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FORMAL MODELING OF CASE VARIATION: A PARAMETRIC APPROACH¹

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This paper aims at evaluating formal theories of case assignment with respect to their applicability to modeling of case variation. Crosslinguistically, differential case marking exhibit significant variation in many parameters, including licensing factors of case variation, correlation of case with linear position, and feeding of predicative or possessive agreement. In this paper, I consider the two most elaborated formal theories of case—the minimalist syntactic case theory and the configurational case theory—and explore their expressive power in modeling various types of differential case marking. I show that none of the theories is superior to the other—rather, each of them naturally accommodates a specific type of case variation but is unsuitable to express the other types. The minimalist syntactic case theory is more flexible in that it is compatible with additional mechanisms deriving the morphologically observable case variation, and more restrictive in that it predicts the one-to-one correspondence between case assignment and agreement. The prime advantage of the configurational theory is that it can represent directly the non-local dependencies between case-marking of different arguments.

Key words: formal language models, typology, case, agreement, differential case marking

ФОРМАЛЬНОЕ МОДЕЛИРОВАНИЕ ПАДЕЖНОГО ВАРИИРОВАНИЯ: ПАРАМЕТРИЧЕСКИЙ ПОДХОД

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Ключевые слова: формальные модели языка, типология, падеж, согласование, дифференцированное падежное маркирование

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1. Introduction

Case marking is one of the most reliable linguistic “tags” that signal the relation of its bearer to the syntactic context and/or its thematic relation to the governing element. The correct recognizing of the argument structure of predicates is crucial for understanding the core meaning of the sentence in both human and automatic language processing. Accordingly, using case morphology as a marker of a specific grammatical relation of the nominal to the predicate/sentence or as an encoding of a specific thematic role is a universal mechanism of syntactic parsing and semantic analysis.

Indeed, research in both experimental and computational linguistics shows the role of case marking in the parsing process. A facilitation effect in sentence parsing due to case marking has been reported for many languages with rich case morphology, such as Japanese (Mazuka, Lust 1990; Yamashita 1997), Finnish (Hujanen 1997) or Basque (Santesteban et al. 2015). Similarly, syntactic parsing of morphologically rich languages can rely heavily on morphological dependencies (Tsarfaty et al. 2013). Thus, using of morphological marking of the highly inflectional language such as Czech in adjusting a statistical parsing model showed a 7% improvement in dependency accuracy (Collins et al. 1999); see also (Øvrelid, Nivre 2007; Øvrelid 2008) on argument differentiation based on different grammatical features in data-driven dependency parsers.

The one-to-one correspondence between morphological case marking and syntactic relation is broken in at least two directions. The first challenge is the case syncretism that results in underdetermination of the morphological tagging of a nominal and makes it much harder for a statistical system to learn the morphological marking patterns of a language (Seeker, Kuhn 2013). The second challenge is that the regular case marking of the given grammatical function can be biased by the case variation process licensed by some language-specific grammatical factor.

Although differential case marking (DCM) is highly widespread, its impact on language processing seems to be underestimated (but see (Butt, King 2001; Butt, King, Varghese 2004)). Yet, modeling of DCM can neutralize the disturbing effect of case variation on the association of a nominal with its grammatical or thematic role; moreover, factors licensing differential case marking can contribute to the syntactic and semantic analysis.

In this paper, I investigate modeling of case variation within the two competing formal theories of case—the minimalist syntactic case theory and the configurational case theory. I use the parameters distinguishing cross-linguistically attested patterns of DCM in order to identify the characteristic “profile” of case variation that can be easily accommodated within each theory, as well as the blind-spots of each theory, that is, linguistic phenomena that cannot be expressed within it.

The paper is organized as follows. Section 2 provides a typological overview of differential case marking and introduces parameters that characterize case variation. In section 3, the two formal theories of case assignment are briefly described. Section 4 discusses their potential in modeling different aspects of case variation. Conclusions are drawn in section 5.

2. Differential case marking: positions and parameters

Case variation is a widespread linguistic phenomenon. The most deeply studied differential object marking (DOM) received much attention in the literature at least since (Bossong 1985); the keynote papers summarizing the functional and typological perspective of DOM are Aissen 2003; de Swart 2007; von Heusinger, Klein and de Swart 2008; de Hoop, Malchukov 2007; Malchukov, de Swart 2008. In (1), a definiteness-conditioned DOM in Hebrew is exemplified.

- (1) a. *Dan kara *(et) ha-itonim.*
 Dan read OM DEF-newspapers
 'Dan read the newspapers.'
- b. *Dan kara (*et) itonim.*
 Dan read (*OM) newspapers
 'Dan read newspapers.' (Danon 2006: (1))

Differential subject marking (DSM) was recognized as a unified phenomenon only recently (de Hoop, de Swart (eds.) 2009); previous approaches to DSM focused mostly on split ergativity—cases when ergative alignment is absent in some transitive clauses (Silverstein 1976; deLancey 1981; Dixon 1994) and on active/semantic alignment or split intransitivity, whereby the sole argument of an intransitive verb does not receive a uniform encoding (Mithun 1991; Donohue, Wichman (eds.) 2008). DSM is often accompanied by DOM: thus, in aspectually determined split ergativity in Georgian ergative/nominative encoding of the subject vary in parallel with nominative/dative encoding of the object, as in (2).

- (2) a. Aorist (Series II), ergative subject, nominative object
nino-m gia-s surateb-i ačvena.
 Nino-ERG Gia-DAT picture-NOM show.AOR
 'Nino showed the picture to Gia.'
- b. Present (Series I), nominative subject, dative object
nino gia-s surateb-s ačveneb-s.
 Nino.NOM Gia-DAT picture-DAT show.PRS
 'Nino is showing the picture to Gia.'

A huge amount of data concerns differential case marking of arguments in embedded structures such as nominalizations or causative constructions (Comrie 1976; Givón 1990; Alexiadou 2001). In nominalizations, case variation usually involves “clausal” and “nominal” case marking of the subject (Szabolcsi 1983; Abney 1987), and this is how possessor case marking is included into the perspective of the differential case marking of clausal arguments. Example (3) shows specificity-induced DSM in Turkish nominalized clause where “clausal” nominative case marking varies with “nominal” genitive case marking (von Heusinger, Kornfilt 2005: (16)).

- (3) a. *Yol-dan bir araba geç-tiğ-in-ı gör-dü-m.*
road-ABL one car pass-NML-3SG-ACC see-PST-1SG
‘I saw that a car [non-specific] went by on the road.’
- b. *Yol-dan bir araba-nın geç-tiğ-in-ı gör-dü-m.*
road-ABL one car-GEN pass-NML-3SG-ACC see-PST-1SG
‘I saw that a car [specific] went by on the road.’

The morphosyntactic encoding of the possessor, in its turn, exhibit variation concerning semantic type of possessive relation (alienable/inalienable possession, Haiman 1983), structural position of the possessor (internal/external possessor, Shibatani 1994; Payne, Barshi (eds.) 1999) and its referential characteristics (Pereltsvaig, Lyutikova 2014; Testelefs 2014).

Thus, DCM occurs in various syntactic positions; it should be noted, however, that these positions—subject, object, possessor—have much in common: they correspond to the basic grammatical functions of the noun phrases that tend to receive a uniform linguistic encoding—special flagging with grammatical cases (nominative, accusative, ergative, genitive) and priority indexing in the predicate (predicative and possessive agreement). This prototypical encoding is biased by licensing factors of DCM to the effect that the nominal receives a special case marking (or “loses” case marking), and this can influence its ability to control agreement. This general scheme of case variation, as well as the regular interrelations of DOM, DSM and possessor marking mentioned above allow us to analyze DCM within a single parametric system, extending and adjusting the parametric description of DOM proposed in (von Heusinger, Klein and de Swart 2008).

At least the following parameters of DCM required by empirical generalizations and relevant for formal models of case assignment can be distinguished:

- locality;
- semantic motivation;
- positional differences;
- correlation with agreement.

Degree of **locality** characterizes the localization of the licensing factor of DCM. Local DCM is conditioned by the properties of the argument itself—e.g. its formal feature (noun/pronoun, locutor/non-locutor), syntactic category (DP/NP), animacy, definiteness, referentiality, topicality etc. Non-local DCM comes in two varieties: predicate-determined and coargument-determined DCM. Predicate-determined DCM is based on properties of the predicate (possibly in combination with the properties of the argument). Thus, DOM in Finnic languages involves quantization of the internal argument and perfectivity/imperfectivity of the VP (4):

- (4) a. *Ta ehitas silla (kahe aasta-ga).*
he build.PST bridge.GEN (two.GEN year.OBL-COMIT)
‘He built a bridge (in two years).’

- b. *Ta ehitas silda (kaks aastat).*
 he build.PST bridge.PART (two.PART year.PART)
 'He was building a bridge (for two years).'

The aspectual, temporal and modal characteristics of the predicate can also influence DSM. In Hindi, ergative encoding of the external argument is attested in perfective clauses, whereas imperfective clauses license a nominative subject (5). Other properties of the predicate that can license DSM of the external argument are volitionality and agentivity; they often correlate with animacy of the external argument.

- (5) a. *laṛke-ne kitāb xarīdī.*
 boy-ERG book.NOM buy.PF
 'The boy bought a book.'
- b. *laṛkā kitāb xarīdtā hai.*
 boy.NOM book.NOM buy.IPF AUX.PRS
 'The boy is buying a book.'

Coargument-determined DCM takes place if an argument gets a case marking depending on the characteristics of its coargument. In (6) from Awtuw (Sepik-Ramu) the direct object receives accusative marking only if it overranks the subject in animacy (de Hoop, Malchukov 2007); so DOM in Awtuw is determined hierarchically and motivated by disambiguation (but see Arkadiev 2008 for the criticism of disambiguation approach based on DCM in two-term case systems).

- (6) a. *Tey tale-re yaw d-æ-l-i.*
 3F.SG woman-ACC pig F.AGT-bite-PAT
 'The pig bit the woman.'
- b. *Tey tale yaw d-æ-l-i.*
 3F.SG woman pig F.AGT-bite-PAT
 'The woman bit the pig.'

DSM can be conditioned by the encoding of the internal argument: in Bagwalal (Andic/Dagestanian) example (7), the choice of the ergative or nominative case of the external argument depends on the case marking of the internal argument (which reflects its thematic role).

- (7) a. *anwar / *anwar-i-r ȩla-t̄a w-alli.*
 Anvar.NOM / *Anvar-OBL-ERG mother-OBL.SUP.LAT M-shout.PST
 'Anvar addressed to his mother.'
- b. *anwar-i-r / *anwar ȩla j-alli.*
 Anvar-OBL-ERG / *Anvar.NOM mother.NOM F-shout.PST
 'Anvar called his mother.'

The parameter of **semantic motivation** distinguishes between the semantically motivated vs purely configurational case variation. Let us consider the encoding of the causee in the causative construction. In Balkar (Turkic/Altaic), causee encoding observes Comrie's (1976) Paradigm Case rule and is determined exclusively by transitivity of the input verb. Regardless of the thematic role of the causee, his/her control over the performed action and semantics of the causative construction, the causee receives accusative with causatives of intransitives and dative with causatives of transitives (Lyutikova et al. 2006). In Hungarian, however, the case of the causee depends on its agentivity: in causer-controlled structures, the causee receives accusative, but in causee-controlled structures, it is marked with instrumental.

- (8) a. *Az orvos pisiltette a gyereket.*
 DET doctor.NOM pee.CAUS.3SG DET child.ACC
 'The doctor made the child pee.'
- b. *Az orvos pisiltetett a gyerekket.*
 DET doctor.NOM pee.CAUS.3SG DET child.INSTR
 'The doctor had the peeing done by the child.' (Ackerman 1994:537)

Positional distribution is often observed with DCM. In Sakha, accusative and unmarked direct objects occupy different positions with respect to the indirect object or VP-level adverbials ((9), Baker, Vinokurova 2010).

- (9) a. *Masha [vp türgennik salamaat-*(y) sie-te].*
 Masha quickly porridge-*(ACC) eat-PST.3SG
- b. *Masha salamaat-*(y) [vp türgennik sie-te].*
 Masha porridge-*(ACC) quickly eat-PST.3SG
- (a=b) 'Masha ate porridge quickly.'

Similarly, in Tatar, genitive case-marked referential possessor precedes adjectives, whereas unmarked non-referential possessor follows them (Pereltsvaig, Lyutikova 2014; Lyutikova, Pereltsvaig 2015). However, case variation may occur in the same structural position. This becomes clear if we compare Tatar example (10) with Sakha example (9). In Tatar, accusative direct object can occupy the same (preverbal) position as the unmarked direct object.

- (10) *Bajras kat-kat xat-(ni) ukl-dt.*
 Bayras again-again letter-(ACC) read-PST
 'Bayras read the/a letter again and again.'

The **correlation** of DCM with **agreement** is evident when one (or even both) of the cases that can be assigned to a noun phrase licenses predicative or possessive agreement. In Tatar example (11), the subject of the relative clause exhibit case

variation between nominative and genitive. Genitive case marking enforces possessive agreement on the head noun.

- (11) a. *Marat Kazan-nan al-ıp kajt-kan kitap bik kıızık.*
 Marat Kazan-ABL take-CONV return-PF book very interesting
- b. *Marat-nıy Kazan-nan al-ıp kajt-kan kitab-ı bik kıızık.*
 Marat-GEN Kazan-ABL take-CONV return-PF book-3 very interesting

(a=b) ‘The book that Marat brought from Kazan is very interesting.’

On the other hand, agreement may persist irrespectively of case marking. This is what happens in Amharic (Ethiopian/Semitic, Baker 2012) where primary object can be marked with accusative or embedded under the prepositional phrase. Object agreement is optional with accusative primary object (12a) and possible with prepositional primary object (12b). Thus, case variation in primary objects does not influence agreement options.

- (12) a. *Ləmma wiŋfa-w-in j-aj-al || j-aj-əw-al.*
 Lemma dog-DEF-ACC 3M.SU-see-AUX.3M.SU 3M.SU-see-3M.OBJ-AUX.3M.SU
 ‘Lemma sees the dog.’
- b. *L-Aster liḍḍ-u-n assajj-əhw-at.*
 DAT-Aster baby-DEF-ACC show-1SG.SU-3F.OBJ
 ‘I showed the baby to Aster.’

In section 4, I discuss the possible interpretation of the parameters outlined above within the syntactic models of case, but first, a brief characterization of the two formal theories of case assignment is due.

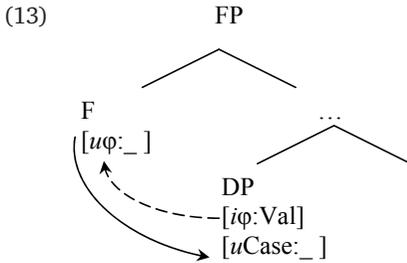
3. Formal theories of case assignment

In the formal syntactic literature, two major approaches to case assignment can be found. The first approach, which is mainly associated with Noam Chomsky’s work, considers case as a syntactic phenomenon that licenses NPs; the second approach, put forward in the work by Alec Marantz, treats case as a postsyntactic, purely morphological phenomenon.

In the modern minimalist syntactic approach (Chomsky 2000, 2001) Case is an unvalued uninterpretable feature of a noun phrase that has to be valued in the course of the derivation. In the Chomsky-style model, Case is assigned to a noun phrase under AGREE relation with a dedicated case-assigning head.

In (13), the head F which has unvalued φ -features [$u\varphi$:_] acts as a goal and seeks for an active bearer of valued φ -features [$i\varphi$:Val] in its c-command domain. The DP with an unvalued Case and valued φ -features suits as a goal. The AGREE relation

between F and DP is established, and F values its φ -features copying the values accessible on the DP. The φ -complete F can, in its turn, value the case feature of the goal. Additionally, the second-order feature [EPP] on [$u\varphi$:_] may attract the goal DP into the projection of FP.



Two kinds of case-assigning heads can be distinguished: lexical heads, that assign case to their own arguments exclusively, and functional heads, that assign structural case to the nearest goal DP available in their c-command domain. Lexical heads assign the lexical (or inherent) case at the very moment of merging with their arguments, discharging their theta-roles; thus lexical case is syntactically local and theta-related.

The characteristic properties of a structural case are: (i) its independence from a theta-role; (ii) its somewhat non-local nature and (iii) the non-obligatoriness of its realization. In view of these properties, three major structural cases are usually recognized: nominative, assigned by the finite predicative head T; accusative, assigned by the transitive light verb head v ; and genitive, assigned by the (possessive) determiner head D.

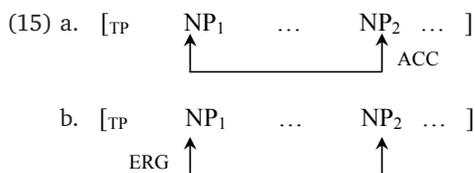
The competing configurational approach dates back to the seminal paper by Alec Marantz (Marantz 1991). The basic idea behind this approach is that (morphological) case assignment can be dependent not only on the presence of governing heads, but also on the presence of other noun phrases (“case competitors”) in the same syntactic domain.

The category of case is organized hierarchically. Marantz distinguishes four distinct kinds of case, forming a disjunctive Case realization hierarchy (14). This hierarchy determines the order in which the different kinds of case shall be assigned.

(14) Case realization disjunctive hierarchy:

- lexically governed case
- “dependent” case (accusative and ergative)
- unmarked case (environment-sensitive)
- default case

First, the most specific lexically-governed case is assigned. Next, the rule of dependent case assignment applies. The dependent case rule requires a configuration where there are at least two caseless NPs in the clausal domain. If this requirement is met, these noun phrases enter into case-competition. In accusative languages, the lower NP is marked with the “dependent” accusative case (15a), and in ergative languages, the higher NP is marked with the “dependent” ergative case (15b).



Then, the rule of the unmarked case applies that marks any still case-less NP in a given syntactic domain with the dedicated case. Finally, if neither of the previous rules applied to an NP, it receives the default case. It is important that the universal availability of the default case realization in Marantz's system means that case assignment is set apart from licensing: case as a purely morphological phenomenon only interprets the syntactic structure, but does not filter it out.

Though some adherents of the approach pursue the postsyntactic analysis of case issues (McFadden 2004; Bobaljik 2008), attempts have been made to incorporate the appealing idea of the “dependent” case assignment into the narrow syntax. Thus, in (Bittner, Hale 1996; Baker 2009, 2012, 2015; Preminger 2011, 2014; Kornfilt, Preminger 2015; Levin, Preminger 2015) the authors explore various paths of implementing configurational case assignment within the syntactic model of case. The basic innovations in the Marantz-style system include a more elaborate definition of case competition domains. Within the clause, more domains for case competition have been distinguished, e.g. VP and TP, which allowed to subsume dative case assigned in ditransitive constructions under a similar analysis.

Although Marantz-style case assignment is construed as independent from agreement of lexical or functional heads (i.e. AGREE operation), the morphological case marking can in principle feed the agreement process (Bobaljik 2008; Preminger 2011, 2014). Thus, J. Bobaljik reinterprets E. Moravcsik's (1974, 1978) hierarchy as the hierarchy of accessibility of case-marked DPs as controllers of agreement (16). Agreement is said to be case-discriminating, in the sense that only those DPs that bear a specific case are visible as goals for a probe looking for a source of valued ϕ -features.

(16) unmarked case >> dependent case >> lexical case

In the series of papers by J. Kornfilt (Kornfilt 2013; Kornfilt, Preminger 2015) a further refinement of the configurational analysis is put forward: “nominative” and “genitive” are considered as descriptive labels for caseless NPs. In her system, agreement targets caseless NPs exclusively.

In the next section, I address the question of how case variation can be implemented within the proposed systems.

4. Evaluating theories

Let us start with discussing explanatory mechanisms available for the two theories. Lexical case assignment seems to be treated similarly in both of them, so the difference is in explaining DCM involving structural cases.

It seems that the configurational case assignment model has only one explanatory mechanism based on the positional alternative. If a noun phrase exhibit differential structural case marking, it may belong to different domains of case assignment, or its domain of case assignment may contain or lack a potential case competitor. This is how various factors licensing structural case variation are to be modeled.

Chomsky-style case assignment is more flexible in that it allows various mechanisms of modeling factors triggering case variation. External factors like telicity, perfectivity or polarity are naturally conceived as (features of) functional heads that assign a structural case to DPs. The impact of factors internal to the noun phrase can be analyzed as a split morphological realization of the same syntactic case. Besides, as case assignment obeys at least phase-level locality and relativized minimality, the positional alternative is also an option for the Chomsky-style model.

Now we can proceed to the parameters of DCM.

The **locality** parameter distinguishes the local DCM and the two types of the non-local DCM: predicate-determined and coargument-determined. The local DCM is easily implemented in the Chomsky-style syntactic case theory, e.g. as a morphologically conditioned realization of the syntactic case, as a parametrization of the case filter allowing structurally deficient nominals to remain caseless (Lyutikova 2014) or as positionally distributed case options available for noun phrases with different features. Configurational case theory can only rely on the positional alternative. Predicate-determined DCM is best conceived as the interdependence between a predicate with a specific feature and an argument selected by it. This is exactly what the “case assignment by functional heads” theory proposes. For the configurational case theory, modeling of predicate-determined DCM has to be mediated by the reorganization of structural configurations, whereby the licensing factor (e.g. imperfective aspect) is associated with more case domains than its counterpart (i.e. perfective aspect). Although sometimes it is indeed the case (thus, biabsolutive constructions in Basque or Tsez have been claimed to be biclausal), extending this mechanism to all cases of predicate-determined DCM is not an attractive decision. On the contrary, coargument-determined DCM is best subsumed under the configurational model. In example (7) above DSM is easily modeled as depending on the presence or absence of the case competitor—the internal argument without lexical case. For a Chomsky-style model, the analysis of (7) involves ergative-assigning and nominative-assigning functional heads, and their choice should somehow depend on the case assigned to the internal argument.

In both models, **semantic motivation** can be easily implemented if it yields the lexical case assignment (cf. Genitive of negation in Russian). If the DCM involves two structural cases, the explanatory proficiency of the two theories differs. In the minimalist theory the regular semantically motivated case, such as instrumental in (8b), can be interpreted as a theta-related case assigned to an argument by a functional head (this is E. Woolford’s (2006) analysis of ergative and dative). In the configurational case theory, however, all non-lexical cases (such as ergative, dative, or instrumental) are semantically as empty as the accusative or nominative.

Positional distribution accompanying the DCM is in the very heart of the configurational model. If case variation occurs in the same syntactic position and involves structural cases, as is the case in Tatar DOM (10), the configurational model

is handicapped. As for the Chomsky-style model, it can deal with both positionally dependent and independent DCM.

The interdependence of case assignment and **agreement** is an attribute of the minimalist case theory. It presupposes one-to-one correspondence between agreement and case, because valuing the φ -features of the functional head enables it to assign case to the goal DP. If no overt agreement is associated with case marking, one can hypothesize that the AGREE operation still takes place but is not realized morphologically. It is much more difficult to explain the optionality of agreement (12a) and the immunity of agreement to case variation (12b).

The configurational model accounts easily for various kinds of splits between agreement and case assignment. If a strong correlation between case and agreement exists (e.g. only nominative subjects control predicative agreement, and predicative agreement is obligatory if there is a nominative subject), the mechanism of case discrimination can be exploited. The weak point of this mechanism is that it predicts the possibility of the multiple agreement of different heads with the same DP. If this option is undesirable on empirical grounds, the configurational model fails to exclude it.

Evaluation of case theories in representing various types of DCM is summarized in Table 1.

Table 1. Parameters of case variation in the formal theories of case assignment

Parameter	Minimalist case theory	Configurational case theory
Locality	local DCM predicate-determined DCM	local DCM coargument-determined DCM
Semantic motivation	easily representable	non-representable outside of lexical government
Positional distribution	non-obligatory	obligatory
Correlation with agreement	strong correlation	various splits between case and agreement

5. Conclusions

In this paper, I considered the two most elaborated formal theories of case—the minimalist syntactic case theory and the configurational case theory—and explored their expressive power in modeling various types of differential case marking. I showed that none of the theories is superior to the other—rather, each of them has its own strengths and weaknesses in modeling different types of case variation. However, this conclusion should not disappoint us. It seems that the mere existence of various patterns of DCM calls for the elaboration of various models of case assignment—at least until the uniform theory of case, flexible enough to account equally well for all attested types of DCM, and restrictive enough to exclude unattested types,

is proposed. Meanwhile, we should be aware of different theories, their potential and their limitations, in order to choose the right model for the empirical data.

Addressing applicability of the study to NLP, I shall emphasize that linguistic rules possibly employed in argument structure retrieval are not required to constitute a uniform theoretical system. Thus, we can adjust the specific mechanisms of the two models discussed in this papers to specific DCM phenomena of a specific language, to the effect that, for example, in Balkar the identification of the causee can be determined configurationally, but the identification of the possessor can be based on the presence of an agreeing nominal head. Interestingly, such a hybrid theoretical system aiming at more natural relations of facts and theories has been proposed recently for Sakha (Baker, Vinokurova 2010). It seems that exactly this sort of models is in demand in computational linguistics.

Abbreviations

1—1st person; 3—3rd person; ABL—ablative; ACC—accusative; AGT—agent; AOR—aorist; AUX—auxiliary; CAUS—causative; COMIT—comitative; CONV—converb; D—determiner (syntactic category); DAT—dative; DCM—differential case marking; DEF—definite; DET—determiner (lexical item); DOM—differential object marking; DP—determiner phrase; DSM—differential subject marking; EPP—extended projection principle; ERG—ergative; F—feminine; GEN—genitive; INSTR—instrumental; IPF—imperfective; LAT—lative; M—masculine; NML—nominalization; NOM—nominative; NP—noun phrase; OBJ—object agreement; OBL—oblique stem; OM—object marker; PART—partitive; PAT—patient; PF—perfective; PL—plural; PRS—present; PST—past; SG—singular; SU—subject agreement; SUP—super (localization); TP—tense phrase (clause); VP—verbal phrase; φ -features—person, number, nominal class features.

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