Unexpressed Object Alternations of Bulgarian verbs in HPSG

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Abstract

This paper proposes a projectionist account of the unexpressed object alternations in HPSG. The approach is based on the two-level mapping mechanism, developed in Manning and Sag (1998) and Sag et al (2003). The proposed analysis keeps identical argument structure values in the lexeme description of both valence alternatives, while different surface valence values are related by a lexical rule.

The HPSG model is applied cross-linguistically to English and Bulgarian. Some Bulgarian-specific traits, such as the limited alternation range and the grammaticalized aspect, related to the formal characteristics of the unexpressed object alternations, are discussed and interpreted within HPSG.

1 Introduction

This 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, violating this regularity, on the other hand, is a challenge to the HPSG grammar theory.

1.1 Regularity of Complementation Patterns in HPSG

The language regularity of complementation patterns has been formalized in the recent versions of HPSG by a mapping mechanism, distinguishing argument structure (ARG-ST) and surface valence (VAL), presented in Manning & Sag (1998) and Sag et al (2003).

Following the above cited works, each verb is regarded as having a particular set of elements[1] on its ARG-ST list, specified in the lexeme

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description. The values of ARG-ST are not given individually for each lexeme, but lexemes are grouped into transitivity classes, defined as sorts in the sort hierarchy. Thus, the ARG-ST values of transitivity classes are adopted as sort constraints.

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*). Accordingly, the constraint on the sort *itr-lxm* is ARG-ST ⟨NP⟩ and on the sort *stv-lxm* is ARG-ST ⟨NP, NP⟩, *cf.* (1) and (2):

(1) спя – sleep, $\begin{bmatrix} itr\text{-}lxm \\ \text{ARG-STR} \ \langle \ \text{NP} \ \rangle \end{bmatrix}$

(2) чета – read, $\begin{bmatrix} stv\text{-}lxm \\ \text{ARG-STR} \ \langle \ \text{NP} \ , \ \text{NP} \ \rangle \end{bmatrix}$

The surface valence (VAL) is specified in the word description. ARG-ST elements are mapped to VAL elements, and in particular to SPR and COMPS list elements, following the Argument Realization Principle (ARP), as in (3) and (4).

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

(4) 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 (5) - (6), where the English and Bulgarian examples are given as translation equivalents:

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

(5) a. John (slept).
b. Иван (спеше).

(6) a. John (read a book).
b. Иван (четеше книга).

1.2 UOA as Irregularity

However, although capturing the difference between projections (5) and (6) 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 with an NP complement (7)[2] and without a complement (8):

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

(8) a. John (read).
b. Иван (четеше).

The irregularity is due to the fact that projection (8) is not licensed by the mechanism described in 1.1. above since that fact that the verb *read* in (7) has no complements contradicts its word description in (3). It practically means that the HPSG grammar, in the version presented above, treats (8) as ungrammatical.

1.3 UOA as Sub-regularity alongside Regularities

How can irregularities such as those in (8) be treated in the HPSG grammar?

In the analysis below, the occurrences of both (8) and (7) are regarded as appropriate for classes of verbs and their alternation - as being of systematic character. Therefore, in regard to (7) and (8), I share the opinion of treating alternations as 'systematically related valence patterns' (Sag et al 2003: 262) rather than as single exceptions within transitivity classes. This

[2] 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.

gives a reason to regard alternations as sub-regularities 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 sub-regularities in the complementation mechanism of HPSG, thus providing a way to license both (7) and (8) 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 based on lexical rules follows the approach, which Sag et al (2003:263) suggests 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 theoretical source of the research is the HPSG grammar, as presented in Sag et al (2003). The classification of alternations in Levin (1993) has been the starting point of the typological investigation, as well as the recent survey of argument realization research in Levin and Rappaport (2005).

The formal aspects of alternations in languages other than English have been taken into account, among which are the works of Frense and Benett (1996) - an English-German account of the conative, middle and locative alternations; Kordoni (2004) - the locative and dative alternations in Modern Greek; and Gupta (2003) on *spray/load* alternation of *be*-verbs in German.

In particular, some Bulgarian-oriented works on valence alternations have been considered. Among them are those of Dimitrova-Vulchanova (1999), treating the aspectual and semantic characteristics of the verb within the Sign Model; the shared-grammar HPSG accounts of Avgustinova et al (1999) and Avgustinova (2001); and the semantic-syntactic study of Koeva (2004).

3 Re-analyzing Verb Attributes due 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 the generalizations are made over analogous language phenomena. It has been checked whether all subtypes of UOA with the corresponding verb classes, defined for English in Levin (2003), are relevant for Bulgarian, *cf.* Section 3.1. Secondly, a specific aspectual constraint on Bulgarian verbs, exhibiting UOA, is discussed, *cf.* Section 3.2.

3.1 Cross-Linguistic Range of UOA (English –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 have been tested empirically on Bulgarian data and a number of differences have been noted.

Only four out of eight subtypes of the English-based classification of B. Levine have full structural correspondences in Bulgarian: *Unspecified object alternation, PRO-arb object alternation, Instructional imperative,* and *Characteristic property alternation*. They correspond to the same relation of verb projections in English and Bulgarian:

(9) (Engl) (Bulg) V NP_j - V

This structural correspondence is shown in (10) - (13) below:

(10) *unspecified object alternation*

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

(11) *PRO-arb object alternation*

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

(12) *instructional imperative*

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

(13) *characteristic property alternation*

- characteristic property of agent:

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

- characteristic property of instrument

a. These scissors **cut metal**. - These scissors **cut**.
b. Тая ножица **реже метал**. - Тая ножица **реже**.

Two English UOA subtypes – *the understood reflexive object alternation* and *the way-object alternation* - have no counterparts in Bulgarian:

(14) (Engl) V NP_j - V
(Bulg) - no alternative

It is seen in the examples below:

(15) *Understood reflexive object alternation*

a. John **washed himself**. - John **washed**.
б. Джон **се изми**. - no alternative

(16) *Way object alternation*

a. He **pushed his way** through the crowd. -
He **pushed** through the crowd.

b. Той **си проби път** през тълпата. - no alternative

Two subtypes – *Understood body-part object* and *Understood reciprocal object* are exhibited in both languages but one of the Bulgarian alternatives has a different structure – namely a PP complement versus an NP complement in English. Actually, in this case, the alternation is of different type in Bulgarian.

(17)

(Engl)	V	NP_j	-	V
(Bulg)	V	PP_j		

For example:

(18) *Understood body-part object alternation*

a. The man **nodded his head**. - The man **nodded**.
b. Човекът **кимна с глава**. - Човекът **кимна**.

(19) *Understood reciprocal object alternation*

a. John **divorced Jane**. - John and Jane **divorced**.
b. Джон **се разведе с Джейн**. -Джон и Джейн **се разведоха**.

Therefore, it should be noted that the range of UOA is much more limited in Bulgarian - it comprises only subtypes (10) - (13) above. Such narrowing of UOA range relates to the HPSG account, namely to the lists of verbs that are marked as alternating. This narrower range, which is relevant for both languages, is taken in the formal analysis below.

Practically, some semantic verb classes, included in the UOA subtypes of Levin (1993), are considered irrelevant for the lexical rule, proposed in the last section of the paper, since they are not alternating in Bulgarian. In particular, these are verbs belonging to classes (39), (42), (47), (54), (56), (58), (62), (73), (78)[3], 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. verbs of *cooking*, *performance*, *eating*, etc., are regarded as alternating in both English and Bulgarian and are the ones whose lexical entries are marked by a particular attribute value, as stipulated in the analysis below.

3.2 Defining Alternating Properties of Verbs in Their Lexical Entries

Since the UOA is sub-regularity, it is valid only for particular verbs, pertaining to the lists, specified above. I propose an attribute ALT

[3] The numbering of verb classes is given according to examples numbering in Levin 1993: pp.33-40, Part One.

(alternation) of *val-cat* sort, which is to show 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. Such a list is quite long, having in mind the number of alternations, defined in (Levin 1993:25-109). 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* …}[4]. The ALT value, I propose here, for non-alternating verbs is *non-alt*.

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

3.3 Aspectuality as a Bulgarian-specific Constraint

The HPSG representation of verb-complement projections in Bulgarian and, in particular of those of alternating verbs, has to account for some aspectual properties, which are related to the mechanism of object realization.

It is important to note that the English verbs in the lists of Levin (1993) have two semantic equivalents in Bulgarian – one of imperfective and one of perfective aspect, e.g. *eat – ям, изям*, *cook – готвя*, *сготвям*, etc[5]. What is crucial for the analysis of these verbs in regard to UOA is that only one element of the pair exhibits UOA in Bulgarian, namely, 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 (21) - (22), while its perfective counterpart *нарисувам 'paint'* has only one projection: (23).

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

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

[4] otsi (Object-of Transitive=Subject of Intransitive), uo (Unexpressed Object), pd (Preposition Drop), ct (Creation and Transformation).

[5] There is also a limited number of Bulgarian verbs, which are 'defective' in this respect, i.e. they have no aspectual counterpart, e.g. *мога, знача, нуждая се* etc.

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

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

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

Firstly, it should be made clear whether the verbs in the aspectual pair are treated as two forms of the same verb or as two distinct verbs. What I follow in this 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 verb idiosyncrasies, as well as with the fact that very often these are not pairs but triples because of the secondary aspect derivation. But a more important argument against a derivational treatment 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 the aspect of the verb as an *agr-pos* feature IMPERF with a Boolean value. Respectively, the verbs of imperfective aspect are [IMPERF +], and those of perfective aspect: [IMPERF -].

(25) $\begin{bmatrix} verb \\ \text{SYN} \left[\text{HEAD} \left[\text{IMPERF} \ \{+ \ , \ -\}\right]\right] \end{bmatrix}$

As to the aspectuality of a verb exhibiting the UOA, it can only be [IMPERF +], that is, every verb with [ALT *uoa*] is also [IMPERF +].

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

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 the hypothesis concerning the nature of alternations. The analysis I propose here assumes that the verb keeps 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, mapped 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.

(27) 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 contains no such argument, *cf.* (28).

(28) 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 my proposal, in both projections the mapping from ARG-ST values to SPR and COMPS values is kept unchanged. It is a lexical rule that maps a word description with COMPS ⟨NP⟩ to a word description with COMPS ⟨ ⟩. The lexical rule is *post-inflectional*, i.e., it maps words to words.

The following UOA (unexpressed object alternation) rule is proposed:

(29) *UOA-rule:*

$$\begin{bmatrix} \textit{pi-rule} & \\ \text{INPUT} & \langle\ \text{X}\ ,\ \begin{bmatrix} \textit{word} & \\ \text{VAL} & \begin{bmatrix} \text{COMPS} & \langle\ \text{NP}\ \rangle \\ \text{ALT} & \textit{uo} \end{bmatrix} \end{bmatrix}\ \rangle \\ \text{OUTPUT} & \langle\ \text{X}\ ,\ \begin{bmatrix} \textit{word} & \\ \text{VAL} & \begin{bmatrix} \text{COMPS} & \langle\ \rangle \\ \text{ALT} & \textit{uo} \end{bmatrix} \end{bmatrix}\ \rangle \end{bmatrix}$$

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

Thus, both alternative projections of read in (7) - (8) above can be licensed in the HPSG grammar as shown in (30) - (32)(31).

For example, the lexeme description of *чета 'read'* has the following constraints:

(30) чета-read,

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

The word description of *чета 'read'*, projecting a head-complement phrase, is constrained by the Argument Realization Principle, *cf.* (31):

(31) $\text{чета}_1\text{-read}_1$,

$$\begin{bmatrix} \textit{word} & \\ \text{SYN} & \begin{bmatrix} \text{VAL} & \begin{bmatrix} \text{ALT} & \textit{uo} \\ \text{SPR} & \langle\ \boxed{1}\ \text{NP}\ \rangle \\ \text{COMPS} & \langle\ \boxed{2}\ \text{NP}\ \rangle \end{bmatrix} \end{bmatrix} \\ \text{ARG-STR} & \langle\ \boxed{1}\ \text{NP}\ ,\ \boxed{2}\ \text{NP}\ \rangle \end{bmatrix}$$

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

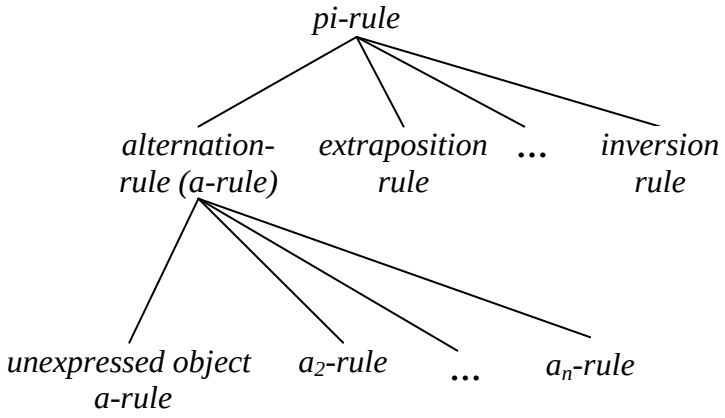
(32) чета$_2$-read$_2$,

$$\begin{bmatrix} word & & \\ \text{SYN} & \text{VAL} & \begin{bmatrix} \text{ALT} & uo \\ \text{SPR} & \langle\ \boxed{1}\ \text{NP}\ \rangle \\ \text{COMPS} & \langle\ \rangle \end{bmatrix} \\ \text{ARG-STR} & \langle\ \boxed{1}\ \text{NP}\ ,\ \text{NP}\ \rangle & \end{bmatrix}$$

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, the Bulgarian-specific constraint [IMPERF +] need not be stipulated in the lexical rule, since it subsumes [ALT uo], as shown above.

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

(33)



The sort *alternation rule* is proposed as a mother node, under which more alternation rules alongside UOA-rule can be inserted, e.g. *a_3-rule* for the dative alternation, *a_4-rule* for *preposition drop* etc., so as to achieve a more precise licensing of verb projections in HPSG.

5 Conclusions

This paper has shown that the 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, due to its comprehensive survey of verb classes and detailed typology of alternations, has proved to be a good source for the HPSG model. 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 sub-regularity of language, concerning particular verb classes, an additional argument ALT whose values constrain the application of the rule has been introduced. 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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