

# Argumentation model based on the ontology of persuasion recipient

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**Abstract** - The article examines the cognitive structure of knowledge representation in the argumentation context, where the corresponding concept as a cognitive category is understood as a special kind of reasoning, as a rationalistic justification procedure, the basis of which is the mental representation of the subject's ontological models about the recipient. The issues of argumentation modeling are considered, regulatory mechanisms, language tools used as markers of the argumentation regulation process are investigated. The proposed method of an argumentation model constructing in prospect contributes to the development of ontolinguistic systems oriented to solving complex problems of automatic text processing that require semantic knowledge, as well as models and methods for constructing information and expert new generation systems.

**Keywords** - cognitive linguistics, ontology, argumentation model, persuasive discourse, frame, automated language processing.

## I. INTRODUCTION

Currently, logicians, cognitive scientists, psychologists, applied linguists, that means, scientists of various fields of knowledge, are engaged in the research of argumentation theory, since the study of this phenomenon contributes to the effective interaction of communicators in various communicative situations [3, 7, 8, 9, 12, 14, 15], including the process of teaching students of higher educational institutions [11, 13, 16]. The use of the scientific analysis results of the argumentation speech acts in the recognition procedure of language speakers is equally important [10]. In addition, such research insights are applicable to automated text processing in different languages.

There are several definitions of the term argumentation in modern linguistic science. Thus, some researchers consider argumentation as a communication process, in terms of which the subject of the speech (speaker) aims at convincing the addressee (recipient) of the truth/falsity of the proposed thesis [4, 5, 6], others consider the argumentation as a universal concept [1]. In our study, argumentation refers to a special kind of reasoning, based on new knowledge ontologization process in terms of mental representation of the speaker's ideas concerning the addressee (or the ontological models of the addressee).

## II. METHODOLOGY

The methodological and theoretical basis of the research is based on an integrative approach taking into account cognitive linguistics, psycholinguistics, pragmalinguistics, text linguistics and contrastive functional analysis data. Modeling methods in ontological research, structural methods, argumentative-functional and propositional analysis methods; cognitive and pragmatic analysis, as well as a number of supplementary methods are used in addition to general scientific analysis methods. The theoretical basis of this relies on the concepts of leading scientists in the field of argumentative ontology.

## III. RESULTS AND DISCUSSION

Argumentation as a cognitive event actualizes pieces of knowledge that act as components of a decision-making situation. In such a case, the mentality factor becomes the most significant one in a decision-making situation, meaning the mental state of the addressee, causing the implementation or non-realization of the potential action to which he is prompted by the subject of speech. The correlation of the decision making a conceptual world based on cause-effect relationships provides a basis for dividing the argumentative discourse into nominative argumentative discourse and integrative argumentative discourse. It should be noted that nominative and integrative arguments can be involved in the same argumentation speech act retaining their specific features.

The cognitive approach to the argumentation analysis assumes its frame representation, where the components of the cognitive situation are the following *classes-components* that are updated in the decision-making process:

1) **initial information situation** (volitional action choice). Verbal components with the meaning of the action are the language markers of the initial information situation: *this task must be solved ..., it is necessary to check the sequence of events, etc.;*

2) **problem situation** (the addressee does not see the problem in the situation being discussed by the speaker). Actualizers of the problem sense interpretation are the substantive components of the type *problem, question, etc.*, since the class of the problem situation is associated with the

process of forming a conceptual image of the expected situation, with the conceptual framework of a speech message;

3) **acceptable solution**, which implementation is affected by many alternative solutions and their results, the searching of the optimal one. Language markers of identifying the desired result are verbal components *to achieve, to receive, to gain*, etc.;

4) **ways to achieve the goal and solutions variants**, when the speaker's actions are focused on identifying possible tactics, including finding the optimal way to achieve the goal. In the verbal design of this class-component, the substantives *way, model, form, tool* are used;

5) **assessment**, which involves updating the basic values of the subject-speaker and the recipient in the decision-making process. The assessment is expressed by such adverbial components as *reasonably, order, admissibly*, etc.;

6) **persuasive strategy**, as a result of which the subject-speaker, by introducing new knowledge into the linguistic picture of the world, strengthens his own arguments. Reinforcement of the argumentation occurs through the use of class-modules with the actual graduation form, when the resulting situation acts as an important cause/condition (*this is only because of / accordingly, if/though still ...*); with the virtual graduation form, when the generated situation acts as a weak factor to justify the realization of the generating situation (*alright then, so be it*);

7) **propositional attitude of the subject**, which is understood as the "decision making" situation.

The propositional attitude reflects the attitude of the subject-speaker to objective reality and contains all the stages of the mental act:

a) perceptual attitude, which implies the construction of the real situation model in the consciousness of the subject-speaker: *I see/hear that ...*;

b) axiological (emotive) attitude, which semantic structure consists of the subject of a certain emotional state, the predicate of the emotional attitude and the object of the state: *I love, I'm afraid*;

c) an epistemic attitude, the attitude of the conscious subject to the content of the statement: *I know, I think*;

d) illocutionary attitude, involves the transmission and receiving of information by communicants: *I will say, I'm saying, I'm telling, I'm asking, I'm talking, I'm arguing, I'm debating*;

e) volitive attitude where the proposition of desirability/undesirability is perceived by the subject-speaker: *I want to, It is my desire to*;

8) illocution type strategy models that imply the power of persuasion in an argumentation speech act. The main components of the cognitive structure of this class are:

a) felicity conditions for the corresponding speech act, when the subject-speaker and the addressee know that there is a problem situation; the subject knows that there is an initial situation; in the situation under consideration there is a common value; the subject has the desired result, it is

reasonable to suppose that the proposition under discussion is true; the subject knows the possible results of solving the selected problem situation, on the basis of which he chooses the optimal solution in the form of a judgment; when the subject considers the proposal under discussion to be true and wants the addressee to have the same attitude towards it, the speaker believes that he does not have such an assessment in relation to the proposal under discussion; in the opinion of the subject-speaker, the initial situation is inconsistent with the accepted value; the subject-speaker believes that his decision will be supported by the proponent, etc.;

b) basic illocutionary acts, implying the use of the replica exchange strategy by the proponent and the opponent; applying a strategy with a consistent reasoning structure; the use of strategy, correlated with the value of the argument according to the scheme "argument - thesis".

Let us consider ways to integrate knowledge in the argumentative model of the world as exemplified in the Russian language. As the factual material shows, the markers of the regulative actions of communicants in the nominative argumentative discourse are multi-level language tools, which are divided into verbal and non-verbal.

Verbal markers of regulative actions in nominative argumentative discourse include basic predicates *to decide, to make a choice / come to a decision*; nominalized verbal predicates, which include the deverbative (propositional name) and verbal (or zero) components: *decide to go - decide to go anyway*.

The description of appearance, movement, posture should be attributed to the non-verbal markers of regulative actions in the nominative argumentative discourse (*He quickly rose from his seat and went surely ...; He blushed, his hands shook, his determined face disappeared, with his mouth agape, he prepared to say something*).

The regulatory tools of the considered argumentative discourse are:

1) discursive components used to expand the scope of the thesis, allowing, if necessary, to expand the thesis applicability (*in general, everything, majority, basically, wider*) or to narrow its scope (*in particular, primarily, especially, mainly*);

2) the arguments of the argumentative dialogue, to which the propositional markers of the argument refer to, indicate the beginning of the sequence of arguments, the order of the arguments (*for example, it is known / well-known, it is clear, let; in fact, consider, first, secondly, in addition, finally, besides*); contextual markers of the argument associated with the preceding text (*after all, otherwise, therefore, consequently, as a result, in view of this*);

3) markers based on the basic components of natural language argumentation. As a rule, these are markers associated with the source-argument (*according to/ as somebody puts it / as is argued by / as Ivanov / Petrov / Vasiliev notes; it is known that, it is well known, as previously noted, after all you said it*); pointing to the relationship between the speaker and the addressee (*just between us, frankly speaking, I'm telling you, well, if you*

want, if you want); justifying the truth of what was said (indeed, it is clear, after all, clearly);

4) markers-references to the temporal features of the arguments (first of all, secondly... let us consider, we will discuss);

5) argumentative markers associated with the reformulation of the components of the argumentative text (in other words, put it otherwise, put it that way).

Integrative argumentation, complicated by a top-level ontology, focuses on justification procedures in order to successfully integrate knowledge into the picture of the world: the speaker does not just introduce a thesis into the dialogue, but also draws attention to the cause-and-effect relations known to him and related to the thesis. In the ontology of argumentation, the “integrative argumentation” concept can be represented by causal and incausal classes of conditionality. In the causal fragment of the integrative argumentation concept, the main unambiguous representatives are two separate situations that are in cause-and-effect relations, in these circumstances, the signs of persuasiveness and verifiability are essential, in some situations the denotative aspect is important, and in others - the speaker's attitude. In the final subclass, one of the components of the semantic constituent is the speaker's personal activity. In the conditionality subclass, the idea of conditionality concept requires the presence of an alternative in the fulfillment of the event-condition and the event-effect and can be represented by the following subclasses: real condition; potential condition; unreal condition.

In the ontology systems design (“specialized IR thesaurus for automated text processing” [2, p. 5]), only the categorial hierarchical taxonomy of concepts is often described. At the same time, complex cases involving combined (convergent) axioms for expressing relations between concepts and the organization of their interpretations remain an unsolved problem. The corresponding integrative persuasiveness can be formed by homogeneous (categorial) relations: causal, final, conditional and concessive, as well as heterogeneous. For example, integrative persuasiveness with combined causal relations has the following structure in the Russian language:

1) homogeneous relations:

a) categorial semantic coordinates “causality + finality” (one event of the given situation is the real/potential result of another situation, the conditioned situation is interpreted as a goal (the goal assumes the subject's personal activity): *Having taken sole possession of the house, Ivan Kuzmich immediately sent for us and in the meanwhile locked Palashka in the storeroom to prevent her from eavesdropping on us* (A. Pushkin);

b) categorial semantic coordinates “causality + conditionality” (the event is considered in terms of the realized opportunity): *The boy did not attend the lessons because he was ill. - The boy did not attend the lessons if he was ill;*

c) categorial semantic coordinates “causality + concession” (the consequence in the deterministic construction partially contradicts the expected result): *Why*

*did she suddenly burst into tears? – She was so overjoyed! - There are times when eyes are filled with tears of joy;*

2) heterogeneous (general category) relations:

a) “causality + temporality” (a consequence of two interrelated events: one event affects the other by their temporal correlation): *After the wind stops blowing, you can hear how their leaves chirp* (M. Sholokhov);

b) “causality + locality” (situations generating an action): - *And they found it under the table;*

c) “causality + object”: *He shouldn't be afraid that he will be bothered with questions* (V. Kaverin);

d) “causality + attribute” (the attribute component acts as an actualizing feature: reveals simultaneously with the action and names the reason for this action): *A person who cannot regain self-control at the right time can make a lot of mistakes;*

e) “causality + manner” (the course nature of the action as a cause): *His red face matching his caftan was so confused, he was sweating profusely that even his beard and red drooping moustache were strewn with small beads* (M. Sholokhov);

f) “causality + comparison” (the attitude of the speaker to objective reality is of a causal nature): *Kum with his mouth open turned into stone; his eyes bulged as if they wanted to shoot; gaping fingers remained motionless in the air* (N. Gogol);

g) “causality + conjunction / disjunction”; closeness of the model (the introduction of the third situation destroys the cause-and-effect relations): *Pass the time he spent whole days sitting on a plank bed, cutting spoons from wood, hollowing out bowls, handling toy figures of people and animals from softwood* (M. Sholokhov).

As can be seen from the examples, the listed components of the ontology object model have their own specific structure, which should be taken into account in developing the system of general access to information. An ontology combined on the basis of causal and incausal, as well as combined communication is illustrated by the scheme of the Protégé 5 system (Figure 1).

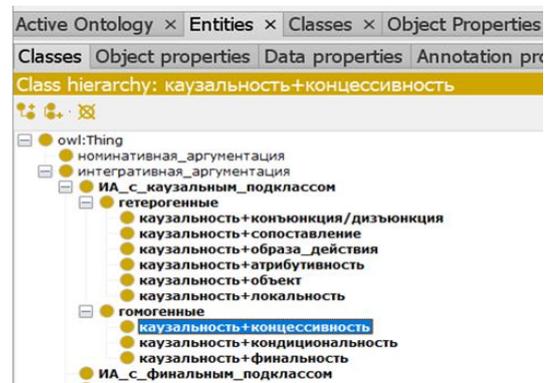


Fig. 1. Scheme of the Protégé 5 system

The markers of regulative actions of communicants in argumentative integrative discourse are multi-level language tools. Among these regulatory tools are linguistic patterns allowing to build a semantic model of an argumentative text

and, moreover, a taxonomy of concepts of a particular subject field. The components of the patterns are lexemes-literals, grammatical categories of a particular language.

Let us consider the conceptual scheme of lexical patterns (lexemes-literals). Procedure as a comparison of the concepts of ontologies and language patterns can have various schemes, in particular, balancing parts of the concept system and the system of lexical meanings, i.e. the ontologies of the concept under consideration should be directly reflected in linguistic meanings (each concept has a set of synonyms, and their features are described in additional intraconceptual structures).

Within the framework of the proposed approach, taxa assigned to a certain semantic class act as a lexical model, when the class hierarchy allows assigning one or another taxon to a certain hierarchy level, more general or specific, with inheritance of the general class properties. These units may also have the necessary data to describe the valence structure of predicate words:

- 1) causality – the reason, etc.;
- 2) finality – goal;
- 3) concession – despite, although and etc.

In argumentative discourses, the most frequent lexico-syntactic patterns are:

- 1) taxis markers:
  - a) hypotactic relative markers: *because*;
  - b) paratactic – tie-relativities: *and, but: that (those)*;
  - c) polypredicative: synthetic with a dependent predicate in the form of participles;
- 2) non-taxis markers (event content is devoid of modal and temporal characteristics):
  - a) substantive causative syntaxes: active (central) causatives *from + N, with + N, because of + N, due to + N, as a result of + N, as a consequence of + N, by virtue of + N* (their etymological certainty clearly indicates causal meaning);
  - b) adverbial components *for some reason, in a state of drunkenness, through stupidity* and etc.

It should be emphasized that the markers of integrative argumentation are often typed lexical markers that interact with the grammatical organization of a specific structure, in particular, the following components are frequent in concessive subconcepts:

- a) adverbial components of the type *vainly* as phraseological means of communication; correlative adverbial components of the type *yet, already*, adverbial combinations of temporal character of the type *half an hour before*;
- b) set prepositional-nominal pronominal combinations of the type *meanwhile*.

In the theory of argumentation, special attention is paid to the text as a "universal means of argumentation". A necessary condition for the qualification of a text as an argumentative is its logical structure, traditionally defined as

"a set of reasons (arguments)", given "to support any previously put forward statement, i.e. thesis" [5, 6]. In the theory of argumentation, a text is considered as a means of transmitting an argumentative process, carrier's invariant model of the corresponding process, as a textual implementation, and as a result of the implementation of a cognitive model of argumentative activity. The effectiveness of the text in the argumentation depends on the logical, psychological, strategic, etc. approaches. In order to extract information from text successfully, the information system must have some textual information associated with the system model of integrative argumentative relations, which gives the researcher an idea about the logical culture level of the author of the text.

Proposed solutions for automatic text processing are also based on the notion of a genre as a set of logical-compositional, formal-linguistic and lexico-grammatical components (certain genre vocabulary, certain formal segments), the logical-compositional structure of the text is determined on the basis of the genre markers lexicon and patterns that highlight content blocks. When choosing a classifying attribute of integrative argumentation, it is necessary to take into account the specifics of the relevant texts: their structural component composition, the model of causation and etc. The main functional positions of causal markers in the argumentative discourse, as the practical material of the compared languages shows, are: a) an introductory position aiming at defining the topic (the tonality is determined, the prospective synsemantic direction is realized, cataphoric connections are established: coherence and integrity of argumentative texts is ensured); b) the medial position, which plays a text-forming role on the basis of combining contact and distant constructions, retains the retrospective semantic focus of the text; c) the final position (an integrative argumentative text-complex, transmitting summarized information, preserving retrospective synsemantic orientation).

It should be noted that the considered modules of integrative argumentation with a conditional marker in most cases represent a macrostructure of a mosaic type, in particular, an integrative module "reasoning" can act as reasoning-proof, reasoning-thinking, reasoning-explaining.

#### IV. CONCLUSION

Thus, the cognitive structure of knowledge representation in the context of argumentation can be represented as a rational justification procedure, the basis of which is the mental representation of the subject's ontological models about the addressee. The language tools used as markers for regulating the argumentation process are varied. The proposed method of constructing a model of argumentation in the future contributes to the development of models and methods for constructing information, expert systems of the new generation based on knowledge.

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