Unexpressed Object Alternations of Bulgarian verbs in HPSG[1]

Tzvetomira Venkova

1. Introduction

The paper presents an HPSG account of the *unexpressed object alternation (UOA)* in its cross-linguistic English – Bulgarian aspect. Valence alternations, also known as 'diathesis alternations', or 'multiple complement realizations', are defined by B. Levin as 'alternations in the expressions of verb arguments, sometimes accompanied by changes of meaning' (*Levin 1993:2*). UOA is a valence alternation between two verb projections – one with realized object argument of the verb, and the other – with an unrealized object.

The interplay between the regular complementation patterns according to transitivity classes, on the one hand, and valence alternations, which violate this regularity, on the other had, is a challenge to the HPSG grammar theory.

- **Regularity of complementation patterns in HPSG**

The language regularity of complementation patterns is formalized in recent versions of HPSG by a mapping mechanism, adopted in Manning & Sag (1998) and Sag et al (2003), which distinguishes **argument structure (ARG-ST)** and **surface valence (VAL).**

Following the above cited works, each verb is regarded as having a particular set of elements[2] on its **ARG-ST** list, specified in the lexeme description. The values of ARG-ST are not given individually for each lexeme, but lexemes are grouped in transitivity classes, included as sorts in the sort hierarchy. The ARG-ST values of each class are constraints to each sort. For example, the verbs *спя* '*sleep'* and *чета 'read'* have descriptions of sorts *intransitive verb lexeme* (*itr-lxm*) and *strict transitive verb lexeme* (*stv-lxm*):

(1)   ⟨ *спя - sleep, itr-lxm*⟩: [ARG-ST ⟨NP⟩]

    ⟨ *чета - read, stv-lxm*⟩: [ARG-ST ⟨NP, NP⟩]

The **surface valence (VAL)** is specified at the word's description. ARG-ST elements are mapped to VAL elements, and in particular to SPR and COMPS lists elements, following the Argument Realization Principle (ARP).

(2)   *спя –sleep,* $\begin{bmatrix} word \\ \text{SYN} \quad \begin{bmatrix} \text{VAL} \begin{bmatrix} \text{SPR} & \langle\; \boxed{1}\; \text{NP}\; \rangle \\ \text{COMPS} & \langle\;\rangle \end{bmatrix}\end{bmatrix} \\ \text{ARG-STR} \; \langle\; \boxed{1}\; \text{NP}\; \rangle \end{bmatrix}$

(3)   *чета – read,* $\begin{bmatrix} word \\ \text{SYN} \quad \begin{bmatrix} \text{VAL} \begin{bmatrix} \text{SPR} & \langle\; \boxed{1}\; \text{NP}\; \rangle \\ \text{COMPS} & \langle\; \boxed{2}\; \text{NP}\; \rangle \end{bmatrix}\end{bmatrix} \\ \text{ARG-STR} \; \langle\; \boxed{1}\; \text{NP}\; ,\; \boxed{2}\; \text{NP}\; \rangle \end{bmatrix}$

The HPSG grammar licenses one head-complement projection for each transitivity class and respectively for each verb that belongs to this class. For example, the verbs above project the phrases in brackets in (4) - (5), where the English and Bulgarian examples are given as translational equivalents:

(4)   a. *Иван (спеше).*
       b. *John (slept).*

(5)   a. *Иван (четеше книга).*
       b. *John (read a book).*

[2] The ARG-ST elements are mapped to semantic roles in the SEM component

- **UOA as subregularuty**

However, although capturing the difference between projections (4) - (5) as regularity, the mechanism sketched so far does not account for some irregularities concerning this distinction. In particular, one such kind of irregularity are the valence alternations which are a frequent phenomenon of language use, as the corpus data show. Syntactically, it means that one verb can project phrases with different number of arguments. For example the strict transitive verb *чета - read* occurs in texts in two realizations, respectively without a complement (6) and with an NP complement (7)[3]:

(6)   a. *Иван (четеше).*
         b. *John (read).*

(7)   a. *Иван (четеше книга).*
         b. *John (read a book).*

The irregularity is due to the fact that projection (6) is not licensed by the mechanism described above since it has no complements, which contradicts the word description of the verb in (3). It practically means, that the HPSG grammar, as presented above, treats (6) as ungrammatical.

How can irregularities such as those in (6) be treated in the HPSG grammar? We regard the occurrence of both (6) and (7) is appropriate for classes of verbs and the variation is of systematic character. Therefore, in regard to (6) and (7) we stick to the opinion of treating alternations as 'systematically related valence patterns' (Sag et al 2003: 262) rather than of single exceptions within transitivity classes. This gives a reason to regard alternations as subregularities that can be captured alongside regularities, rather than as irregularities that have to be excluded.

This paper presents an attempt to incorporate valence alternations as subregularities in the complementation mechanism of HPSG, thus providing a way to license both (6) and (7) as grammatical in English and Bulgarian.

The proposal is to formalize Levin's approach to unexpressed object alternations within the HPSG framework of Sag et al 2003 and apply it cross-linguistically to English and Bulgarian. Bulgarian data is presented in comparison to English and the cross-linguistic relevance of the English-based alternations typology of Levin (1993) is tested. The analysis is based a lexical rules is proposed approach, which Sag et al (2003:263) suggest in as a general direction for solving this problem: 'patterns of valence alternations are governed by both semantic and syntactic constraints of the kind that could be described by finely tuned lexical rules'. The analysis below draws on this claim in attempting to develop particular solutions for the UOA, valid for both English and Bulgarian.

2. Previous research

The basic source of the research is the HPSG grammar, as presented in Sag et al (2003), as well as the alternations classification in Levin (1993). In regard to the cross-linguistic aspect of alternations, the works of Frense and Benett (1996) - an English-German account, Kordoni (2004) - Modern Greek, have been considered. The Bulgarian-specific analysis of UOA draws on the HPSG account of Slavic diathesis of Avgustinova (2001) and the Sign Model analysis of Dimitrova-Vulchanova (1999).

3. Re-analyzing verb's attributes according to UOA

Verb's attributes are reanalyzed in two aspects. Firstly, the range of the notion *UOA,* in regard to verb classes, associated with it*,* is compared cross-linguistically, since it is important to know if we make generalizations over analogous language phenomena. It has

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[3] Actually there is one more projection of the transitive verb *read*: *John (read a book to his son),* which is not discussed here since it is related to benefactive or dative alternation types. However, this projection is another instance of irregularity to the strict transitive verb realization pattern.

been checked whether all subtypes of UOA with the relevant verb classes, defined for English in Levin (2003), are relevant for Bulgarian. Secondly, a specific aspectual constraint on Bulgarian verbs, exhibiting UOA, is discussed.

3.1. Range of UOA cross-linguistically in English and Bulgarian

Levin (1993) distinguishes eight subtypes of unexpressed object alternations with one or more verb classes that exhibit each of them for English. These subtypes has been tested empirically on Bulgarian data and a number of differences have been noted.

Only three out of eight subtypes of the English-based Levin's classification have direct structural correspondences in Bulgarian: *Unspecified object alternation, PRO-arb object alternation, Instructional imperative.* They correspond to the same relation of verb projections in English and Bulgarian:

(8) (Engl), $NP_i \; V \; NP_j$ -- $NP_i \, V$
(Bulg)

One subtype – *the understood reflexive object alternation* has no alternative structure in Bulgarian:

(9) (Engl)   -- $NP_i \, V$
             $NP_i \; V \; NP_j$
(Bulg)   -- no alternative structure

Three subtypes – *Understood body-part object, Understood reciprocal object* and *Way object alternations* are exhibited in both languages but one of the Bulgarian alternative has a different structure – namely a PP complement versus NP complement in English. Actually, in this case, it should be named differently in Bulgarian.

(10) (Engl), $NP_i \; V \; NP_j$ -- $NP_i \, V$
(Bulg) $NP_i \; V \; PP_j$

One subtype - *Characteristic property alternation* has equivalence respectively in one of its subtypes - *characteristic property of agent,* such as (8) and the other subtype - *characteristic property of instrument* such as (10).

Therefore, when we talk about UOA in Bulgarian, we should have in mind that its range is much more limited - it comprises only the subtypes (11) - (14):

(11) unspecified object alternation

a. *My mother is cooking a soup. - My mother is cooking.*
b. *Майка ми готви супа.*   - *Майка ми готви.*

(12) PRO-arb object alternation

a. *His voice annoys people.*   - *His voice annoys.*
b. *Гласът му дразни хората.*   - *Гласът му дразни.*

(13) instructional imperative

a. *Beat the mixture for 10 minutes. - Beat for 10 minutes.*
b. *Разбивайте сместа 10 мин.*   - *Разбивайте 10 мин.*

(14) characteristic property of agent alternation

a. *Our cat scratches people.*   - *Our cat scratches.*
b. *Нашата котка драска хората.* - *Нашата котка драска.*

In formalizing the alternations cross-linguistically we take UOA in its narrower range, relevant for both languages. This narrowing of UOA ranges relates to the HPSG account in regard to the lists of verbs that are marked as alternating. Practically, all semantic verb classes, given to the UOA subtypes of Levin (1993), are not considered as eligible for the lexical rule, proposed in the last section of the paper in our account of Bulgarian. In particular, these are verbs belonging to classes (39), (42), (47), (54), (56), (58), (62), (73), (78)[4], e.g. *verbs of gestures/signs involving body parts, load* verbs, *push/pull* verbs etc. In contrast to them, the verbs belonging to classes (37), (67), (69), (80), e.g. class (37) containing some verbs of *cooking, performance*, *eating*, etc., are regarded as alternating and are the ones whose lexical entries are marked by a particular attribute value, as stipulated in the analysis below. Accordingly, their Bulgarian translation equivalents and some additional verbs are also marked as alternating for the HPSG grammar.

3.2. Defining alternating properties of verbs in their lexical entries

Since the UOA is a subregularity, it is valid only for particular verbs, pertaining to the lists, specified above. We propose an attribute ALT (alternation) of *val-cat* sort, which is to indicate the alternating properties of these verbs. The values of the ALT attribute are chosen among a list, indicating the possible verb alternations, based on Levin's classification We propose that non-alternating verbs have ALT value *non-alt*. Such a list is quite long, having in mind the number of alternations (Levin 1993:25-109) defines. We believe that syntactically, the main groups of alternations in her classification can be taken as ALT values in HPSG, e.g. *unexpressed object* or *preposition drop alternations*. Therefore, a list of ALT values can start for example like that: {*non-alt, otsi, uo, conative, pd, dative, benefactive, locative, ct ...*}[5],

(15)
$$\begin{bmatrix} \text{verb} \\ \text{SYN} \ [\text{VAL} \ [\text{ALT} \ \{\text{non-alt, otsi, uo, conative, ... }\}]] \end{bmatrix}$$

3.3. Aspectuality as Bulgarian-specific constraint on UOA

The HPSG representation of verb-complement projections in Bulgarian, and in particular of object realization alternations, has to account for some aspectual properties.

It is important to note that verbs from the lists of alternating English verbs in Levin (1993) have two semantic equivalents in Bulgarian – on of imperfective and one of perfective aspect, e.g. *eat – ям, изям, cook – готвя, сготвям*, etc[6]. What is crucial for the analysis of these verbs in regard to UOA is that only one element of the pair can have UOA in Bulgarian. It is only the imperfective verbs that can be realized both with and without an object. The perfective transitive verbs always have an object. For example, only the imperfective verb *рисувам 'paint'* has two projections (16) - (17), while its perfective correlate *нарисувам 'paint'* has only projection (18).

(16)   *Детето **рисува** картина.*   - ***рисувам*** – *Imperfective Aspect*
        The child **draws** a picture.

(17)   *Детето **рисува**.*   - ***рисувам*** – *Imperfective Aspect*
        The child **draws**.

(18)   *Детето **нарисува** карина.*   - ***нарисувам*** – *Perfective Aspect*
        The child **drew** a picture.

(19)   **Детето **нарисува**.*   - ***нарисувам*** – *Perfective Aspect*

Therefore Bulgarian aspectuality determines additional constraints to the HPSG analysis. How can this relation complementation to aspectuality be reflected in our HPSG analysis?

Firstly, it should be made clear if the verbs in the aspectual pair are to be treated as two forms of the same verb or as two different verbs. What we accept in his paper is the latter hypothesis, supported in Rå Hauge (1999:85-89) among others. Such an approach is straightforward in comparison to morphological derivation of perfective from imperfective verb forms, which has to deal with many verbs' idiosyncrasies, as well as with the fact that very often these are not pair but triples because of the secondary aspect derivation. But what is a more important argument is that affixation often leads to change of meaning and then it is often arbitrary to judge whether an affix is an aspectual formant or a word formant.

Accordingly, the members of the aspectual pair are described in the HPSG grammar as two distinct lexical items of sort *lexeme*. Each of them has a particular aspect value, which is independent of the value of the other element in the pair.

Secondly, the above shown aspect distinction motivates the need of an attribute, representing the aspectual characteristics of each Bulgarian verb. Our proposal is to define verb's aspect as a *agr-pos* feature IMPERF with a Boolean value. Respectively, the verbs of imperfective aspect are [IMPERF +], and those of perfective aspect: [IMPERF -].

(20)
$$\begin{bmatrix} verb \\ SYN \quad [HEAD \quad [IMPERF \quad \{+ \quad , \quad -\}]] \end{bmatrix}$$

In regard to the alternating properties of each Bulgarian verb, a verb exhibiting the UOA, can only be [IMPERF +], that is every verb with [ALT *uoa*] is also [IMPERF +].

(21)
$$\begin{bmatrix} verb \\ SYN \quad \begin{bmatrix} HEAD & [IMPERF \quad +] \\ VAL & [ALT \quad uo] \end{bmatrix} \end{bmatrix}$$

However, the opposite is not true – not every [IMPERF +] is [ALT *uoa*]. In other words, the class of Bulgarian verbs, which are [HEAD [IMPERF +]], subsumes the class of verbs [VAL[ALT *uoa*]].

4. Integrating alternations into the grammar

The integration of UOAs in the HPSG grammar depends on a hypothesis concerning the nature of alternations. The analyses we propose here assumes that it is a matter of argument realization whether or not the object argument is realized. In other words, a verb is considered to be keeping its object argument on its ARG-ST in both alternative projections and it is the surface realization of this argument that is to be constrained.

The grounds for such interpretation can be shown by a *what*-question test. The presence of an unrealized ARG-ST argument, matched to a thematic role in the SEM component of the verb *draw*, can be proven by the fact that the information about the missing object can additionally be retrieved by a *what*-question test.

(22) A. *The child is drawing.*
      B. *What is the child drawing?*
      A. *A picture / a portrait / something/ I don't know what.*

In contrast to it, such a question makes no sense and gets no answer when asked about the object of bare head phrases which are projections of intransitive verbs, i.e. of verbs whose ARG-ST list has no such argument, *cf.* (23).

(23) A. *The child is sleeping.*
      *B *What is the child sleeping?*
      A. ???.

The recent HPSG conception of separating argument structure from surface valence, discussed in Section 1 above, provides a suitable mechanism for supporting such an analysis. According to our proposal, in both projections the mapping from ARG-ST values to SPR and COMPS values is kept unchanged, *cf.* (3) above. It is a lexical rule that maps a word description with COMPS ⟨NP⟩ to a word description with COMPS ⟨ ⟩. The lexical rule is a *post-inflectional,* i.e., it maps words to words.

We propose the following uoa (unexpressed object alternation) rule:

(24)

$$
UOA\text{-}rule:
\begin{bmatrix}
\text{INPUT} & \left\langle \; X \; , \; \begin{bmatrix} word \\ \text{VAL} \begin{bmatrix} \text{COMPS} & \boxed{1} \\ \text{ALT} & uo \end{bmatrix} \end{bmatrix} \right\rangle \\[20pt]
\text{OUTPUT} & \left\langle \; X \; , \; \begin{bmatrix} word \\ \text{VAL} \begin{bmatrix} \text{COMPS} & \langle \, \rangle \\ \text{ALT} & uo \end{bmatrix} \end{bmatrix} \right\rangle
\end{bmatrix}
$$

The phonetic form of the related words is unchanged – X. The ALT value *uo* is included to make sure that the rule operates only on words, satisfying this constraint.

Thus, both alternative projections of *read* in (6) - (7) can be licensed in the HPSG grammar in the following way. Lexeme description чета *'read'* has the following constraints:

(25) чета
$$
\begin{bmatrix}
stv\text{-}lxm \\
\text{SYN} \quad \begin{bmatrix} \text{VAL} \begin{bmatrix} \text{ALT} & uo \\ \text{SPR} & list(\text{expressions}) \\ \text{COMPS} & list(\text{expressions}) \end{bmatrix} \end{bmatrix} \\
\text{ARG-STR} \; \langle \; NP \; , \; NP \; \rangle
\end{bmatrix}
$$

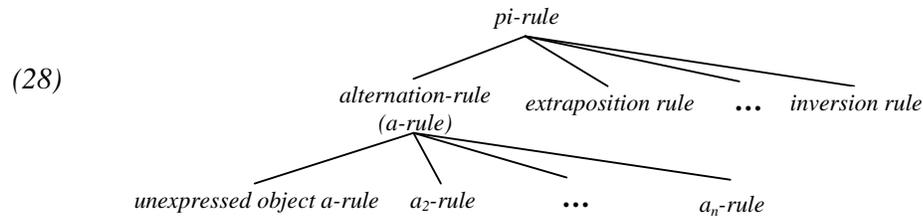The word description of *чета* 'read', projecting a head-complement phrase, is constrained by the ARP, *cf.* in (26)

(26) чета$_1$
$$
\begin{bmatrix}
word \\
\text{SYN} \quad \begin{bmatrix} \text{VAL} \begin{bmatrix} \text{ALT} & uo \\ \text{SPR} & \langle \; \boxed{1} \; NP \; \rangle \\ \text{COMPS} & \langle \; \boxed{2} \; NP \; \rangle \end{bmatrix} \end{bmatrix} \\
\text{ARG-STR} \; \langle \; \boxed{1} \; NP \; , \; \boxed{2} \; NP \; \rangle
\end{bmatrix}
$$

The word description of чета *'read'*, projecting a bare head phrase is constrained by the uoa-*lexical rule*:

(27) чета$_2$
$$
\begin{bmatrix}
word \\
\text{SYN} \quad \begin{bmatrix} \text{VAL} \begin{bmatrix} \text{ALT} & uo \\ \text{SPR} & \langle \; \boxed{1} \; NP \; \rangle \\ \text{COMPS} & \langle \; \rangle \end{bmatrix} \end{bmatrix} \\
\text{ARG-STR} \; \langle \; \boxed{1} \; NP \; , \; NP \; \rangle
\end{bmatrix}
$$

The UOA in both English and Bulgarian is licensed in this way, having in mind the narrowed range of the alternation in Bulgarian, as well as the connection between aspect and UOA. However, Bulgarian-specific constraint [IMPERF +] needs not to be stipulated in the lexical rule, since, as shown above, it subsumes [ALT *uo*].

As to the place of the *uoa- rule* in the sort hierarchy of lexical rules, *cf.* Sag et al (2003:251, 492), we propose that it is inserted under a supersort *alternation rule* in the *pi-rule* branch:

(28)

$$pi\text{-}rule$$

alternation-rule   extraposition rule   ...   inversion rule
(a-rule)

unexpressed object a-rule a_2-rule   ... a_n-rule

The sort *alternation rule* is proposed in view of the numerous alternation rules that have to be introduced, so as to achieve a more precise licensing of verb projections in HPSG.

5. Conclusions

In this paper, we have shown that model of HPSG, based on the distinction of argument structure and surface valence, can account for unexpressed object alternations as well. The proposed analysis keeps one lexeme description for the two valence alternation variants of a verb and relates their word descriptions by a lexical rule. Such a solution captures the idea of preserving an object argument, although not realized, in the argument structure of the verb.

Levin's theory-neutral investigation of verb alternations has proved as a source for the HPSG two-step mapping model, due to its comprehensive survey of verb classes and detailed typology of alternations. Moreover, it can be applied cross-linguistically, and the variations of its validity in regard to particular verb classes reveal some language-specific aspects of complementation in particular languages. In the paper it has been applied to English and Bulgarian.

Since the UOA is a subregularity of language, concerning particular verb classes, an additional argument ALT has been introduced, whose values constrain the application of the rule. In regard to Bulgarian, this attribute has been shown as related to the IMPERF + attribute, which accounts for a particular aspect of the complex interplay of verb aspectuality and complementation in Slavic languages.

Since the analysis is considered as one step into the overall description of alternations mechanism, it can be easily extended by inserting new sorts under the *alternation rule* sort and by extending the list of values for the ALT attribute.

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