

On the Non-canonical Valency Filling

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Abstract

Valency slot filling is a semantic glue, which brings together the meanings of words. As regards the position of an argument in the dependency structure with respect to its predicate, there exist three types of valency filling: active (canonical), passive, and discontinuous. Of these, the first type is studied much better than the other two. As a rule, canonical actants are unambiguously marked in the syntactic structure, and each actant corresponds to a unique syntactic position. Linguistic information on which syntactic function an actant might have (subject, direct or indirect object), what its morphological form should be and which prepositions or conjunctions it requires, can be given in the lexicon in the form of government patterns, subcategorization frames, or similar data structures. We concentrate on non-canonical cases of valency filling in Russian, which are characteristic of non-verbal parts of speech, such as adverbs, adjectives, and particles, in the first place. They are more difficult to handle than canonical ones, because the position of the actant in the tree is governed by more complicated rules. A valency may be filled by expressions occupying different syntactic positions, and a syntactic position may accept expressions filling different valencies of the same word. We show how these phenomena can be processed in a semantic analyzer.

1 Introduction

Discovering the predicate-argument structure of the sentence is an important step in constructing its semantic structure. Identifying arguments of predicates (or, in a different terminology, valency slot filling) is a semantic glue that combines the meanings of words together. It is in fact the main mechanism of meaning amalgamation.

What information is needed to discover the predicate-argument structure of the sentence? First of all, one needs a dictionary that contains the following information for each argument-bearing word:

(a) analytical definition of the meaning of the word should be given; among other things, it should represent all valency slots (by means of variables);

(b) each valency slot should be assigned the information on how it can be filled; this information includes primarily the data on the syntactic position of the actant in the syntactic structure (subject, direct or indirect object), what prepositions or conjunctions are needed to introduce it and what lexicogrammatical form it can have. This information is provided by subcategorization frames, government patterns and similar data structures.

Besides the dictionary, for identifying the actants in the text, the syntactic structure of the sentence should be available, because different actants have different syntactic positions with respect to the predicate.

This aspect – different syntactic positions of actants with respect to the predicate – did not receive sufficient attention in the literature, neither in linguistics nor in computational linguistics. To a large extent, only verbs and nouns are considered as argument-bearing words and subcategorization frames seem a sufficient tool to identify arguments in the sentence. However, other parts of speech, such as adjectives, adverbs, particles, conjunctions, and prepositions are equally entitled to be classed as

argument-bearing words. Moreover, being non-prototypical predicates, they substantially enlarge our knowledge of the ways predicates use to instantiate their valencies.

The paper is structured as follows. First, we will discuss different ways of valency filling paying special attention to the patterns that cannot be described by means of subcategorization frames (Section 2). Then we will present our case study – syntactic properties and non-canonical valency instantiation of the words *edinstvennyj* and *tol'ko* in Russian (Section 3). This is the main contribution of the paper. However, we would also like to show that this approach is implementable in a semantic analyser. With this aim in view, we will briefly introduce semantic analyser SemETAP (Section 4) and show how it treats these phenomena (Section 5). We will conclude in Section 6.

2 Valency Slot Filling

First of all, we have to draw the readers' attention to the fact that we understand the concepts of *valency* and *actant* somewhat broader than it is often done. Here we follow the tradition of the Moscow Semantic School (MSS), which in its turn, shares these notions with the Meaning – Text theory (Apresjan 1974, Mel'čuk 1974). For MSS, the starting point in defining the concept of valency is the semantic analysis of the situation denoted by the given word. Analytical semantic definition of a word, constructed according to certain requirements (Apresjan 1999), should explicitly present all obligatory participants of the situation denoted by this words. For a word *L* to have a certain valency slot it is necessary, though insufficient, that a situation denoted by *L* should contain a corresponding participant in the intuitively obvious way. Another condition is that this participant should be expressible in a sentence along with *L* in a systematic way (Mel'čuk 2004a, 2004b). A word or a phrase that denotes such a participant is said to fill (or, instantiate) the valency slot and is called an actant (or, argument).

In this respect, all types of words that denote situations with obligatory participants (which we call predicates) – verbs, (some) nouns, adjectives, adverbs, prepositions, particles etc. – are on equal footing and obey the same principles of description.

Deciding on the set of valency slots is not the whole story. Besides that, one needs to exhaustively describe all the ways these slots can be filled and **not only canonical** ones. We lay special emphasis on describing the whole spectrum of possible syntactic realization of arguments, because non-canonical valency filling significantly complicates the task of detecting arguments of the predicates.

The MSS framework represents the sentence at various levels of representation. In particular, each sentence has a syntactic structure and a semantic structure. In the semantic structure of the sentence, predicates and their actants are always connected by predicate-argument relations directed from the predicate to the argument. For example, (1a) is represented as (1b):

(1a) *John bought a house.*

(1b) hasAgent(Buy, John), hasObject(Buy, House)

In the syntactic structure it is not always that simple. The syntactic position of the actant with respect to its predicate may be more diverse, if we take into account all kinds of actant-bearing words and all possible syntactic realizations of the actants. From this point of view, we distinguish three types of valency slot filling: ACTIVE, PASSIVE, and DISCONTINUOUS ones (Boguslavsky 2003). If a predicate **subordinates** its actant in the syntactic structure by means of an immediate dependency relation, we will say that such a valency filling is ACTIVE. This is the most typical (canonical) case. If a predicate **is subordinated** to its actant, we will say that the filling is PASSIVE. If there is **no direct syntactic link** between the predicate and the actant, the valency filling is DISCONTINUOUS.

Let us give some examples. In (2) the verb *to precede* subordinates both its actants A1 and A2 (the subject and the object), and therefore the valency filling is active.

(2) *The workshop [A1] precedes [L] the main conference [A2].*

Preposition *before* denotes the same situation as the verb *to precede* and therefore has the same valencies. However, in the syntactic structure, these valencies are filled in a different way. In (3), A1 is filled passively, and A2 – actively:

(3) *The workshop [A1] before [L] the conference [A2].*

Passive valency filling is characteristic for prepositions, conjunctions, adjectives, adverbs and particles.

One of the valencies of the quantifiers, such as *all*, *some*, *most*, etc. is filled by the noun they are connected to and another one – by the verb, with which they do not have any direct syntactic link. Therefore, it is a case of a discontinuous valency filling:

(4) *Most* [L] *delegates* [A1] *supported* [A2] *the resolution*.

A regular source of the discontinuous valency filling are subject- and object-oriented adverbials. To give an example, let us compare sentences (5a) and (5b):

(5a) *John has a habit of getting up early*.

(5b) *By habit, John got up early*.

Habit has two valencies – person Q ('John') and situation P ('get up early') – and both of them are instantiated both in (5a) and in (5b). However, in neither case is *habit* syntactically connected to *John*.

As for (5a), actant Q of *habit* is detached from *habit* and connected to *has* because *has* is the value of Lexical Function Oper1 (in Melčukian sense). The functions of the Oper-Func family have a property of syntactically attracting some actants of their arguments. In (5b), actant Q of *habit* can only be the subject of the main verb (*get up*), and therefore *habit* instantiates valency Q in the discontinuous way. Cf. sentences (6a)-(6b) that show that *by habit* is subject-oriented and takes the subject of the main verb as its actant. In (6a) it is John's habit that is referred to, and in (6b) it is Mary's habit.

(6a) *By habit, John borrowed \$100 from Mary*.

(6b) *By habit, Mary lent \$100 to John*.

Active valency filling is mostly typical for verbs and nouns and is particularly well fit for slot instantiation. First of all, actants are directly connected to the predicate. Besides, each valency slot has its own set of surface realizations. If a word has several valency slots, their means of realization, are, as a rule, clearly contrasting. Different actants are marked by different means – cases, prepositions, conjunctions. Different actants of the same word cannot intersect: no word can normally participate in the filling of different valencies of the same predicate at the same time. As a rule, there is a one-to-one correspondence between the actants and their syntactic positions. However, it may so happen that this correspondence does not hold, and a valency may be filled by expressions that occupy different syntactic positions. This is called diathesis alternation, or modification (Mel'čuk, Xolodovič 1970, Padučeva 2003, Partee 2005):

(7a) The farmers loaded the truck with (the) hay.

(7b) The farmers loaded (the/some) hay on the truck.

However, these are relatively rare situations that do not undermine the general rule. It is in the nature of things that the actants are marked in the syntactic structure in an unambiguous way, and each actant corresponds, as a rule, to a unique syntactic position. An attempt to extend this observation to passive and discontinuous valency slots reveals interesting surprises (Boguslavsky 2009). The data presented below show that this one-to-one correspondence can be violated in a number of ways. We will see that a valency may be filled by expressions occupying different syntactic positions, and a syntactic position may accept expressions filling different valencies. Moreover, the same word can belong to more than one actant of the same predicate.

Below, we will examine in detail two such words – the Russian adjective *edinstvennyj* and the particle *tol'ko*, both meaning 'only'. These words are of considerable interest from the point of view of the valency filling typology.

3 Case study: *edinstvennyj* – *tol'ko* 'only'

From the point of view of the argument structure, it is very instructive to contrast two Russian words – particle *tol'ko* and adjective *edinstvennyj*, both of which basically mean 'only'. In different contexts, a few other English words may be appropriate translations (*only* – *single* – *sole* – *unique* – *alone*), but for simplicity's sake we will only use the basic equivalent 'only' in the glosses of the examples below. These words give us a rare opportunity to observe dramatic differences in terms of valency filling when the words are practically synonymous. Indeed, both words claim that a certain object is – in some aspect – unique (a more precise definition will be given below). Valency instantiation differences have the result that the sentences that have a similar structure behave differently, while sentences of different composition manifest identical valency filling patterns.

For example, in (8a) and (8b) the words *edinstvennyj* and *tol'ko* are interchangeable (up to the syntactically determined word order). In (9a) and (9b) replacing one word for the other drastically modifies the meaning of the sentence, and in (10a)-(10c) the relationship between *edinstvennyj* and *tol'ko* is even queerer: if one substitutes *tol'ko* for *edinstvennyj* in the same noun phrase, the sentence will become anomalous, but if one introduces *tol'ko* in a different noun phrase, the resulting sentence will be synonymous to the original one:

- (8a) *Ivan edinstvennyj menja ponimaet.*
lit. Ivan only me understands
'Only Ivan understands me'
- (8b) *Menja ponimaet tol'ko Ivan.*
lit. me understands only Ivan
'only Ivan understands me'
- (9a) *V uglu stojal edinstvennyj stul.*
lit. in corner stood only chair
'There was only one chair in the corner'
- (9b) *V ugly stojal tol'ko stul.*
lit. in corner stood only chair
'There was only a chair in the corner'
- (10a) *Edinstvennym drugom Ivana byl Petr.*
lit. only friend of-Ivan was Peter
'Peter was the only Ivan's friend'
- (10b) **Tol'ko drugom Ivana byl Petr.*
lit. only friend of-Ivan was Peter
- (10c) *Drugom Ivana byl tol'ko Petr.*
lit. friend of-Ivan was only Peter
'Peter was the only Ivan's friend'

Another mystery of *edinstvennyj* which is also connected to the argument structure is related to the correspondence between *edinstvennyj NP* and *edinstvennyj iz NP* 'only of NP'. In (11a) *edinstvennyj NP* can be replaced by *edinstvennyj iz NP* without any semantic shift (cf. (11b)). In (12a) such a substitution results in an anomaly (cf. (12b)).

(11a) *Panteon – edinstvennoe antičnoe sooruženie, došedšee do našix dnej s nepovreždennym kupolom.*

lit. Pantheon – only ancient building having-come to our days with intact cupola
'Pantheon is the only ancient building that has survived until now with the cupola intact'

(11b) *Panteon – edinstvennoe iz antičnyx sooruženij, došedšee do našix dnej s nepovreždennym kupolom.*

lit. Pantheon – only of ancient buildings having-come to our days with intact cupola
'Pantheon is the only one of ancient buildings that has survived until now with the cupola intact'

(12a) *Ivan vybral edinstvennyj nadežnyj put'.*

'Ivan chose the only reliable way'

(12b) **Ivan vybral edinstvennyj iz nadežnyx putej.*

'*Ivan chose the only one of the reliable ways'

To explain these facts, one should first give analytical definition of both words, that fixes their valencies, and then describe how they can be filled.

3.1 Meaning and valency slots of *edinstvennyj*.

A detailed analysis of valency instantiation of *edinstvennyj* and *tol'ko* can be found in (Boguslavsky 1996). Here we will only give a brief review with some refinements.

Edinstvennyj is used in several syntactic contexts, and in each of them the valencies are filled in a different way. It is the copulative construction that is the most transparent from this point of view. Here all the valencies are filled by clearly distinguishable phrases:

(13) *Petr – edinstvennyj čelovek, ktoromu Ivan doverjaet.*

'Peter is the only person whom Ivan trusts'

Therefore this construction can be used as an input of the semantic definition:

(14) *Q jest' edinstvennyj R, kotoryj P* 'Q is the only R which P' = '(Q is R which P); among all Rs there is no one except (this) Q, which would have property P'

Here, the parentheses enclose the part of the sentence meaning which serves as the context for *edinstvennyj*. In sentence (13), the subject 'Peter' fills valency Q, 'person' – valency R, and the clause 'whom Ivan trusts' – valency P. Applying the definition (14) to (13), given these variable instantiations, will yield the following meaning: 'Peter is a person whom Ivan trusts; among all the (relevant) people, there is no other (= different from Peter) person whom Ivan trusts'.

Valency P is obligatory in all contexts, R and Q are optional.

As a rule, **valency Q**, is expressed by means of the copulative construction (cf. (13)) or another one which presupposes the copulative construction at a deeper level. Two characteristic constructions of this type are the appositive construction (cf. (15)) and the co-predicative one (cf. (16)):

(15) *Petr [Q], edinstvennyj čelovek, kotoromu Ivan doverjaet, znaet o nem vse.*

'Peter [Q], the only person whom Ivan trusts, knows everything about him'

(16) *Petr [Q] edinstvennyj pol'zuetsja doveriem Ivana.*

lit. Peter [Q] only enjoys trust of-Ivan

'Peter is the only one who enjoys Ivan's trust'

In spite of the fact that *edinstvennyj* agrees with *Petr* in case, number and gender, as is proper for adjective + noun phrases in Russian, it is not its regular modifier, being syntactically linked to the verb rather than to the noun. This is what happens in general in co-predicative constructions, as opposed to the modificative ones. In co-predicative and modificative constructions, *edinstvennyj* fills its valencies quite differently. This becomes obvious if we compare the co-predicative phrase (17a) and the modificative one (17b):

(17a) *Angličanin edinstvennyj prišel vovremja.*

lit. Englishman only came on-time

'the Englishman was the only one to come on time'

(17b) *Edinstvennyj angličanin prišel vovremja.*

lit. only Englishman came on-time

'the only Englishman came on time'

In both cases the Englishman is set off to other people according to some property, but these properties are quite different in (17a) and (17b). In (17a) no one else came on time, and in (17b) no one else was an Englishman.

One should also take into account that there are two types of co-predicative constructions in Russian, which affects the valency instantiation of *edinstvennyj*: in the subject-copredicative construction (as in (17a)) the adjective refers to the subject of the sentence, while in the object-copredicative construction (as in (18)) it refers to the object:

(18) *Ja ljublju ee edinstvennyju.*

lit. I love her only

'I love only her'

The thing that is interesting about the modificative construction (Adjective + Noun) is that the modified noun fills two valencies of *edinstvennyj* at a time – Q and P. If we come back to sentence (17b), we will see that in its semantic structure 'Englishman' occurs twice: 'besides (this) Englishman, there is no one who is an Englishman'. It is to be noted that these two occurrences of 'Englishman' differ in their referential status: in the position of Q the status is referential ('this Englishman'), while in the position of P it is predicative ('be an Englishman').

The copulative construction manifests a similar case, if *edinstvennyj* is not a noun modifier. The subject also plays two roles with respect to *edinstvennyj* – Q and P. This becomes obvious if we compare (19a) and (19b):

(19a) *Holiday Inn – edinstvennaja gostinitsa na ostrove.*

'Holiday Inn is the only hotel on the island'

(19b) *Eta gostinitsa – edinstvennaja na ostrove.*

lit. this hotel (is) only on island

'This hotel is the only one on the island'.

In (19a), the actants of *edinstvennyj* are as follows: Holiday Inn = Q, hotel = P; island = R. All the valencies filled in (19a) are also filled in (19b). Both sentences say that a certain hotel is the only one on the island. Hence, the valencies P and Q that are filled in (19a) by different phrases in (19b) correspond to the single occurrence of *hotel*.

Valency P is filled as follows:

- if *edinstvennyj* is a co-predicate (cf. (17a) and (18)), valency P is filled by the predicate of the sentence;
- if *edinstvennyj* is a modifier (cf. (20a) and (20b)) or a head of the elective construction (cf. (20c)) of a noun which has a restrictive attribute, valency P is filled by this attribute.

(20a) *edinstvennoe gosudarstvo* [R], *soxranivšee* [P] *svoju konstitutsiju*

lit. only state [R] that-preserved [P] its constitution

'the only state to preserve its constitution' = 'among the states [R] there is no other that preserved [P] its constitution'

(20b) *edinstvennoe kardinal'noe* [P] *sredstvo* [R] *ot glavnoj boli*

'the only radical [P] remedy [R] for headache' = 'among remedies [R] there is no other that is radical [P]'

(20c) *edinstvennyj iz moix družej* [R], *kto živet* [P] *za gorodom*

lit. only of my friends [R] who lives [P] out of town

'the only one of my friends who lives out of town' = 'among my friends [R] there is no other who lives [P] out of town'

Valency R is filled either by a locative phrase (cf. *edinstvennyj passažir v kupe* 'the only passenger in the compartment'), or the elective prepositions *iz* 'of' and *sredi* 'among' (cf. *edinstvennyj jurist sredi nas* 'the only lawyer among us'), or by a modified noun, if it has a restrictive attribute (cf. (13), (20a), (20b)).

One more actant configuration that arises due to the phrasal stress on *edinstvennyj* is noteworthy. Let us compare sentence (21a), in which *edinstvennyj* is pronounced with a neutral intonation, and (21b), where this word is stressed:

(21a) *My upustili edinstvennuju vozmožnost' perelomit' situatsiju.*

lit. 'we missed only opportunity to reverse the situation'

'we missed the unique opportunity to reverse the situation'

(21b) *Eto neprijatno soznavat', no, poxože, my vospol'zovalis' ↓edinstvennym blagom svobody.*

'It is frustrating to realize, but it seems we made use of only one asset of freedom'.

In both cases, *edinstvennyj* is a noun phrase modifier without any restrictive attributes, which makes both sentences similar from the point of view of the valency instantiation rules presented above. However, sentence (21a) is interpreted as predicted: 'we missed an opportunity to reverse the situation; there was no other opportunity'. This interpretation is obtained with Q = opportunity, P = be an opportunity, and R not instantiated. In (21b), on the contrary, the modified noun phrase ('asset of freedom') fills valency R, P is instantiated by the predicate of the sentence ('make use'), and Q is not instantiated at all: 'we made use of an asset of freedom; of all the assets of freedom, there is no other one we made use of'. This dramatic shift in valency instantiation has been provoked by the phrasal stress that falls on *edinstvennyj*.

3.2 Meaning and valency slots of *tol'ko*

As mentioned above, particle *tol'ko* is synonymous with *edinstvennyj* (in one of its senses), but differs in its syntactic potential and valency instantiation patterns. First of all, *tol'ko* is a particle, while *edinstvennyj* is an adjective. Therefore their syntactic behaviours are quite different. *Tol'ko* cannot occur in many syntactic contexts characteristic of *edinstvennyj* (cf., e.g. *Eta gostinitsa edinstvennaja - *Eta gostinitsa tol'ko*). On the other hand, *tol'ko* may be connected to a word of any part of speech and cannot have its own dependents (cf. *edinstvennyj iz nas - *tol'ko iz nas*).

In most (but not all) contexts the following rule holds true: (a) valency Q is filled by the phrase to which *tol'ko* is subordinated syntactically and which it immediately precedes; (b) valency P is filled by a verb which is the head of the clause to which *tol'ko* belongs; (c) valency R is filled by phrases headed by prepositions *iz* 'of' and *sredi* 'among'.

(22) *Iz* [R] *vsego spiska literatury on soslalsja* [P] *tol'ko na knigu* [Q] *1974 goda.*

lit. of the whole list of references he referred only to the book of 1974 year
'of [R] the whole reference list he only referred [P] to the 1974 book [Q]'
Now, we can come back to sentences (8)-(12) and explain the differences observed.

3.3 *Tol'ko* vs. *edinstvennyj*: valency filling.

In the light of what we learned of the argument properties of *edinstvennyj* and *tol'ko*, we can now explain the facts presented in (8)-(12) above.

In sentences (8a) and (8b) *edinstvennyj* and *tol'ko* have different syntactic links: *tol'ko* depends on *Ivan*, and *edinstvennyj* is a co-predicate and depends on the predicate *ponimaet* 'understands'. Nevertheless, the sentences are synonymous, since *edinstvennyj* and *tol'ko* fill their valencies in the same way. Co-predicative constructions are the only¹ context in which *edinstvennyj* fills valency P by the main VP, just as *tol'ko* does.

In sentences (9a)-(9b), the situation is inverse: both words depend on the same noun (*stul* 'chair'), but valency P is filled in different ways. Therefore, the sentences are not synonymous.

Sentences (10a)-(10c) contain a copulative construction. *Edinstvennyj* belongs to the predicative NP, and fills Q by the subject of the copula. Since *tol'ko* should be placed before actant Q, it is natural that, to preserve the synonymy, *tol'ko* should be moved to the subject NP.

As opposed to *edinstvennyj*, *tol'ko* is a rhematizer and cannot be placed in the thematic position. Therefore, (10b) not only is non-synonymous with (10a), but is also ungrammatical. If we change the communicative perspective, sentence (10b) will become grammatical (*Petr byl tol'ko drugom Ivana* 'Peter was only Ivan's friend (but not a brother)') but will remain non-synonymous with (10a).

Let us now turn to sentences (11a) and (12a). In both cases, NP to which *edinstvennyj* is connected ('ancient building' vs. 'way') has a restrictive attribute ('having come' vs. 'reliable'). According to the rules above, in both cases the NP fills valency R, and the attribute – valency P. An alternative way to fill R is use the *iz* 'of' + N group ('of ancient buildings' vs. 'of the ways'). However, in (11b) the introduction of this construction leads to success, while in (12b) it doesn't.

The fact is that the *iz*-group fills valency R as a whole. It cannot include extraneous elements. This is what happened in (12b). The group 'of reliable ways' contains the word 'reliable', which in fact fills valency P and not R: *edinstvennyj nadežnyj put'* 'the only reliable way' means that there is no other way that is reliable. If we take this word out of the *iz*-group, the sentence will become quite correct:

(23) *Ivan vybral edinstvennyj iz putej, kotoryj byl nadežnym.*

'Ivan chose the only of the ways that was reliable'

As for sentence (11a), this problem does not arise, since the participle *došedšee* 'having-come' does not belong to the *iz*-group, but is connected directly to *edinstvennyj*. This follows from the fact that *došedšee* (nom, sg) does not agree in case and number with *sooruzenij* 'buildings' (gen, pl) but with *edinstvennoe* (nom, sg). Otherwise, the sentence would be as ungrammatical as (12b):

(24) **Panteon – edinstvennoe (nom, sg) iz antičnyx sooruzenij (gen, pl) , došedšix (gen, pl) do našix dnej s nepovreždennym kupolom.*

lit. Pantheon – only (nom, sg) ancient building (gen, pl) having-come (gen, pl) to our days with intact cupola.

4. SemETAP semantic analyzer.

The semantic analyzer SemETAP, under development in the Computational Linguistics lab of the Kharkevich Institute for Information Transmission Problems of the Russian Academy of Sciences, is aiming at performing semantic analysis based on both linguistic and extra-linguistic knowledge. This analyzer includes a wide-coverage linguistic processor capable of building coherent semantic structures for Russian, a knowledge-extensive lexicon, which contains a variety of types of lexical information, an ontology, which describes objects in the domain and their properties, a repository of ground-level facts, a set of common-sense axioms, and an inference engine (Boguslavsky 2011, Boguslavsky et al. 2013). The text is processed in three steps: 1) building of dependency syntactic structure (SyntS), 2) building of basic semantic structure (BSemS), and 3) building of extended

¹ except for the cases of diathesis modification under phrasal stress – cf. above.

semantic structure (ExtSemS). Most of the predicate-argument links are established in SyntS. Here belong all cases of the active (see above, Section 2) valency filling, which correspond to immediate dependency links between the predicate and the argument. Passive and discontinuous valency filling is performed at the level of BSemS. It is there that the actants discussed in the previous section are presented. ExtSemS is obtained by means of various semantic procedures based on common sense axioms, context data, ground-level facts, etc. A similar distribution of knowledge between the levels is adopted in the Onto-Sem approach (Nirenburg, Raskin 2004).

5. Non-prototypical valency filling in SemETAP

Let us go back to our case study. For convenience, we will repeat below the sentences under discussion.

- (8a) *Ivan edinstvennyj menja ponimaet.*
lit. Ivan only me understands
'Only Ivan understands me'
- (8b) *Menja ponimaet tol'ko Ivan.*
lit. me understands only Ivan
'only Ivan understands me'
- (9a) *V uglu stojal edinstvennyj stul.*
lit. in corner stood only chair
'There was only one chair in the corner'
- (9b) *V uglu stojal tol'ko stul.*
lit. in corner stood only chair
'There was only a chair in the corner'

SyntSs of these sentences do not contain explicit information on the actants of *edinstvennyj* and *tol'ko*. SyntSs of (8a) and (8b) obtained by the ETAP parser are shown in Fig. 1 and 2. In (8a) *edinstvennyj* (word 2) is connected to the verb *ponimaet* 'understands' (word 4) by the subject-copredicative dependency relation. In (8b) *tol'ko* (word 3) is linked to *Ivan* (word 4) by the restrictive dependency relation.

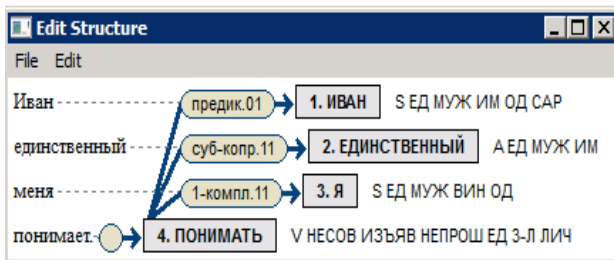


Fig. 1. SyntS of (8a) *Ivan edinstvennyj menja ponimaet*

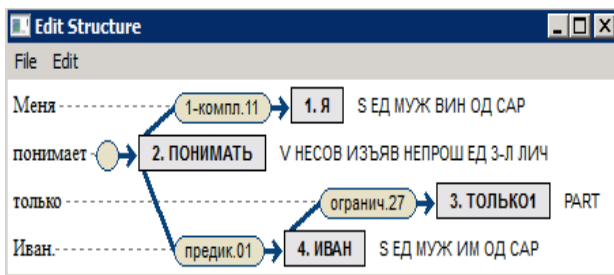


Fig. 2 SyntS of (8b) *Menja ponimaet tol'ko Ivan*

In spite of completely different SyntSs, synonymous sentences (8a) and (8b) get an identical BSemS shown in Fig. 3. In this BSemS, both *edinstvennyj* and *tol'ko* have the same equivalent – Only. Its actants Q, R and P, described in section 3, are connected to this concept by means of relations *hasObject* (for valency Q), *hasSource* (for valency R) and *hasAttribute* (for valency P).

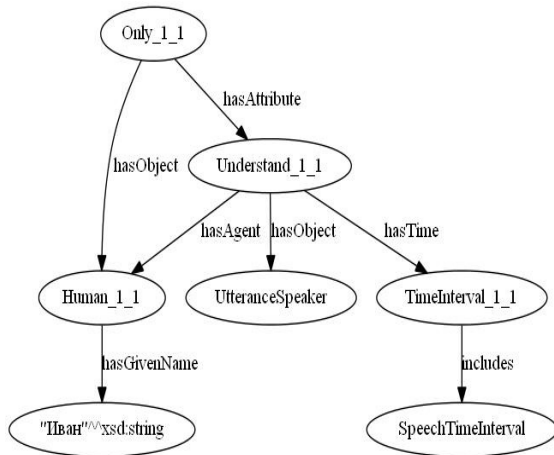


Fig. 3 BSemS of both (8a) and (8b)

SyntSs of sentences (9a) and (9b) are very similar. In both cases, *edinstvennyj/tol'ko* is connected to the same noun *stul* ‘chair’. However, as can be seen in Fig. 4 and 5, the BSemSs of these sentences are noticeably different. They differ in how valency P of these words is instantiated. In (9b) it is filled by the main verb: ‘there is nothing except the chair [Q] that is standing [P] in the corner’. In (9a), both Q and P are filled by the same concept – chair (leaving aside the difference in the referential status): ‘there is nothing except the chair [Q] standing in the corner that is a chair [P]’.

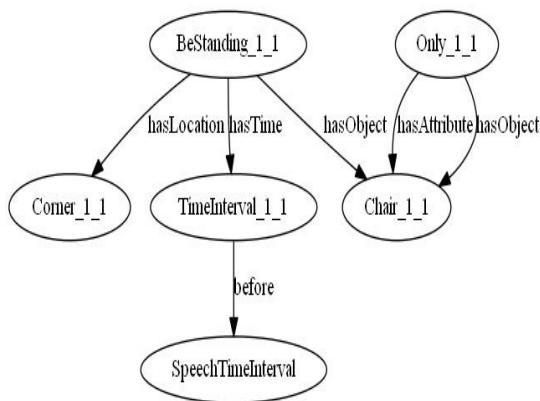


Fig. 4 BSemS of (9a) *V uglu stojal edinstvennyj stol*

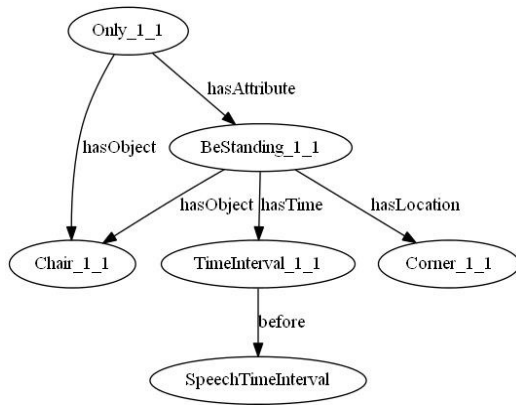


Fig. 5 BSemS of (9b) *V uglu stojal tol'ko stul*

6 Conclusion

Non-canonical valency filling received less attention, both in linguistics and in computational linguistics, than well-studied cases of active valency filling, when actants are directly subordinated to predicates in a dependency structure and different actants are always represented by non-intersecting phrases. We show that the inventory of valency filling is not restricted to that. Actants can be connected to predicates in different ways. They can subordinate their predicate and even have no direct connection with it. It is also possible that the same word participates in the filling of different valencies of the same predicate. We have shown how these phenomena can be handled in a semantic analyser.

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