Meaning Representation of Utterance in the Manyaspect Model

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Summary

The work is based on the concept notion of the existence of a logical representation of the NL-utterance meaning.

Basic ideas of the Manyaspect NL-sentence meaning model (MAMM-S) are described: the idea of meaning aspects; the idea of semantic primitives “subject-relation-attribute”, the idea of object-role interrelation. The links between the semantic primitives constituting the meaning of the sentence and the cognitive models which describe their semantics are shown. MAMM-based approach to the NL-utterance meaning representation is demonstrated by the example of the assertion-type utterance, as a functional type of the utterance. The NL-utterance meaning structure is analysed. In MAMM-U there are four meaning components: the basic communication component; the component of communication presupposition; the component of utterance circumstances; the sentence meaning. The necessity of a cognitive model of mental acts is stressed to determine the semantics of the utterance meaning components. Two mechanisms of accounting for the referential aspects of utterance are included into MAMM-U: function of actualization and referential part of meaning. The statuses of truth are included for processing utterances that are inhomogeneous in their composition. The described approach is under evaluation within the work with "Nedorosl", a laboratory computer system for language ability modelling.

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1 MOTIVATION

The utterance is a phenomenon of natural language(NL) that is distinguished from the sentence by having communicative functional orientation: questioning, informing, requesting. That's why the semantics of the NL- utterance is wider than the meaning of a separate sentence.

The meaning representation should meet the following requirements:

- it should be a logical form serving as a basis for reasoning (in the logical and common-sense interpretation of this word) and other cognitive functions (search, learning etc.);
- it should present a composition of the fragments of cognitive models from the knowledge base;
- the expressive power of the representation means must correlate to the expressive power of NL;
- it should allow a computer realisation of the NL- sentence (utterance, text) interpretation method.

Linguistic investigations in the field of NL- processing [8,9,10,11,12,13,14,15,16,17] are separated from the results in modern logic or use them with simplification.

Mathematical logic oriented approaches (classical and non-classical) [6,7] are directed rather at the problem of reasoning modelling than at the representation methods of concrete forms and phenomena of the natural language.

Most of the well-known representation formalisms [1,2,3,5] are oriented to the representation of knowledge of the reality surrounding an agent as an aggregate called "knowledge base" in literature.

Representation of the sentence meaning in terms of conceptual graphs is described in [4]. It is well-known [20], however that the utterance meaning has a number of distinguishing features compared to the sentence meaning:

- the meaning of the utterance is wider than the meaning of the sentence, because of the utterance functional load;
- the concepts in the utterance are actualized, i.e. connected with the objects and the notions in the common field of the communicants;
- the components of the utterance meaning can have different status of truth and this reflects on the general value and status of truth.

In this paper a brief review of the Manyaspect model of meaning for the NL- sentence (MAMM-S) first is given. Then an extension of the MAMM for the meaning representation of the NL- utterance is proposed. Mainly, this research is focused on the representation method of the logical form. The results of researches [19,20,21] were taken into account when developing the Manyaspect meaning model for the NL- utterance (MAMM-U).

2 REVIEW OF MANYASPECT MEANING MODEL

The Manyaspect meaning model is based on three ideas:

- the idea of meaning aspects;
- the idea of semantic primitive;
- the idea of object-role interrelation.

2.1 The idea of meaning aspects

In MAMM the meaning of the NL- sentence is represented as a logical formula in predicate calculus. This logical formula has macro- and micro-level of representation.

Example 1: *"When the performance was over, the actor Talantov went to the station."*

At the macro-level the meaning(***M***) of the NL- sentence can be represented as a logical conjunction of logical forms:

$$M = (T1 \,\&\, T2) \,\&\, (N1 \,\&\, N2) \,\&\, TT \,\&\, NN, \qquad (1)$$

where

T1 - is a tree of non-temporal semantic primitives (SP) for the clause 1) *"When the performance was over";*

T2 - is a tree of non-temporal semantic primitives for the clause 2 *)"the actor Talantov went to the station.";*

N1 - is a net of temporal semantic primitives for the clause 1) from example 1;

N2 - is a net of temporal semantic primitives for the clause 2) from example 1;

TT - is a tree of SP trees corresponding to linguistic conjunction link of the clause in a compound sentence;

NN - is a net of SP nets corresponding to temporal relations in events described by the clauses.

Thus, four meaning aspects were proposed for NL- sentences in MAMM - in accordance with four kinds of graphs [18]:

Ti - tree i of semantic primitives;
Ni - net i of semantic primitives ;
TT - tree of trees ***Ti*** (i=1...n) of SP;
NN - net of nets ***Ni (i=1...n)*** of SP[1].

[1] The terms “tree” and “net” are used here in the meaning that predicates of this component construct appropriate graph.

The idea of the existence of meaning aspects (or projections) was also stated by the other authors. Refer to [22, 20].

2.2 The idea of semantic primitive: subject-relation-attribute

At the micro-level each meaning aspects of the NL-sentence is represented as a composition of semantic primitives in the form:

relation(subject,attribute_1, ... attribute_i, ... attribute_n). (2)

In MAMM the object-role notation is used for (2):

relation(subject_role,subject; attribute_1_role,attribute_1 ...
... attribute_i_role,attribute_i; ... attribute_n_role,attribute_n) (3)

The notation (3) corresponds to the following expression in predicate calculus[7]:

$$\$(x_1)\ldots\ \$(x_i)\ldots\ \$(x_n)\ p(x_1,\ldots\ x_i,\ \ldots\ x_n)\ \&$$
$$(\ R_1(x_1)\ \&\ \ldots\ R_i(x_i)\ \ldots\ \&\ R_n(x_n))$$
$$(x_1=A_1\ \&\ \ldots\ x_i=A_i\ \ldots\ \&\ x_n=A_n), \quad (4)$$

where

p - predicate constant corresponding to ***semantic relation***;

$x_i(i = 1...n)$ - variables corresponding to ***subject*** and ***attributes***;

$R_i(x_i)(i = 1...n)$ - expressions describing ***semantic roles*** of ***subject*** and ***attributes***[1];

$A_i(i=1...n)$ - individual constant corresponding to concepts of ***semantic subject*** and ***semantic attributes***[2].

$\$$- existential quantifier[3].

The semantic primitive described by formulas (2,3,4) is called the SRA-element in MAMM. The categories (***semantic***) ***subject***, (***semantic***) ***relation*** and (***semantic***) ***attribute***, used in MAMM, should not be confused with others, which are determined in similar terms in other theories, for example: in Kodd's ER-model, in the relation theory, in logic of syllogisms.

Most of the links in the NL can be determined by binary predicates, but for generality the predicates with arity n were used in formulas (2,3,4). The table 1 gives SRA-elements, which can be distinguished in sentence of example 1.

The idea of binary predicates is actively used in syllogistics [23], and was proposed for linguistics in [24]. A discussion of arity problem for semantic primitive can be found in [1].

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[1] Thus role $R_i(x_i)$ in MAMM is interpreted as "element-set" relation $x_i\ \hat{I}\ R_i$

[2] In reality the set of possible referential meanings of concepts is more different. See [20]

[3] Also the combination of quantifiers $"x_1\$x_2\ \ldots\ \$x_n$ can be in formula (4).

Table 1. SRA-elements in example 1.

NL-equivalent / ***SRA-elements***	
"the performance was over"	
S_1= ***to_be_over(process***, F_a *("the performance"))*	(5)
S_2=*"the performance"*	(6)
H_1= ***to_hold_what(i_situation***, F_a *("the performance")*;***p_situation***, $F_a(S_1)$	(7)
H_2= ***before(i_situation***, F_a (S_2);***p_situation***, F_a ***(UTP))***	(8)
H_3= ***before(p_situation***, F_a (S_1);***p_situation***, F_a ***(UTP))***	(9)
"the actor Talantov"	
S_3= ***to_have_name(concept***, F_a *("the actor")*;***name***, F_a *("Talantov"))*	(10)
"The actor . went to the station"	
S_4 = ***to_go_where(t_object***, F_a *("the actor")* ; ***place***, F_a *("the station"))*	(11)
H_4 = ***simultaneously(i_situation***, F_a (S_3);***i_situation***, F_a (S_4) ***)***	(12)
H_5 = ***before(i_situation***, F_a (S_3);***p_situation***, F_a ***(UTP))***	(13)
H_6 = ***before(p_situation***, F_a (S_4);***p_situation***, F_a ***(UTP))***	(14)
"When the performance was over, the actor Talantov went to the station."	
H_7 = ***after(p_situation***, F_a (S_4);***p_situation***, F_a (S_1)***)***	(15)
H_8 = ***after(p_situation***, F_a (S_4);***i_situation***, F_a (S_2)***)***	(16)
H_9 = ***simultaneously(i_situation***, F_a (S_3);***p_situation***, F_a (S_1)***)***	(17)
H_{10} = ***simultaneously(i_situation***, F_a (S_3);***i_situation***, F_a (S_2) ***)***	(18)

Notes:

1. The predicate S_1 is unary.
2. The concept *"performance"* is interpreted as an ***i_situation.***
3. H_1, H_2, H_3, H_4, H_5, H_6, H_7, H_8, H_9, H_{10} -temporal ***relations.***
4. ***i_situation***- is an interval situation; ***p_situation*** -is a point situation.
5. ***t_subject***-is a transportable subject.
6. ***UTP***-utterance time point.
7. F_a - function of actualisation.

2.3 The idea of object-role interrelation

The SRA- elements are combined into SRA- formulas at the micro-level due to the mechanism of object-role interrelation. Let us examine this mechanism in

detail. Each SRA- element in MAMM gets a status of an individual concept (as, for example, ***relations*** S_1, S_2, S_3, S_4 in table 1), and can therefore be used as ***the subject*** or ***the attribute*** in ***the relation*** of the higher level. For this purpose in MAMM a special function of actualization $(Y=F_a(P))$ is introduced that sets in accordance for every logical relation P the concept Y from universe A of all individual constants $(Y \hat{I} A)$.

Thus, the ***T***-aspect of meaning (nontemporal ***relations*** in the clauses) for example 1 is described by the following formulas:

$$T_1 = S_1, \quad (19)$$

$$T_2 = S_4 \ \& \ S_5 \ . \quad (20)$$

Temporal ***relations*** (the ***N***-aspect) are described by the formulas:

$$N_1 = H_1 \ \& \ H_2 \ \& \ H_3, \quad (21)$$

$$N_2 = H_4 \ \& \ H_5 \ \& \ H_6 \ . \quad (22)$$

Because the conjunction link "when" determines a temporal ***relation*** between the parts of compound sentence, formulas for the ***TT***-aspect is as follow

$$TT = N_7 \quad (23)$$

and ***NN***-aspect is

$$NN = H_7 \ \& \ H_8 \ \& \ H_9 \ \& \ H_{10} \ . \quad (24)$$

The final MAMM-formula can be produced substituting (19-24) into expression (1). The process is known as a composition method [7]. The use of the composition method allows us to find logical values for expressions, which, strictly speaking, are the high-order ***relations***. As, for instance, expression (12).

The idea of semantic case and role has long been known [25,26,27,28].

2.4 MAMM and cognitive models

The natural language is a result of social agreement. Formally, the grammatical norm of a language (orthography, morphology, syntax etc.) is recorded in dictionaries, grammar books. However, a great part of semantics of language ability remains formally undescribed. One of the ways of a formal description of the language semantics is cognitive modelling.

In MAMM the NL- sentence meaning is viewed as a composition of ***relations***, covering, in general, various cognitive models. On the contrary, in a cognitive model links of ***relations*** are described which are associated due to its semantics. In figure 1 the semantic links of the SRA- element are shown, which can be described within a cognitive model.

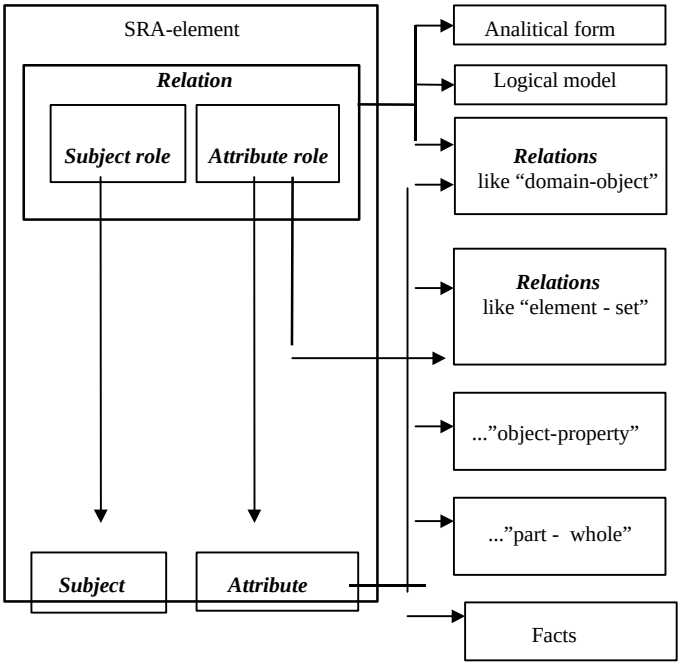

Figure 1. Semantic links of the SRA- element.

Notes:

1. Many ***relations*** in the NL are of a synthetic nature. We shall exemplify the ***relations***, corresponding to the government model of the verb *"to drive"* (the verb government model in terms of the SRA- element is described in [18]).

The analytic form for one of the meanings of this verb and for one of ***relations (to_drive_where)*** can be described as follows:

"to drive" = "to go by automobile and to direct it"

$$to\_drive\_where(t\_object, F_a(O_1); place, F_a(O_2)) =$$
$$to\_go\_where(t\_object, F_a(O_1); place, F_a(O_2)) \;\&$$
$$to\_go\_by\_what(t\_object, F_a(O_1); transport, F_a(\text{"automobile"})) \;\&$$
$$to\_direct\_what(director, F_a(O_1); directed, F_a(\text{"automobile"}))$$

where :

to_drive_where, to_go_where, to_go_by_what, to_direct_what are the names of appropriate ***relations;***

t_object,place,transport,director,directed are the names of the ***roles***;

t_object is an abbreviation of ***transportable_object;***

O_1, O_2, O_3 are the names of the variable for identifying the concepts;

"automobile" - an individual concept.

In the theory of conceptual dependencies [3] an analytic form (=conceptualization) is the basic method of knowledge representation. Criticism on this approach has been expressed in [4,5][1].

2. The logical model is a system of logical links for ***relations,*** entering into the cognitive model. Researches [28,29,30,31] can serve as examples of logical models (logics) for temporal ***relations***.

[1] We have a hypothesis about isomorphism between analytic form in MAMM and interpretation of meaning in the sense of Meaning <->Text Model [9]

3. The ***relations*** and the concepts (the ***subject*** and the ***atribute***) can belong to the definite domain. In this case they are domain - dependent and participate in ***relations*** like "domain-object". Hence, the ***relation to_drive_where*** can be referred to the domain "transport".
4. The ***relations*** like "element-set", "object-property", "part-whole" are described in details and used in various systems of knowledge representation [1].
5. Facts are the descriptions of concrete ***relations*** between the objects, in which they are involved during their life cycle.
6. The ***role*** is a set of concepts having definite properties which allow them to play this ***role*** in ***relation***.

3 SEMANTICS OF THE NL-UTTERANCE

The Manyaspect model of the meaning for NL-utterance can be obtained as an extension of MAMM for the NL-sentence. The utterance in example 1 hasn't explicit grammatical registration. For definiteness, let us interpret (following [21]) the sentence in example 1 as an utterance in example 2.

Example 2. *"I tell you when the performance was over, the actor Talantov went to the station."*

3.1 The structure of the NL-utterance meaning

Four components can be distinguished in the macro-structure of the NL-utterance meaning:

- basic communication component ***B***;
- presupposition communication component ***P***;
- component of the utterance circumstances ***C***;
- sentence meaning ***M***.

Therefore, MAMM-formula for the NL-utterance meaning (***UM***) is as follows:

$$UM = B \,\&\, P \,\&\, C \,\&\, M \,. \qquad (25)$$

The structure and the content of the sentence meaning (***M***) was viewed in detail in section 2. Now let us concentrate on representation of components ***B***, ***P*** and ***C*** from (24).

3.2 Basic communication component

The basic communication component(***B***) in (25) for example 2 can be represented as logical conjunction of two ***relations***:

$$B = B_1 \,\&\, B_2 \qquad (26)$$

$$B_1 = to\_inform\_whom(source, F_a("I"); reciever, F_a("you")) \qquad (27)$$

$$B_2 = to\_inform\_what(source, F_a("I"); message, F_a(M)) \qquad (28)$$

The semantics of these ***relations*** can be determined in the cognitive model of mental acts [32]. ***M*** is a meaning of the NL-sentence from (1).

3.3 Communication presupposition

When synthesizing the utterance a ***source*** (i.e.person who makes a ***message***) proceeds from definite suppositions about communication status of the ***receiver*** (i.e. a person who receives the ***message***).

$$P = P_1 \,\&\, P_2\,, \tag{29}$$

$$P_1 = to\_suppose\_what(thinking\_object, F_a\,("I"); presupposition, F_a\,(E1)), \tag{30}$$

$$P_2 = to\_suppose\_what(thinking\_object, F_a\,("I"); presupposition, F_a\,(E_2)), \tag{31}$$

where

$$E_1 = to\_have\_property(object, F_a\,(THEME_1); property, F_a\,(E_3)) \,\&\, to\_have\_value(property, F_a\,(E_3); value, F_a\,(E_4)),$$

$$E_2 = to\_have\_property(object, F_a\,(M); property, F_a\,(E_3)) \,\&\, to\_have\_value(property, F_a\,(E_3); value, F_a\,(E_5)),$$

$$THEME_1 = "when\ the\ performance\ was\ over",$$

$$E_3 = \langle KNOWNNESS\_TO\_RECIEVER \rangle,$$

$$E_4 = \langle KNOWN \rangle,\ E_5 = \langle UNKNOWN \rangle.$$

Concept meanings taken from the text are given in quotation marks ""; concept meanings taken from the knowledge base supposed are given in angular brackets <>; low case in bold italic means names of ***relations*** and ***roles***; E_1, E_2, E_3, E_4, E_5, $THEME_1$ are the names of individual concepts. ***M*** is the NL-sentence meaning from (1). In English (29) can be written as: *"The source supposes that theme is known for a receiver and the rheme is still unknown.*

3.4 Utterance circumstances

The utterance circumstances include the next factors:

- the utterance form;
- temporal circumstances of the utterance.

The utterance form is determined by a synthetic form of ***relation*** expressed by the verb "*to tell*" in example 2 and can be represented as:

$$C_1 = to\_have\_property(object, F_a\,(M); property, F_a\,(G_1)) \,\&\, to\_have\_value(property, F_a\,(G_1); value, F_a\,(G_2)) \tag{32}$$

$$G_1 = \langle FORM \rangle,\ G_2 = \langle SPOKEN \rangle$$

Temporal circumstances (C_2) of the utterance are determined by temporal ***relations***, concerned utterance. There is a simplified chronological diagram for the utterance of example 2 in figure.2.

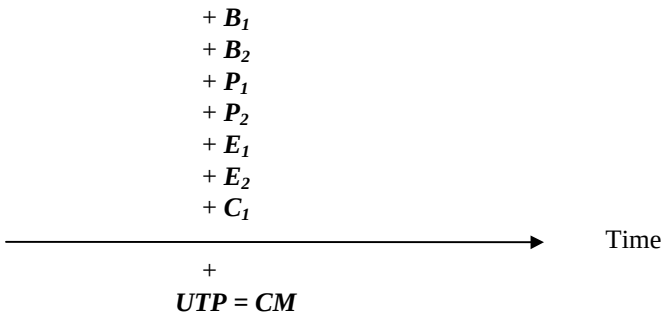

Figure 2. Chronological diagram of the temporal circumstances of the utterance in example 2.

$$C_2 = HR_1 \,\&\, HR_2 \,\&\, HR_3 \,\&\, HR_4 \,\&\, HR_5 \,\&\, HR_6 \,\&\, HR_7 \,\&\, HR_8, \quad (33)$$

where

$$HR_1 = simultanously(p\_situation, F_a\,(UTP);\ p\_situation, F_a\,(CM)), \quad (34)$$
$$HR_2 = simultanously(p\_situation, F_a\,(UTP);\ p\_situation, F_a\,(B_1)), \quad (35)$$
$$HR_3 = simultanously(p\_situation, F_a\,(UTP);\ p\_situation, F_a\,(B_2)), \quad (36)$$
$$HR_4 = simultanously(p\_situation, F_a\,(UTP);\ p\_situation, F_a\,(P_1)), \quad (37)$$
$$HR_5 = simultanously(p\_situation, F_a\,(UTP);\ p\_situation, F_a\,(P_2)), \quad (38)$$
$$HR_6 = simultanously(p\_situation, F_a\,(UTP);\ p\_situation, F_a\,(E_1)), \quad (39)$$
$$HR_7 = simultanously(p\_situation, F_a\,(UTP);\ p\_situation, F_a\,(E_2)), \quad (40)$$
$$HR_8 = simultanously(p\_situation, F_a\,(UTP);\ p\_situation, F_a\,(C_1)), \quad (41)$$

UTP - the utterance time point, ***CM*** - the current moment.
Accordingly, in (25) $C = C_1 \,\&\, C_2$.

3.5 Function of actualization and referential part of meaning

Reference [20] is substitution of concepts existing in the memory or in the field of view of agent into the logical form corresponding to the NL-utterance. MAMM has two mechanism of accounting for the referential aspects of utterance.

FUNCTION OF ACTUALISATION:
1) correlates to text fragments (mainly it is the noun phrases, (see n.5,6,10,11, in table 1) referring to individual and sets of individuals from universe ***A***.
2) correlates to every logical predicate individual concept from universe ***A***.

REFERENTIAL PART of meaning is additional information about a concept contained in the utterance if it is referred for the first time or is determined by the individual-set links, generic or attribute features or is determined in an indefinite form. In the MAMM the referential part of the NL-utterance meaning is included into the T-aspect of meaning.

3.6 Status of the value of truth

In MAMM-U utterances are assumed to be distinguished by the nature of their truth values.

So, two types of status of predicates can be distinguished: the status of modality and the status of completeness.

The status of modality can have four value:

- axiom (3);
- fact (2);
- hypothesis (1);
- unknown (0).

The status of completeness is determined by two values:

- primary information (1);
- inference result (0).

The numerical value of priority of the status is shown in brackets. The value of truth of compound expressions is estimated according to the statuses of modality and completeness of its components. Two rules are introduced for the composition of elements with different status of truth.

RULE OF GENERAL DECREASE OF STATUS.

- The component of MAMM-form with a lower value of priority decreases the general status of expression to its own level.

RULE OF SELECTIVE DECREASE OF STATUS.

- In some logical expressions for some combinations of truth values the component of MAMM-form with a lower value of priority does not necessarily decrease the general value of status to own level, if its truth value change can not influence the general value of truth.

In tables 2 and 3 examples of logical expressions are shown as an illustration of how the rule of selective decrease of status works. In these tables ***P1, P2*** are initial logical variables with a definite status of modality, ***P3*** is the result of the logical operation. The value of status is shown in brackets. It is obvious that in cases when the resulting value ***P3*** is insensitive to the changes of component ***P2*** with a lower status value it can be marked with a higher status value (strings 3 and 4 in table 2, strings 1 and 2 in table 3).

Table 2. Example of the composition of status of modality for the operation of logical conjunction (AND).

N	**P1(AXIOM)**	**P2(FACT)**	**P3 = P1 AND P2**
1	TRUE (AXIOM)	TRUE (FACT)	TRUE (FACT)
2	TRUE (AXIOM)	FALSE(FACT)	FALSE(FACT)
3	FALSE(AXIOM)	TRUE (FACT)	FALSE(AXIOM)
4	FALSE(AXIOM)	FALSE(FACT)	FALSE(AXIOM)

Table 3. Example of the composition of status of modality for the operation of logical disjunction (OR).

N	**P1(AXIOM)**	**P2(FACT)**	**P3 = P1 OR P2**
1	TRUE (AXIOM)	TRUE (FACT)	TRUE (AXIOM)
2	TRUE (AXIOM)	FALSE(FACT)	TRUE (AXIOM)
3	FALSE(AXIOM)	TRUE (FACT)	TRUE (FACT)
4	FALSE(AXIOM)	FALSE(FACT)	FALSE(FACT)

Thus, tools for processing utterances that are inhomogeneous in their composition are included in MAMM-U.

4 REPRESENTIVE POSSIBILITIES OF THE MODEL

Table 4 illustrates the role of various components (aspects) in the utterance meaning. There are 10 examples in the left column of the table. The first example corresponds to example 2 from part 3 of this paper. The following nine examples are composed on its basis by modifying. There are four columns in the right side of the table that show the changes of the utterance meaning components relate to the first example. Columns B, P, C and M correspond to the notation of components of meaning in the formula (25). Sign "+" (plus) indicates the change, sign "-" (minus) indicates no change of a meaning component.

Table 4. The examples of the change of meaning components.

N	Example	Change				Notes
		B	P	C	M	
1.	"I tell you that <M>."					1.
2.	"He cried to me that <M>."	+	-	+	-	2.
3.	"I asked him, if it was true that <M>."	+	+	+	-	3.
4.	"I asked him, when actor Talantov vent to the station."	+	+	+	+	4.
5.	"I told him that <M>	+	-	+	-	5.
6.	"Is it that really <M>?"	+	+	+	-	6.
7.	"Hardly <M>."	-	+	+	-	7.
8.	"Actor Talantov went to the station when the performance was over."	-	+	-	+	8.
9.	"I think that <M>."	+	+	+	-	9.

10.	"I report to you, that <M>."	-	-	+	-	10.

Notes:
1.This example is the starting pattern.
2.SOURCE and RECIEVER and the utterance time are changed.
3.RECIEVER and the utterance time are changed, a modal nuance and a question form appeared influencing the basic and the presupposition components.
4.RECIEVER, the utterance time and the question form are changed.
5.RECIEVER and the utterance time are changed.
6.Linguistic modality changes the components B,P,C.
7.The same.
8.Theme and rheme are changed. The attention was focused on the fact of the performance being over.
9.A modality nuance.
10.The form of utterance is changed.

The proposed model for the NL-utterance meaning representation has principal, mainly preliminary nature, and contains considerable potential to extend its possibilities. In this paper only one functional type of the utterance was review: a message. Representative possibilities should be considerably extended by including other types in it: question, request (command). The author did not consider such an important factor of the utterance as logical modality[7]. Researching of message with ritual nature: greeting, congratulation, farewell etc. is of interest. The subjective relation of a source to the message and recipient is uncounted circumstance of the utterance.

The author didn't review the question of identifying methods of the utterance meaning components. However, accounting, that some components of NL-utterance meaning have not a grammatical formulation, one may suppose that this question is not simple. The Meaning units grammar proposed in [18] allows to identification of explicit meaning units in the sentence. Thus, it can be supposed, that a specific semantic (or cognitive) procedure will be demanded to process the utterance. It should be similar to that ones used for processing ambiguities and polysemy in the NL-sentence [17]. The method suggested could be used in computer models of discourse and in text processing.

5 DISCUSSION

Any system for NL-phenomena meaning representation can be seen from three points of view: it is based on a mathematical formalism; it gives notation and it describes the facts of the natural language. So it would be more convenient to compare meaning representation systems separate by every of these parts.

The author considers that the approach to NL-sentence meaning representation described in [4] is the most similar to MAMM-U among other knowledge representation theories [1].

The MAMM-U and the conceptual graphs theory (CGT) are based on a common formal theory of predicate calculus.

The notation in CGT is closer to the graph type of representation, although a formula variant is also exists. However, the object-role notation accepted in

MAMM-U and based on object-role links and semantic primitives is more linguistics-oriented. Besides, it is cognitive-oriented because one of the condition for choosing SRA-elements during NL-utterance interpretation is its existence in the cognitive model of the agent.

But, most distinctly the differences between MAMM-U and the approach in [4] show themselves in the field of phenomenology.[1]

MAMM-U permits to describe such phenomena of NL-utterance as:

- semantic primitives in the utterance meaning [17];
- referential aspect of the utterance [20];
- communicative and illocutive function of the utterance [21,19];
- truth nature of the utterance and even of its parts.

6 CONCLUSION

The work is based on the concept notion of the existence of a logical representation of the NL-utterance meaning.

Basic ideas of the Manyaspect NL-sentence meaning model (MAMM) are described: the idea of meaning aspects; the idea of semantic primitives ***subject-relation-attribute;*** the idea of object-role interrelation. Shown are the links between the semantic primitives constituting the meaning of the sentence and the cognitive models which describe their semantics. MAMM-based approach to the NL-utterance meaning representation is demonstrated by the example of the assertion-type utterance, as a functional type of the utterance. The NL-utterance meaning structure is analysed. In MAMM-U there are four meaning components: the basic communication component; the component of communication presupposition; the component of utterance circumstances; the sentence meaning. The necessity of a cognitive model of mental acts is stressed to determine the semantics of the utterance meaning components. The described approach is under evaluation within the work with "Nedorosl", a laboratory computer system for language ability modelling.

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