The underlying intention of the paper is to call for concerted and multifaceted efforts for further improvements in the field of MT. The decisive components in this improvement should and must include various semantically codable layers within the hierarchically-designed overall semantic system. Different existing theories of semantic classification are discussed from the point of view of their application to MT.

The purpose of this research is to survey existing semantic classification theories in order to evaluate them in terms of their applicability to automatic assignment of features and properties for machine dictionary entries. These features are such morpho-syntactic and semantic categories whose values are context-free, while the properties constitute the corresponding context-sensitive values.

In our specific case, in dealing with the Russian input sentence, prior to its English synthesis, we have to automatically parse the Russian sentence. The dictionary will provide the codes for the features and properties as defined above. The set of such Russian categories as gender, number, case, voice, tense, person, mood, and degrees of comparison constitute the area of Russian morphosyntactic layers. The set of semantic categories such as animate vs. inanimate, solid, liquid, gaseous, fluid (objects); qualifiers, quantifiers (attributes); relators (free form to a free form, bound form to a free form, bound form to a bound form; simple to complex sentences; parts of a sentence to another part of a sentence; anaphoric connectors within the paragraph, including the zero connector) represent the endo- and exostructures with corresponding ranges for specific transformational capabilities as a component within the Russian parser.

Idiomatic expressions are one of the manifestations of the semantic exocentric structures. So are case relations, prepositional phrases, and kernel sentences. All things being equal, a survey of existing semantic classification theories should provide as its final result a set of eclectically selected fragments from various theories (due to the fact that no single theory was designed for MT purposes) with the intention of the disambiguation of the deficient parsing output.

Since there is no complete and satisfactorily developed classificatory semantic theory for machine translation dictionaries and grammar in translating from the Russian scientific text into its English adequate information equivalent, the researcher should develop some general criteria which he could use in classifying the existing theories in terms of their applicability for disambiguation of the 'unwanted' results of the existing Russian MT parsers.

BACKGROUND FOR EVALUATION OF EXISTING SEMANTIC CLASSIFICATION THEORIES

Let us take a single scientific sentence in Russian (with its English translation):

1. V VOZNIKNOVENII ZABOLEVANIIA OCHEVIDNUJU ROL' IGRAL KONTAKT LJUDEJ S GRYZUNAMI.

English gloss: In the emergence of the disease, an apparent role was played by contact of people with rodents.

Let us paraphrase this Russian sentence in various ways:

1.1 Zabolevaniya ochevidno voznikali ot kontakta ljud' s gryzunami.
Diseases obviously cropped up from contact of people with rodents.

1.2 Zabolevaniya ochevidno vyzyvalis' kontaktom ljud' s gryzunami.
Diseases obviously were caused by people's contact with rodents.

1.3 LJUDI zabolevali ochevidno ot kontakta s gryzunami.
People become sick, obviously, from contact with rodents.

1.4 Gryzuny ochevidno peredavali zabolelenija ljudjam pri kontakte.
Rodents obviously transmitted diseases to people through contact.

1.5 LJUDSKIJ kontakt s gryzunami ochevidno vyzyvaet 3ti zabolelenija.
Human contact with rodents evidently has caused these diseases.

1.6 Rol' kontakta s gryzunami pri zabolelenijakh ljud'jachevidna.
The role of contact with rodents in human diseases is obvious.

1.7 VOZNIKNOVENIE zabolelenij svjazano s kontakтом mezdu ljud'mi i gryzunami.
Emergence of diseases is connected with contact between people and rodents.
Let us take the single focus, VVZYVAT’SJA, i.e., the passive transformation of VVZYVAT’ produces the paraphrases 1.2 and 1.10. If we replace the words in these sentences with their morpho-syntactic symbols, we shall see that while the message is the same, the distribution pattern is not the same. Sentence 1.2 will appear as:

\[ N_1 \ D_1 \ VVZYVALIS’ \ N_2 \ N_3 \ P_1 \ N_4 \]

where \( c \) = case, \( cl \) = nominative case, \( c5 \) = instrumental case, and \( cd \) = case determiner.

Sentence 1.10 will appear as:

\[ A \ N_1 \ P_2 \ N_3 \ VVZYVAJUTSJA \ N_4 \ N_5 \ cl \ cd \ c6 \ cd5 \ c5 \ cd5 \ c5 \]

where \( Ac1 \) is a transformation of \( Nc2 \) from 1.2.

This ability of the speaker to use both endocentric and exocentric morpho-syntactic tools for depicting an identical focus of the same situation is called the syntactic (structural) meaning of the sentence.

**Pragmatic Meaning.** In the communicative process, in addition to the message to be transmitted, there are participants (speaker/listener), and the sentence structure might contain the participants’ evaluation of either the message itself or the modal attitude toward the participants, including self-evaluation. In the above paraphrases where the word ‘achevidno’ ‘v chastnosti’ or its derivative is used, the pragmatic meaning is present. In 1.10 there is an existential modifier (‘v chastnosti’), and in 1.2, assertion of truth (‘achevidno’).

This ability of the observer to add his evaluation constitutes the pragmatic meaning of the sentence. In a diagram, these four meanings could be represented by two triangles with a common vertex:

```
Pragmatics -------- Syntax
                |
                |
Denotation -------- Signification
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**DIRECTION AND SCOPE OF THE SEMANTIC THEORIES TO BE EXAMINED**

If the above four kinds of meanings are to be efficiently coded in the dictionary for automatic parsing, then the researcher has to seek the corresponding statements in each theory under examination, and select the appropriate fragments from it. The selection could be done against the historical semantic development with the emphasis on the theories containing, in addition to the **naming** semantics (with its various problems), the **combinatory** semantics (both within the system and the structure axes of the sentence, and each component of the sentence).

**Classical semantics** concentrated essentially on the individual word and the predicate word in the sentence, Here belong the works [1—9].

The main focus of classical semantics was on the processes developing within the individual word or the synonymic series (narrowing, widening, generalisation, specification, improvement, degrading, metaphor, meto-
nymic, radial, chain-like development of meanings of words), and later also on such processes as polysemy, homonymy, synonymy vs. antonymy, meaning and use, usual (regular) and figurative uses, and the like.

Modern semantics concentrates on the sense of the whole sentence(s). Here belong the works [10—16]. In a more technical sense, the modern varieties of the semantic theories are within the orbit of the predicate calculus of the first and second order. In the first, the attention is paid to the predicate function and the obligatory arguments going with it as optimal fillers for the positions within the sentence. Here belong the world, [17—20] and others. The main reason for the emergence of modern semantics was the stimuli provided by the logical foundations of mathematics, and the use of computers for machine translation purposes. There developed two main streams of modern semantics: (a) ‘Let us think harder’, with its resulting work in creation of mathematical linguistics, and (b) ‘Let us work harder’, with the resulting artificial intelligence.

Language models (Revzin, Markus) and similar works elsewhere try to create the automatic facility for both generating and understanding the sentence, concentrating essentially on the written variety of natural language. Basically, three semantic problems are being considered in these works:

1. The ability of the speaker to express the same thought in many ways;
2. The ability of the listener to recognize varying morpho-syntactic structures as expressions of the same thought; and
3. The ability of the participants in the communication process to draw inferences of a semantic nature, on the basis of the information already perceived.

Those three problems indicate a possible universal semantic language to be discovered, and used for coding of the dictionary entries and the rules for establishing the relations between the elements of the sentence.

OPERATIONAL SEMANTIC MODELS

After the survey of semantic theories is carried out, one has to build the operational semantic model to test whether or not the existing deficiencies in the Russian parser could be disambiguated. Here, one would like to mention that the inclination based on our own experience leads us to believe that the coding system based on Nida's ideas in the area of semantic translation, coupled with the formalisation apparatus parallel with that of W. J. Hutchins [21] and Simmons [22] might secure the further improvement of the Russian-to-English machine translation, information transfer and the naturalness of the English synthesis.

REFERENCES