

Parallel Language and Semantic Treatment in AGN

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Abstract: *AGN is a Generalized Net model, developed for simulating the cognitive process of natural language comprehension. It allows a more global representation, on a high level of abstraction, of overall cognitive process of message acquisition. AGN imitates the cognitive system's functions of control and coordination of the included sub-processes, some of which run in parallel. The treatment and processing of information includes joint operations in two knowledge spaces – language and semantics. The functioning of AGN can be combined with a database to represent human memory with structured knowledge. For this purpose, language is formalised and presented as Language Information System (LIS).*

This leads to the development of a database structure based on human cognitive resources, semantic primitives, semantic operators, syntactic rules and data. In LIS, the grammatical rules of the language are related to operators in the semantic space. The method is applied for modelling a specific grammatical rule (secondary predication in Russian). The results of applying LIS are consistent with the stages of treatment, modelled with AGN. The processing of examples from the linguistics domain are tracked by the transitions of AGN, which perform operations in two knowledge spaces. Analysis and the tracking of these examples suggests that the mechanisms of language comprehension are strongly assisted by a Top-down information flow, based on semantic primitives and operators. The result of this formalization supports the idea that AGN model can be combined with a database, which represents the structure of memory knowledge.

Keywords: *natural language processing, generalized net, parallel treatment.*

1. Introduction

The presented model is elaborated in result of cognitive modeling approach. It considers at length the essential cognitive principles of natural language processing with regards of some particularities of human memory. The basic assumption is that constructing meaning is a dynamic process resulting of a two-way flow of information – the flow gathered through the senses (Bottom-up processing), and the flow of the information which is stored and classified in memory (Top-down processing)¹. The presented paper represents a development of the model, called Association Cup Model for natural language comprehension [4], which has been further formalized using a Generalized Net and called AGN. AGN (Fig. 1) represents the cognitive system, which insures the control mechanism for overseeing different levels of information processing. The model reproduces the main stages of treating information, conducted by natural language. The used formalism offers several advantages: 1) it allows a formal description of the cognitive process, taken as whole; 2) it permits reproduction of the top-down and bottom-up information flows; 3) it makes possible the representation of the interactions between two types of human memory – Long Term Memory (LTM) and Working Memory (WM). The development of AGN and its parts have been presented in a number of papers [4-7, 11, 8] and will be presented here shortly².

The Top-knowledge, stored in LTM, is organized in two related spaces³ – the *language space* (as a system of lexical units and syntactic rules) and the *semantic space* (the semantic representation of the world as a system of semantic primitives and rules). They have respectively two underlying structures – the word-forms graph WG, expressed by the γ -token, and the semantic net NSet, expressed by the σ -token. Tokens γ and σ are thought as structures, which elements accumulate expectation/activation during the message acquisition. AGN has access to each of them on two places – one “retrieval” place (Z_4 and Z_{11}) and one place for storing expectation/activation (Z_{24} and Z_{25}). The result of the Top-down flow is stored in WG as “expectation” of word-forms⁴. Four sources of expectation are modeled. Two are related to the language – the memorized language practice, called “primary association” and the knowledge of grammatical rules. Two other sources of expectation are due to semantic activation: the listening-comprehension “message feed-back” (caused directly by the word-forms in the message) and the “secondary association” (semantic activation, accumulated because of the sequence of the message word-forms).

AGN treats language message, consisting in sentence-fragments, formally expressed as a sequence of α -tokens. Each α -token, traveling from the input to the final position of the net, is submitted to consequent treatments, performed on the transitions Z_i . AGN transitions $Z_1 - Z_{29}$ imitate the phases of the process of speech perception. The information, obtained by the system, is formalized as α -token’s characteristics, which are acquired when crossing the transitions. The Top-down

¹ Concerning the cognitive aspects of language processing, the constraints on linguistic performance come mostly from the top-down information processing.

² Here the numberings, the names of procedures etc. follow the initial description of AGN, given by Slavova [6].

³ Most cognitive researchers agree on the different nature of the language knowledge and the conceptual knowledge, including their separate localization on the cortex.

⁴ It is known that the capacities of speech perception do not allow capturing all the pronounced phonemes. In fact, the cognitive system constructs the missed, but “expected” content of the message. The same top-down phenomenon is available when reading texts.

information flow assigns new characteristics to the “traveling up” signal, which interacts with LTM structures. To imitate the parallel “emergence” of the gathered information of different type, the α -token splits, follows different pathways and terminates by fusing all obtained characteristics into an internal lexical and semantic representation of the message content. Several procedures are included in the process. The procedures, related to language are expressed by λ -tokens, the procedures, related to semantics are expressed with ϕ -tokens and the “mental dictionary”, giving the relations between the elements of WG and NSet is expressed by means of γ -tokens.

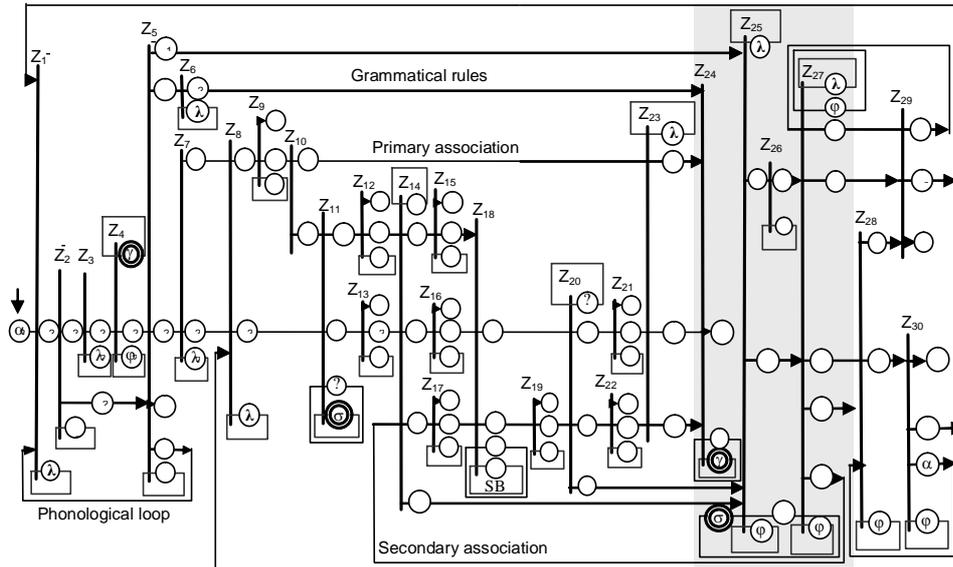


Fig. 1. AGN-Generalized Net model of process of message acquisition

Stages of treatment. Initially, token α enters the net with characteristics “Phonological features”. Transition Z_1 simulates the stage of segmentation of the received signal using prosodic knowledge. Transition Z_2 simulates the role of auditory sensory memory. Transition Z_3 corresponds to the stage of phonemes recognition, modeled as a process of comparison of the received signal with the phonological store in LTM, with working memory temporary phonological storage. Transition Z_4 is to simulate a process of comparison of the recognized phonetic content with the available lexical knowledge, retrieved from WG. Transition Z_5 simulates the accepting or rejecting the retrieved word-form for further treatment. Transitions Z_6 to Z_{24} represent a Working Memory (WM) Sub-Net⁵ where the two information flows meet⁶ and generate expectation/activation. Multiple transitions in this part are connected to LTM-tokens, producing lists of LTM knowledge (lexeme representatives, synonyms, homonyms, concepts, attributes etc.) The sub-net imitates limited WM resource and ‘concentration’ on the message content by retaining only the heads of the lists, sorted following the accumulated activation. On Z_{24} the expectation from all pathways is overlapped and stored in the elements of WG (see also Fig. 3, token γ on place l_{82}). Transition Z_{25} simulates the activation of the semantic net from the message word-forms and the

⁵ This sub-net is presented in details in [7].

⁶ According to the most part of the existing in cognitive science theories and models of memory, the Top-down and the Bottom-up flows meet using Working Memory resources.

parallel capturing of the partial syntactic structure of the sentence. Transition Z_{26} is to model working memory space for lexical units which have obtained an internal semantic representation, as they have activated their corresponding NSet elements. Transition Z_{27} expresses the mental process of analyzing the entire sentence after its last word-form has been perceived. Transition Z_{28} simulates the extraction of basic semantic roles from the syntax structure, using feedback information from the message memory. Transition Z_{29} simulates the mental processes of rechecking the memorized sentence. Tokens α are stored with the obtained characteristics in the message memory, re-represented by transition Z_{30} .

The Generalized Net approach has allowed formalizing, on a high level of abstraction, the cognitive process of message acquisition. This representation allows incorporation of sub-nets and separate modules, such as databases, neuron nets etc. Such an approach starts to be used in hybrid nets in AI [1].

2. An information system approach to language

The generalized net model suggests that transitions Z_{25} and Z_{27} have to be formalized as running in two knowledge spaces. The corresponding procedures have to be related to the elements and to the rules of the semantics and the language space. In AGN, the correspondences between these spaces are modeled by means of the “mental dictionary” (token ? in Fig. 1), containing the relations between the lexical units in WG and the elements of the semantic net NSet. The two spaces are expressed as autonomous structures. A sequence of questions appears concerning the simultaneous operations in WG and NSet. That has led to a trial to represent language in a more general way.

The attempt to formalize human language as an Information System – a Language Information System (LIS), is presented in [11]. It is assumed that LIS is constructed on the bases of semantic primitives and operators on them. It is shown how LIS operates on the example of a concrete grammatical rule in Russian – the Secondary predication. That rule is rather particular, as it allows for the secondary predicates two case markings (Instrumental/Nominative), which assign to the sentences different meaning:

- a. *Maria prisla ustalaja* /-nominative.
 - b. *Maria prisla ustaloj* /-instrumental.
- Mary arrived tired.

The semantics of Russian secondary predication has been examined a lot by the specialists in linguistics and the obtained results and explanations are not uniform.

The LIS reasoning has been followed in order to construct a database in which exists simultaneously the language level and the semantic level, with their structures, interconnected (Fig. 2). For the purposes of this realization, several linguistics studies were analyzed. A revised version of the theory “event structure” [3, 12, 13], examining the language semantics primitives, has been employed.

Examples of statements, taken from the linguistics studies of secondary predication (53 sentences) were examined using this “semantics database”. The examples were assigned two levels of representation (Re and Se in Table 1) in order to imitate phases of semantic-levels-translation of language data to semantic primitives and operators. The basic semantic categories that were used are “concept”,

“characteristic”, “state” and “event”. The proposed for the study semantic operators were: “assign characteristic”, “Choose State” and “chunk in new concept”. Using queries over the modeled in the DB parameters, several guesses about the semantic interpretation of secondary predication were checked. It came out that the use of this LIS structure explains the semantics of the secondary predication in a clear way. The provided analysis suggests that the case marking of the secondary predicate does not influence the structure of the matrix verb’s event⁷. It appeared that the case marking of the secondary predicate implies meaning of a “Choose State” operator in the case of Instrumental and an “assign characteristic” in the case of Nominative.

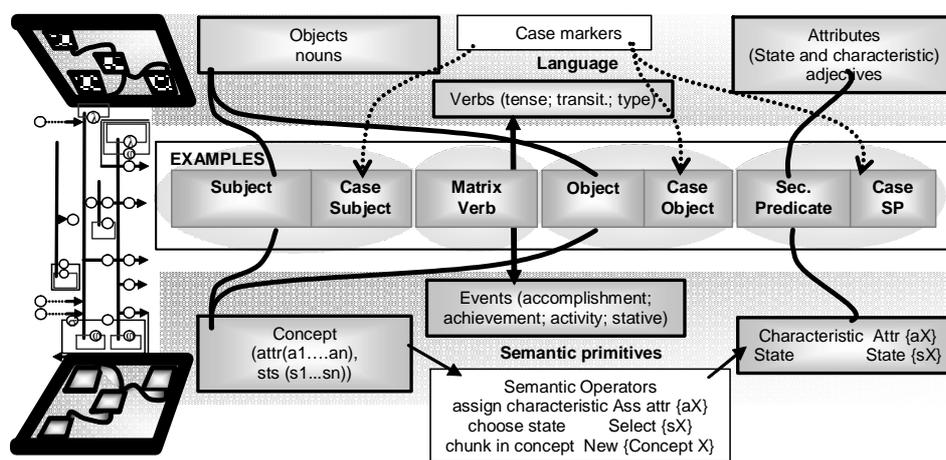


Fig. 2. The database design

That approach permitted to figure out that there are relations between the purely language features and semantic operators. Such assumption gives an operational basis for the joint semantic-language operations and leads to a solution of the problem of parallel treatment on Z_{25} and Z_{27} . The LTM can be presented as a database, in which exist simultaneously the language level and the semantic level (Fig. 2), with their structures, interconnected. The further analysis, provided in this paper, aims to examine the treatment, performed on transitions Z_{25} and Z_{27} ⁸, which has to transmit the grammatical information to semantic operations and to carry out semantic verifications of the grammatical solutions.

3. Parallel treatment in AGN

One unexpected result, coming from the analysis of query-results of the “semantic database” is that for intransitive verbs the “Choose State” operator is applied always to the state of subject, but for transitive verbs it is applied to both - the state of subject and to the state of object, as it is in the statements StA and StB in Table 1⁹. Obviously, in the statement StA “ripe” is the state of the object, and in StB – the state “tired” is the state of the subject. As it is seen, there are not case markers leading to these

⁷ Some linguistic theories are in agreement with this result, but some are not.

⁸ The formal descriptions of Z_{25} and Z_{27} have been adjusted after the presented here study.

⁹ The examined here examples of statements are from the “LIS on the Example of Russian Secondary Predication” [11].

different semantic solutions. The two sentences have canonic for Russian word-order Subject-Predicate-Object (S-P-O). From the point of view of AGN treatment, the procedures on Z_{25} and Z_{27} have to “attach” the word-form “ripe” to the object “bananas”, when treating StA and the word-form “tired” to subject “I” when treating StB. The analysis which follows confirms that during the language processing AGN has to translate the grammatical rules to basic semantic operations.

Table 1

<i>StA</i>				
Ex	Ja	Pokupaju	Banany	Spelymi
Re	<i>I/-nom</i> <i>I (concept)</i> <i>attr(a1....an), sts (s1....sn)</i>	<i>Buy</i> <i>Buy</i>	<i>bananas/-acc</i> <i>bananas (concept)</i> <i>attr(a1....an), sts (s1....sn)</i>	<i>ripe/-instr</i> <i>ripe (state)</i>
Se	<i>I (concept)</i> <i>attr(a1....an), sts (s1....sn)</i>	<i>Buy</i>	<i>bananas-ripe (selected state)</i> <i>in state {sX}</i>	
<i>StB</i>				
Ex	<u>Don</u>	<u>Piset</u>	<u>Pis'mo</u>	<u>Ustalyim</u>
Re	<i>Don/-nom</i> <i>Don (concept)</i> <i>attr(a1....an), sts (s1....sn)</i>	<i>Writes</i> <i>Writes</i>	<i>letter/-acc</i> <i>letter (concept)</i> <i>attr(a1....an), sts (s1....sn)</i>	<i>tired/-instr</i> <i>tired (state)</i> <i>state {sX}</i>
Se	<i>Don-tired (selected state)</i> <i>in state {sX}</i>	<i>Writes</i>	<i>letter (concept)</i> <i>attr(a1....an), sts (s1....sn)</i>	

Transition Z_{25} (Fig. 3) simulates two processes, which run in parallel. The first is the activation of the semantic space by the message word-forms W_i and corresponds to building a mental image of W_i in terms of concepts and features. The second one is the detection of grammatically related words-chains in the sentence. It is supposed that the cognitive system first assembles a fractional representation of the sentence-meaning structure (coupled words for example) by consulting the semantic net for incompatibilities, as the determined word-chains have to be coherent with the characteristics of the corresponding semantic primitives.

The α -token enters Z_{25} with the following characteristics, coming from positions: $l_{12} - W_i + \text{GrFtrs} - \text{word-forms } W_i$, assumed to be perceived (on transition Z_5) with their grammatical features GrFtrs;

$l_{49} - \text{Ntct}$ (from the message feed back pathway) – the head of the list of nodes of the semantic NSet, corresponding to W_i . The correspondence is found on Z_{11} using the mental dictionary (?-token). Another characteristics, obtained by α on Z_{11} are couples $WN_k: (W_i, \text{NSet})$, representing the word-forms W_i , assembled with their corresponding nodes of NSet.

$l_{69} - \text{NtSBlist}$ – the first n of list of NSet nodes, closed to the activated nodes Ntct, for example the attributes of the concepts (the “message feedback”), as well as by the received up to the moment W_i , arranged following the number of their manifestations in a semantic buffer SB (the secondary association).

$$Z_{25} = \{ \{ l_{12}, l_{49}, l_{69}, l_{70}, l_{83}, l_{89} \}, \{ l_{83}, l_{85}, l_{87}, l_{88}, l_{89} \},$$

	l_{83}	l_{85}	l_{87}	l_{88}	l_{89}
l_{12}	true	true	false	false	false
l_{49}	false	true	false	false	true
l_{69}	false	false	false	false	true
l_{70}	true	false	false	true	false
l_{83}	true	false	true	false	false
l_{89}	false	false	false	true	true,

$$\vee (\wedge (l_{70}, l_{83}, l_{12}), \wedge (l_{89}, \vee (l_{49}, l_{69}))) >.$$

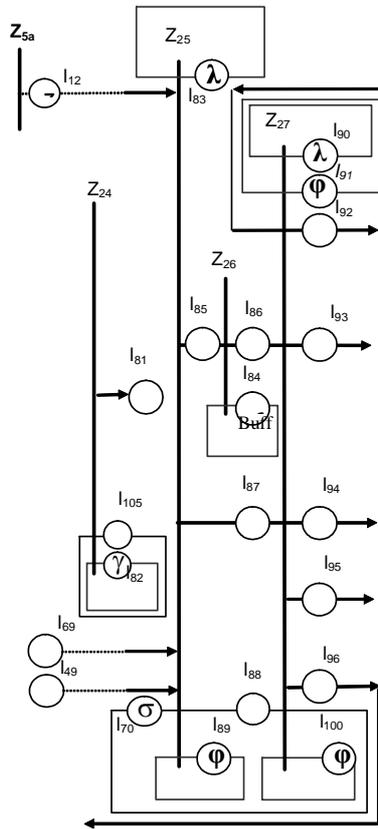


Fig. 3. Transitions, based on two spaces

On transition Z_{25} :

λ -token "Language knowledge – syntax and grammar" turns without changes on l_{83} with:

"word-forms concordance – Procedure TreeBranches";

σ -token, the Semantic net NSet stays on l_{70} :
"Semantic net elements – NSet";

ϕ -token "Cognitive process – semantic activation" turns without changing its characteristics on place l_{89} with

"Storage of activation in NSet nodes - Procedure SemA".

TreeBranches is language dependent. It expresses the memorized knowledge about the basic language rules, for example the word concordance, case markers etc. TreeBranches receives (from position l_{12}) the word-forms W_i with their grammatical features GrFtrs, discovered on Z_4 .

After Z_{25} , on place l_{88} , σ -token (the semantic net) takes the characteristic:

"ANet = SemA (Ntct, NtSBlist) – activation of NSet elements and edges",

on l_{87} token α takes the characteristic

"ParSynStr = TreeBranches (NSet, GrFtrs) – Partial syntax structure."

on l_{85} are transmitted $W_i + GrFtrs$ coming from l_{12} and the couples $WN_k: (W_i, NSet_j)$ coming from l_{49}

Transition Z_{26} represents a WM buffer ($Buff$), queued on l_{84} and transmitted to l_{86} . It stores the $W_i + GrFtrs$, with their corresponding semantic nodes – the couples $WN_k: (W_i, NSet_j)$ and represents the "lexical memory", storing the words with their meanings.

Transition Z_{27} expresses the mental process of analyzing the entire sentence after its last word-form has been perceived. It is assumed that two parallel processes take place at this time-moment: 1 the sentence syntax structure is clarified and 2 the semantic focus Nt^1 of the sentence is detected (this is not examined here).

The brought by α characteristics, acquired before Z_{27} consists of:

from l_{87} – partial syntax representation ParSynStr (edges of the syntax tree);

from l_{86} – word-forms $W_i + GrFtrs$, with their corresponding nodes of NSet in

Buff on Z_{26} .

Transition Z_{27} employs from l_{88} the activation ANet of the semantic net NSet as well as its structure, as it is assumed that the syntax tree has to be recognized with semantic justification.

	l_{70}	l_{90}	l_{91}	l_{92}	l_{93}	l_{94}	l_{95}	l_{96}	l_{100}
l_{86}	false	true	false	true	true	false	false	false	false
l_{87}	false	true	false	false	false	true	false	false	false
l_{88}	true	false	true	false	false	false	true	true	true
l_{90}	false	true	true	false	false	false	false	false	false
l_{91}	false	false	true	false	true	true	false	false	false
l_{99}	false	true	false						
l_{100}	false	false	false	false	false	false	true	true	true,

$$\vee(\wedge(\vee(l_{86}, l_{99}), \wedge(l_{88}, l_{90}, l_{91})), \wedge(l_{88}, l_{100}))>$$

The following procedures are running on Z_{27} :

λ -token “Syntax knowledge” stays on place l_{90} without changing its characteristic “Syntax structure discovery – Procedure *Parse*”;

ϕ -token “comparing semantics and syntax” stays on l_{91} with a fixed procedure “Comparing – Procedure *Comp*”;

ϕ -token “focus determination” stays on place l_{100} with “Semantic centre localization – Procedure *DetSC*”.

After Z_{27} , on places l_{93} and l_{94} , token α takes on the characteristic “TRes = Comp (Parse(Buff, ParSynStr), ANet) – Complete syntax structure” and in places l_{95} and l_{96} the α -token takes the characteristic:

“Nt¹ = DetSC (NSet, ANet) – Momentary semantic centre”

Comp may have two results: 1) tree construction failed; 2) syntax tree TRes.

4. Tracking of examples

The provided further analysis demonstrates that the language treatment uses both – the stored in the memory structure of the semantic space and the activation (by the message content) of the semantic elements. The treatment of the two statements – StA and StB on transitions Z_{25} and Z_{27} is given separately bellow.

Statement StA

Z_{25} : Transition Z_{25} receives from its “language” input l_{12} the word-forms W_i with their grammatical features GrFtrs, such as gender, plural, case markers etc. (Table 2).

Table 2. Content of *Buff*

W_i :	GrFtrs:
Ia	<i>Pers. pronoun 1 person singular Nominative</i>
pokupaju	<i>Verb 1 person singular</i>
banany	<i>Noun masculine plural Accusative</i>
spelymi	<i>Adjective plural Instrumental</i>

Table 3

NSet, label :
<i>I</i>
<i>Buy</i>
<i>Bananas</i>
<i>Ripe</i>

On the other hand, AGN brings from place l_{49} to the “semantic” input of Z_{25} the couples WN_k : (W_i , NSet_{*i*}) as characteristics of α . These couples represent the message word-forms with the labels of their corresponding nodes of NSet. The used W_i have an unique corresponding element in NSet as they don’t have homonyms. The labels of NSet elements are further given with English names (Table 3). The transmitted from l_{49} (the message feedback) to Z_{25} couples (W_i , NSet_{*i*}) are:

$WN_k : \{(Ia, I), (pokupaju, Buy), (banany, Bananas), (spelymi, Ripe)\}$.

The procedure *TreeBranches* has to discover word-form concordances and to “propose” them as possible groupings for the further syntactic treatment, performed on Z_{27} . Following the brought grammatical features GrFtrs, *TreeBranches* will assemble “Ia” with the verb “pokupaju”. The W “spelymi” will be grouped with “banany” (see Table 3).

The grammatical treatment result of transition Z_{25} is the following:

TreeBranches (0, GrFtrs):

edge A1 : {Ia, pokupaju} {I, buy}

edge A2 : {banany, spelymi} {bananas, ripe}

At the same time-moment, the corresponding of W_i nodes of NSet are activated by the procedure *SemA*: ANet = SemA (Ntct, NtSBlist) – activation of NSet elements”

ANet =

= {Ntct : {I (concept), Buy (activity), Banana (concept), Ripe (characteristic)},
NtSBlist: {{att&sts. of I}, {nodes, related to Buy}, {attr&sts. of Banana},
{features, closed to Ripe}}}

These activated nodes support the grammatical result as, on the semantic level, concepts are actants of activities and possess characteristics. The result of *TreeBranches* is:

ParSynStr =

= *TreeBranches* (ANet, GrFtrs) – {{Ia, pokupaju}, {banany, spelymi}}

The obtained edges of the partial syntactic structure ParSynStr and W_i , stored on the buffer place l_{84} with their grammatical features GrFtrs, are transmitted to Z_{27} for further treatment.

Z_{27} : To the input of Z_{27} come results from:

l_{86} – the content of Buff : W_i + GrFtrs (Table 2),

WN_k : the couples {(Ia, I), (pokupaju, Buy), (banany, Bananas), (spelymi, Ripe)};

l_{87} – the edges of the partial tree “ParSynStr = {{Ia, pokupaju}, {banany, spelymi}}”

l_{88} – the semantic net NSet with the activated nodes ANet.

Transition Z_{27} has to perform first the language procedure *Parse*(Buff, ParSynStr) and after that to apply to its result the semantic check of the procedure *Comp* (*Parse*(), ANet).

The procedure *Parse* on l_{90} is a λ -token “Syntax knowledge”. The sentence in StA has the correct word-order S-P-O and the canonic case markings for the Subject and the Object (following the grammatical rules, the Object is in accusative). The result of *Parse* will be:

Parse(Buff, ParSynStr)=

= {S:(Ia, I)/-nom}; {P:(pokupaju, Buy)}; {O:(banany, Bananas)/acc}, {SP:(spelymi, Ripe)/-instr}

As supposed, *Parse* will translate the Instr. case marking on “spelymi” as a *Choose State* operator in the semantic space. Checking the first member of the couples WN_k , *Parse* will discover the couple (spelymi, Ripe) and will apply *Choose State* to the node *Ripe* (characteristic) in the semantic space NSet. *Choose State* will search to attach *Ripe* as a state of an activated concept¹⁰ in Ntct. As

¹⁰ Only concepts have states.

l_{88} – the semantic net NSet with the activated nodes ANet.

Transition Z_{27} has to perform first the language procedure $Parse(Buff, ParSynStr)$, which will relate “Don” as subject and “pis’mo” as Object of the sentence. As the available couples of “ustalym” are two, $Parse$ will build two solutions:

$$Parse(Buff, ParSynStr) = \\ [\{ S: (Don, Don) / -nom \}; \{ P: (piset, writes) \}; \{ O: (pis' mo, letter) / -acc \}, \\ SP: (ustalym, tired) / -instr \}] \text{ OR} \\ [\{ S: (Don, Don) / -nom \}, \{ SP: (ustalym, tired) / -instr \}; \{ P: (piset, \\ writes) \}; \{ O: (pis' mo, letter) / -acc \}].$$

$Parse$ will translate the Instr. case marking on “spelymi” as a *Choose State* operator in the semantic space. Checking the first member of the couples WN_k , $Parse$ will discover the couple (ustalym, tired) and will apply *Choose State* to the node tired (characteristic) in the semantic space NSet. *Choose State* will search to attach tired as a state of an activated concept in Ntct (ANet). As

$$tired \in \{ attr\&sts \text{ of Don} \} \text{ and } tired \notin \{ attr\&sts \text{ of letter} \}, \\ tired \text{ will be assigned as state of Don.}$$

The *Choose State*'s result will be the activation of the semantic edge $\{ Don \leftarrow tired \}$ which will be added in ANet. Using the second members of the couples WN_k , $Comp$ will confirm one of the grammatical results of $Parse$ and will build the tree.

$$TRes = Comp (Parse(Buff, ParSynStr), ANet) = \\ = \{ S: (Don, Don) / nom \} \leftarrow \{ SP: (ustalym, tired) / instr \}; \{ P: (piset, \\ writes) \}; \{ O: (pis' mo, letter) / acc \}$$

4. Conclusions and future work

AGN premises to analyze the information flows, managed by the cognitive system during the message acquisition and, on this basis, to make supposals about the mechanisms of NLP.

The supposal that the cognitive system treats in parallel semantic and syntactic knowledge was made on the bases of two formal representations: the AGN model and the representation of the Language as an Information System. The results of these two formal approaches are in agreement. The idea to combine semantic knowledge and syntactic knowledge in one and the same interconnected database structure gives a possible solution for the parallel treatment of semantic and syntactic knowledge. The formal structures of AGN and LIS can be combined for parallel use of semantic and grammatical knowledge on the last transitions of AGN.

The tracking of AGN model with examples confirm that the stages of processing necessitates “translation” of the grammatical rules to semantic operators and their application to categories of semantic primitives. The analysis here has examined some of the mechanisms, related to “Choose State” operator. Examples of statements like “Don is writing a letter dead”, which are grammatically correct, but perceived as incorrect or as metaphoric, are the reason to suppose that the procedure $Parse$ entails also a “*chunk in new concept*” operator, performed on Z_{27} . Notice, that if “Don” is not chunked to “who is writing”, there wouldn't be reasons to reject “dead” as state of Don. Such (and many other) examples have to be analyzed and the treatment, performed on the last transitions of AGN – adjusted.

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