototyping is one more important stage in computer lexicography, which will be disclosed in the following section.

**Statement of the problem: Prototyping
as an important stage
in lexicographical modeling**

The term “model” in the Russian lexicography encompasses both abstract images and actually functioning beta-versions of lexicographic products. The suggested analysis of the notions “model” and “prototype” in Russian and in English proves the necessity to officially introduce the terms “prototype” and

“prototyping” in the terminology of the Russian computer lexicography.

The simultaneous combination of abstract and materialistic features in the notion of “model” may affect the implementation of a specific project to create an electronic lexicographic product. The point is that the lexicographical work in today’s market conditions requires careful planning and calculation of “capabilities” in accordance with the wishes of the customer. Therefore, it is very important to discuss at the very beginning what specifically the customer will receive, at what time and for what means. The lexicographer may promise to create a model of the dictionary by the set deadline implying a conceptual product shaped as a scheme, while the customer can expect to see a software product (prototype), which, for example, has all the basic functions of the final product (dictionary, glossary, etc.).

The following quote from the collective monograph can provide an example: “This glossary is just a model, it is not intended to be a complete reflection of the Russian computer slang” (Linguistic modeling, 2009:

129). It is not clear, whether the model is characterized by quantitative or also by conceptual limitations. If this model is the dictionary, then why it cannot claim to be all-encompassing, at least on the conceptual level? Modeling the dictionary, do not we try to create an open system to enable its regular replenishment, to provide all the key logical and conceptual units that reflect the current state of the language or its subsystems? Are the very principles of creating a dictionary, the idea of its design no longer a full-fledged model of the dictionary? A quantitative parameter does not play a fundamental role in this case, in our opinion.

The quantitative parameter comes into play at the next stage of design, which can follow the modeling, and which is not specifically touched upon in the Russian computer lexicography. This is the stage of prototyping, creating a prototype of a lexicographic product.

The international applied terminological studies widely employ the term “prototype”, borrowed from the field of information technology, e.g.: “6.2.3. **Prototype**. In terminology projects, as in industry, it is useful to make a prototype before mass production begins. The prototype, which might comprise the first 10 entries, for instance, is given to the customer for approval. The customer can thus ask for changes to the structure, form, content, etc. before hundreds of “wrong” entries are produced. Production should only start once the customer’s feedback has been received. Acceptance of the prototype is therefore a milestone within the Implementation and Controlling phase, which is why it must be included in the project plan from the beginning and defined with the customer” (Fähndrich 2005: 252-253).

By the nature of the design or functions, “prototypes” fall into four basic categories: 1) *proof-of-principle prototypes* (also called

“breadboards”) are used to test some aspect of the intended design without attempting to exactly simulate the visual appearance, choice of materials, or intended manufacturing process; 2) *form study prototypes* allow designers to explore the basic size, look, and feel of a product without simulating the actual function, behavior, or exact physical appearance of the product; 3) *visual prototypes* capture the intended design aesthetic and simulate the exact appearance, color, and surface textures of the intended product but will not actually embody the functions or “behaviors” of the final product; 4) *functional or working prototypes* are, to the greatest extent practical, attempt to simulate the final design, aesthetics, materials, and functionality of the intended design all in one package (Papelis, Madhavan, 2010: 315-316).

Current periodicals on information technology are ample in material for defining the concept of “prototype” through the use of the word in specific contexts (Colazzo, Costantino, 1998; Zhizhimov, Mazov, 1999; Bakhtizin, 2002; Ivanov, 2002; Melkumyan, 2006; Klimentov, Maksimov, Kharitonova, 2008; Suleymanova, Yakovlev, 2010).

The Russian word “prototype” is international, but its semantics is somewhat different from its counterpart “prototype” in the English language, namely by the absence of the following meanings: “a full-scale (full size)” and “operational, acting, functioning” (Table 2).

Interestingly, the English word “model” in the Webster Explanatory Dictionary (Multilex, 2009) is different from the word “prototype” in one of the technical meanings by the semes “reduced-size” and “life-size”, respectively. It turns out that in English the term “model” remains conventional (conditional) to a somewhat greater extent than the corresponding Russian term due

Table 2. Definitional analysis of the word “prototype” and “model” in the explanatory dictionaries.

Russian explanatory dictionaries		
PROTOTYPE	generic	Pre-image (2), example/ sample (2), man (2)
	specific	Real (2) Source for generating an image (2) Retrospective/ relating to the past Relating to the future Initial
MODEL	generic	Sample (13), man (9), thing/ item (6), type (5), scheme (5), trade-mark (5), reproduction (4), copy (2), description (2), image (2), example/ drawing, system, object, pattern
	specific	Exemplary, serving as an example (3), serving for making copies (series) (3), serving as a form (4), serving as material (8) Reduced in size (5) Serving as a replacement, as an analogue (3) Enlarged (2) Full-sized Reproduced Serving for clarification Generalized form
English explanatory dictionaries		
PROTOTYPE	generic	Thing, being, original, model, pattern, archetype, example
	specific	First Relating to the past Full-scale Operational, functioning Demonstrating Testing Having novelty Perfect Directed at anything particular
MODEL	generic	Man (4), thing (2), representation (2), archetype, design, imitation, copy, plan, style, fragment / piece
	specific	Small-scale Serving for creating a larger object Preliminary Hypothetical Stylized Based on analogy Serving for analysis and explanation Serving as a form Serving as an example to emulate Relevant to a particular product Serving as a material/ subject Demonstrating

to the fact that the borrowed Russian word “prototype” still retains a narrower semantics than its English counterpart.

Discussion: Prototype vs Model

We suggest using the term “prototype” to describe a specific physical product of our lexicographical research in accordance with its technical meaning in the Webster explanatory dictionary (Webster, 1999; Multilex, 2009): «...a full-scale, operational model, used for demonstration or testing, that incorporates a new design or features». In this case, we see no contradiction in the simultaneous use of this term with the term “model”; for example, the following word combination is considered possible: “a prototype of the conceptual model of a glossary developed by us”.

By the term “model” we imply both the presence of only a conceptual product structure in the form of verbal description, scheme, etc., and the possible presence of the generated product, the external parameters of which can be presented in reduced-size (or larger size for a miniature original). The prototype is based necessarily on the conceptual model and includes the obligatory presence of the product generated from the reproduction of all

the external parameters in real size (compare *aircraft prototype* and *aircraft model*). The prototype in a computer modeling has another mandatory feature – reduced volume of content to enable pre-testing and adjustment before starting to work on the full-scale version of the product. Thus, we see no contradiction in using the term “prototype” as a specific term to the term “model” in lexicographical modeling, since every prototype is a model, but not every model is a prototype.

Conclusion

Summing up the above, we acknowledge the importance of prototyping phase in the implementation of projects on creation of electronic lexicographic products. The model is a conceptual notion of idealistic character (though a physical counterpart is possible as well which differs from the original by scale), while the prototype created on the basis of the model is a materialistic notion that functions in real life-size. However, the prototype has a very important distinguishing feature – its substantive content (by the number of entries and their thematic coverage) is usually inferior to the final product (dictionary, glossary, etc.) planned by the model.

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Модель vs-прототип в современной российской компьютерной лексикографии

Т.М. Софронова

Красноярский государственный педагогический университет

им. В.П. Астафьева

Россия, 660049, Красноярск, ул. Лебедевой, 89

В отечественной компьютерной лексикографии термин «модель» охватывает как абстрактные изображения, так и реально функционирующие бета-версии лексикографических продуктов. Предлагаемый анализ понятий «модель» и «прототип» в русском и английском языках подтверждает необходимость официального введения термина «прототип» в терминологию компьютерной лексикографии в России так же, как это было сделано за рубежом.

Ключевые слова: модель, моделирование, прототип, прототипирование, компьютерная лексикография.

Научная специальность: 10.00.00 – филологические науки.
