

**ON CASE ASSIGNMENT
AND THE COORDINATION OF UNLIKES:
THE LIMITS OF DISTRIBUTIVE FEATURES**

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Abstract

This paper discusses the notion of distributivity of features in coordinate structures and demonstrates its limits in unlike coordination constructions involving conjuncts bearing different grammatical cases. Two solutions are presented, one – termed “liberal” – necessitating certain extensions to the formal machinery of LFG, and another – termed “conservative” – which recycles the mechanism of off-path constraints.

1 Introduction

The aim of this paper is to demonstrate a certain weakness of the standard mechanism of distributive and non-distributive features in LFG analyses of coordination, and to propose a straightforward extension of this mechanism to account for the problematic data. An alternative solution of the same problem, by Mary Dalrymple (p.c.), is also presented, which does not require any modifications to the formal apparatus of LFG and relies instead on the mechanism of off-path constraints.

The problem addressed here may be summarised as follows. For various languages, it makes sense to posit general statements taking care of so-called structural case assignment (as opposed to lexical – or inherent – case assignment). For example, in Polish, such statements may require that case-bearing subjects must be in the nominative, with the exception of a class of numeral phrases, which must occur in the accusative.¹ However, given standard LFG assumptions, such statements fail in cases of unlike coordination. Since *CASE* is a distributive feature, such statements would assign the same case (if any) to all conjuncts, even if one of them is a nominal phrase (and, hence, should occur in the nominative in the subject position), and another one is a numeral phrase (accusative) or a clause (caseless). The problem is not limited to subject positions.

After outlining standard LFG assumptions regarding coordination, distributive features and case assignment in Section 2, we present Polish case facts in more detail in Section 3. Then, the problem such facts present to the current analyses – and to standard LFG assumptions – is described in Section 4. Two solutions to this problem are then proposed: our solution introducing an extension of the standard approach to distributivity (Section 5) and a more conservative solution suggested to us by Mary Dalrymple (Section 6). Finally, Section 7 discusses the relative pros and cons of these approaches, and concludes the paper.

2 Standard LFG assumptions

In LFG analyses of coordination, following Dalrymple and Kaplan 2000 (who credit John Maxwell with the basic idea), all conjuncts are elements of a set in a hybrid feature structure which, apart from representing this set, may also contain its own features. When f is a hybrid feature structure, the interpretation of a functional

¹See Przepiórkowski and Patejuk 2012 (in these proceedings), especially fn. 2 there.

description such as “(f FEATURE) = VALUE” depends on the status of the FEATURE: in case of distributive features, like CASE, such a statement applies to all elements in the set represented by the feature structure, but not to the feature structure itself, while in case of non-distributive features, like NUMBER, GENDER and PERSON, the statement pertains to the whole feature structure and it does not affect the elements of the set.

Here, we assume recent LFG approaches to the representation and assignment of case proposed in Dalrymple et al. 2009; for example, the unambiguously accusative German pronoun *ihn* ‘him’ will be specified for CASE as in (1a), giving rise to the feature structure in (1b), while the German *was* ‘what’, syncretic between the nominative and the accusative, will be specified as in (2a), satisfied, e.g., by the feature structure (2b) when interpreted as accusative:

- (1) a. CASE NOM = –
CASE GEN = –
CASE DAT = –
CASE ACC = +
- b. $\left[\begin{array}{c} \text{CASE} \left[\begin{array}{c} \text{NOM} \quad - \\ \text{ACC} \quad + \\ \text{GEN} \quad - \\ \text{DAT} \quad - \end{array} \right] \end{array} \right]$
- (2) a. CASE GEN = –
CASE DAT = –
CASE {NOM|ACC} = +
- b. $\left[\begin{array}{c} \text{CASE} \left[\begin{array}{c} \text{NOM} \quad + \\ \text{ACC} \quad + \\ \text{GEN} \quad - \\ \text{DAT} \quad - \end{array} \right] \end{array} \right]$

On this approach, the usual case assignment statements look as in (3) below:

- (3) a. (\uparrow SUBJ CASE NOM) = +
b. (\uparrow OBJ CASE ACC) = +

An application of these statements to the nominative/accusative syncretic *was* in a German free relative construction (4a), where *was* is simultaneously an object (of the matrix verb) and a subject (of the embedded verb), results in the structure in (4b):

- (4) a. Ich habe gegessen was übrig war.
I have eaten what left was
‘I ate what was left.’
- b. *was* in (4a):
- $\left[\begin{array}{c} \text{CASE} \left[\begin{array}{c} \text{NOM} \quad + \\ \text{ACC} \quad + \\ \text{GEN} \quad - \\ \text{DAT} \quad - \end{array} \right] \end{array} \right]$

The distributivity of CASE is crucial in LFG analyses such as Dalrymple and Kaplan 2000 and Dalrymple et al. 2009, where case assignment annotations such as “ACC \in (\uparrow OBJ CASE)” (in the former) or “(\uparrow OBJ CASE ACC) = +” (in the latter) apply to all conjuncts in coordinate objects. Interestingly, in case of verbs with indeterminate case requirements, e.g., the Russian *proždat* ‘wait’, taking accusative

or genitive objects, the statement “ $(\uparrow \text{OBJ CASE } \{\text{ACC|GEN}\}) = +$ ” applies to all conjuncts, but the “ $\{\text{ACC|GEN}\}$ ” uncertainty is resolved separately for each conjunct, giving rise to the possibility of coordination of differently cased NPs, as in (5) from Levy and Pollard 2001, p. 221 (cited by Dalrymple et al. 2009, p. 41):

- (5) Včera ves’ den’ on proždal svoju podругu Irinu i zvonka ot yesterday all day he waited-for self’s girlfriend.ACC Irina and call.GEN from svoego brata Grigorija. self’s brother Gregory
 ‘Yesterday he waited all day for his girlfriend Irina and for a call from his brother Gregory.’

3 Case in Polish

We adopt the basic distinction between structural and lexical case assignment, widely assumed, e.g., in transformational theories (starting with Rouveret and Vergnaud 1980 and Vergnaud 1982, and adopted in Chomsky 1981, *inter alia*) and in Head-driven Phrase Structure Grammar (e.g., Heinz and Matiasek 1994, Pollard 1994, Przepiórkowski 1996), and traceable back at least to Kuryłowicz 1949. In the particular implementation of this idea assumed here (roughly that of Przepiórkowski 1999), predicates mark their case-bearing arguments with a specific morphological case or they leave the case of the argument unspecified, marked only with the diacritic “ $sc = +$ ” (*sc* stands for *structural case*).²

The basic facts of structural case assignment in Polish are as follows:³

- (6)
- **subjects** bearing structural case are in the nominative,
 - with the exception of numeral phrase subjects, headed by so-called governing numerals (see below), which are in the accusative;
 - **objects** bearing structural case are in the accusative,
 - unless they are in the syntactic scope of sentential negation, in which case they are in the genitive (so-called Genitive of Negation, GoN).

These facts may be modelled in a straightforward way by case assignment statements like the following (for the first two bullets above), on the assumption that $S = \uparrow \text{SUBJ}$:⁴

- (7)
- a. $(S \text{ SC}) =_c + \wedge (S \text{ ACM}) \neq \text{REC} \rightarrow (S \text{ CASE NOM}) = +$
 - b. $(S \text{ SC}) =_c + \wedge (S \text{ ACM}) =_c \text{REC} \rightarrow (S \text{ CASE ACC}) = +$

²Note that *sc* is largely a bookkeeping feature, which may be avoided at the cost of complicating the analysis.

³We ignore here case assignment to adjuncts; see Przepiórkowski 1999 for an extensive discussion.

⁴Implication is understood here as in Andrews and Manning 1993, pp. 17–18 (they in turn give credit to Ron Kaplan and John Maxwell), and Bresnan 2000, p. 62, i.e., $A \rightarrow B$ is equivalent to $\neg A \vee (A_c \wedge B)$, where A_c is the constraining (‘nonconstructive’) version of A .

As implied above, “ $sc =_c +$ ” distinguishes arguments assigned case via syntactic statements from those inherently case marked or not case marked at all. Moreover, ACM represents *accommodability*, a lexical feature introduced for Polish by Bień and Saloni (1982) to distinguish numeral forms governing the genitive noun (the value of ACM in such cases is REC) from numeral forms agreeing with the following noun ($CONGR$) (see also Przepiórkowski and Patejuk 2012 in these proceedings).

4 Problem

Like many other languages, Polish allows for the coordination of unlikes, e.g.:

- (8) Janka szokowała umowa ACTA i że polski
 Janek.ACC shocked.3.SG.F agreement.NOM.SG.F ACTA and that Polish
 rząd ją w ogóle podpisał.
 government it at all signed
 ‘Janek was shocked by the ACTA agreement and the fact that Polish govern-
 ment signed it at all.’
- (9) Janek i jego pięć córek głosowali
 Janek.NOM.SG.M and his five.ACC.PL.F daughters.GEN.PL.F voted.3.PL.M
 przeciw ACTA.
 against ACTA
 ‘John and his five daughters voted against ACTA.’

As shown in (8) above, involving verb agreement with the closest conjunct,⁵ the subject of the verb *szokować* ‘shock’ may be nominal or sentential, so it may also be realised by a coordinated structure containing an NP – apparently receiving the nominative case via the first statement above – and a CP. In (9), on the other hand, the subject of the verb may only be nominal (in the broad sense of the word), but just as in case of other verbs taking structurally-cased subjects, it may be realised by a noun phrase or by a numeral phrase, among others, so it may also be realised as a coordination of an NP and a NumP, which should be assigned case, respectively, via the statements (7a–b) above.

Unfortunately, given current LFG assumptions, these statements do not in fact handle such cases of unlike coordination. In order to see the problem more clearly, let us simplify (7) to (10), assuming for a moment that we deal with structurally case-marked elements only (i.e., that “ $sc =_c +$ ” is true):

- (10) a. $(S \text{ ACM}) \neq REC \rightarrow (S \text{ CASE NOM}) = +$
 b. $(S \text{ ACM}) =_c REC \rightarrow (S \text{ CASE ACC}) = +$

⁵Polish is a relatively free word order language with dominating SVO order, but (8) happens to exhibit the OVS order.

Let us now try to apply the simplified statements (10) to the assumed structure of (9). Without going into details, “(S_{ACM}) =_c REC” is either true or false, so exactly one of the antecedents in the statements (10a–b) is true.⁶ Let us assume that “(S_{ACM}) =_c REC” is false. This means that (10b) has no effect (as the antecedent is false), while (10a) has the effect of requiring all conjuncts to be nominative (because CASE is distributive). This is contrary to fact, as one conjunct in (9) – *Janek* – is nominative, and the other one – *jego pięć córek* – is accusative.

A similar reasoning can be carried out with the assumption that “(S_{ACM}) =_c REC” is true – in such a case both conjuncts in (9) are required to bear the accusative case.

Which of these two possible assumptions is true here? The accommodability feature_{ACM} is never assigned syntactically, it is a lexical feature of a class of numerals, so it does not make much sense on a coordinate structure as a whole, i.e., it should rather be considered a distributive feature. Then, “(S_{ACM}) =_c REC” would require that both conjuncts have the appropriately valued_{ACM} feature, which is not true for (9), as the noun phrase *Janek* has no_{ACM}. Hence, “(S_{ACM}) =_c REC” is false here, and both conjuncts are assigned the nominative via (10a).

Let us now return to the original subject case assignment statements, as given in (7). On the reasonable assumption that *sc* is a distributive feature valued “+” on both broadly nominal conjuncts in (9), “(S_{sc}) =_c +” is true, and the discussion based on (10) carries over. On the other hand, the statement “*sc* =_c +” distinguishes between the two conjuncts in (8): the nominal phrase *umowa ACTA* satisfies it, while the clause *że polski rząd ją w ogóle podpisał* has no *sc* feature at all. The latter implies that “(S_{sc}) =_c +” is false for the whole coordinate construction in (8), so the antecedents of both statements (7a–b) are false, and the statements are vacuously true without the constructive consequent having any effect. This means that *umowa ACTA* is not constrained to be nominative and could bear any case, contrary to fact.

Note that the problem is not limited to subject positions. Consider (11) below (from Kallas 1993, p. 93, translation and glosses ours), involving coordination between an accusative noun, *wyjazd*, and a finite clause, *żeby nie wracał*.

- (11) Doradził mu wyjazd i żeby nie wracał.
 advised him.DAT departure.ACC and that not return
 ‘(He) advised him to leave and not to come back.’

The last two bullets of (6) may be formalised in a way similar to the statements in (7), giving rise to the same problems in case of unlike coordination in the object position, as in (11).

⁶Apparently, in XLE, the platform for implementing LFG grammars (Maxwell and Kaplan 1996; <http://www2.parc.com/is1/groups/nl/tt/xle/>), distributivity and negation are encoded in a way that makes both “(S_{ACM}) =_c REC” and “(S_{ACM}) ≠ REC” false when applied to a coordinate structure with one conjunct satisfying “(S_{ACM}) =_c REC” and the other having no_{ACM} feature and, hence, satisfying “(S_{ACM}) ≠ REC”. Under this interpretation, both constraints in (10a–b) – and in (7a–b) – would be vacuously satisfied, without any constructive effect. Note that this still leads to an undesirable interpretation of case assignment constraints.

To summarise, the intuitively clear case assignment statements such as (7) fail in cases of unlike coordination. In particular, instead of meaning “for each conjunct: if the conjunct is structural and numeral, it must be accusative”, (7b) currently means “if all conjuncts are structural and all are numeral then all must be accusative” (and analogously for (7a)).

5 Liberal solution

In order to handle structural case assignment in Polish (and, no doubt, many other languages) naturally, we propose to understand (non-)distributivity not as a property of features, but as a property of statements.

More precisely, we rewrite (7a–b) above as (12a–b) below, which should be read as “the f-structure(s) referred to as (\uparrow SUBJ) must satisfy the following properties...”.

- (12) a. (\uparrow SUBJ): ($SC =_c + \wedge ACM \neq REC \rightarrow CASE\ NOM = +$)
 b. (\uparrow SUBJ): ($SC =_c + \wedge ACM =_c REC \rightarrow CASE\ ACC = +$)

By default, all such statements are understood as distributive with respect to the path specified before “:” (i.e., with respect to “(\uparrow SUBJ)” in (12)), while non-distributive statements are explicitly marked as such. This means that, in case of, say, (12b), if the value of “(\uparrow SUBJ)” is a vanilla feature structure, it must satisfy the condition “($SC =_c + \wedge ACM =_c REC \rightarrow CASE\ ACC = +$)” as a whole, but if it is a hybrid feature structure, each element of the set represented by this hybrid feature structure must satisfy this condition. This ensures that the implication is applied to each conjunct separately, giving the desired results: if the conjunct is structural and numeral (in the appropriate sense), it will be assigned the accusative case; otherwise (12b) has no effect.

An interesting consequence of this proposal is that a given feature may behave distributively in some ways and non-distributively in others. This seems to be required for the full analysis of examples like (9) above, repeated as (13) below.

- (13) Janek i jego pięć córek głosowali przeciw
 Janek.NOM.SG.M and his five.ACC.PL.F daughters voted.3.PL.M against
 ACTA.
 ACTA
 ‘John and his five daughters voted against ACTA.’

In Polish, as in other Indo-European languages, verbs only agree with nominative subjects, otherwise occurring in the default 3rd person singular neuter form. In particular, sentential subjects and accusative numeral subjects trigger such “default agreement”; compare (13) with (14) below.

- (14) Pięć córek głosowało przeciw ACTA.
 five.ACC.PL.F daughters voted.3.SG.N against ACTA
 ‘(The) five daughters voted against ACTA.’

Now, if CASE were always distributive, then the subject in (13) should be caseless, so the verb should be in the default 3.SG.N form, as in (14). Note that, unlike in (8), (13) does not involve agreement with the closest conjunct: the form of the verb is plural masculine, unlike either of the two conjuncts. Rather, the verb agrees with the coordinated phrase as a whole, which bears the features of gender and number resolved to masculine and plural, just as in many other languages (cf., e.g., Wechsler and Zlatić 2003 and Dalrymple and Kaplan 2000). But in order to keep the generalisation that verbs only agree with nominative subjects, the coordinated phrase as a whole must also bear a non-distributive feature CASE equal to NOM. In effect, we assume the f-structure of the subject in (13) as in (15) below:

$$(15) \left[\begin{array}{l} \text{CASE} \quad [\text{NOM} \quad +] \\ \text{NUMBER} \quad \text{PL} \\ \text{GENDER} \quad \text{MASC} \\ \left\{ \left[\begin{array}{l} \text{CASE} \quad [\text{NOM} \quad +] \\ \text{NUMBER} \quad \text{SG} \\ \text{GENDER} \quad \text{MASC} \end{array} \right], \left[\begin{array}{l} \text{CASE} \quad [\text{ACC} \quad +] \\ \text{NUMBER} \quad \text{PL} \\ \text{GENDER} \quad \text{F} \end{array} \right] \right\} \end{array} \right]$$

One way to formalise these observations is to posit a default *non-distributive* statement of nominative case assignment to subjects (where ‘@’ marks non-distributivity of the statement):

$$(16) \quad (@(\uparrow \text{SUBJ}): (\text{CASE NOM} = +))$$

Because this is a default statement (as indicated by the outer parentheses), it does not conflict with the explicitly accusative case of numeral subjects or the explicitly caseless clausal subjects, but at the same time it expresses the prevalent intuition that Polish subjects are nominative.⁷

6 Conservative solution (by Mary Dalrymple)

There is, however, a solution which does not require extending the formal apparatus of LFG, although it is based on a relatively rarely used LFG mechanism, namely, the so-called off-path constraints (Dalrymple 2001, p. 148).⁸

Off-path constraints make it possible to restrict the path (or, more importantly, its part) used by other statements. For example, while the minimal feature structure satisfying (17a) is that of (17b), the statement (18a), with an off-path constraint added to the attribute A, specifies (18b).⁹

$$(17) \quad \text{a.} \quad (\uparrow \text{A B C}) =_c + \qquad \text{b.} \quad \left[\begin{array}{l} \text{A} \quad \left[\begin{array}{l} \text{B} \quad \left[\begin{array}{l} \text{C} \quad + \end{array} \right] \end{array} \right] \end{array} \right]$$

⁷See, e.g., an agitated defence of this position in Saloni 2005.

⁸This solution was suggested to us by Mary Dalrymple after our presentation of the analysis of Section 5 at the LFG 2012 conference in Denpasar.

⁹Note that off-path constraints are written *below* the attribute to which they apply.

$$(18) \quad \text{a. } \left(\begin{array}{c} \uparrow \quad \text{A} \quad \text{B C} \\ \leftarrow \text{D} \end{array} \right) =_c + \quad \text{b. } \left[\begin{array}{c} \text{A} \quad \left[\begin{array}{c} \text{B} \quad \left[\begin{array}{c} \text{C} \quad + \end{array} \right] \end{array} \right] \\ \text{D} \quad \text{E} \end{array} \right]$$

More formally, ‘ \leftarrow ’ denotes the f-structure which contains the attribute to which it is attached, while ‘ \rightarrow ’ denotes the f-structure which is the value of the attribute to which it is attached. Hence, (19a) (i.e., with ‘ \leftarrow ’ above replaced by ‘ \rightarrow ’) specifies the structure in (19b).

$$(19) \quad \text{a. } \left(\begin{array}{c} \uparrow \quad \text{A} \quad \text{B C} \\ \rightarrow \text{D} \end{array} \right) =_c + \quad \text{b. } \left[\begin{array}{c} \text{A} \quad \left[\begin{array}{c} \text{B} \quad \left[\begin{array}{c} \text{C} \quad + \end{array} \right] \end{array} \right] \\ \text{D} \quad \text{E} \end{array} \right]$$

Now, the idea of Dalrymple’s solution is to attach the constraint that should be distributed to all conjuncts, e.g., the constraint “ $\text{SC} =_c + \wedge \text{ACM} =_c \text{REC} \rightarrow \text{CASE ACC} = +$ ”, to a distributive feature guaranteed to be present on all conjuncts. A new feature could be created specifically for this purpose, but it is also possible to recycle the standard feature `PRED`:

$$(20) \quad \left(\begin{array}{c} \uparrow \text{SUBJ} \quad \text{PRED} \\ \leftarrow \text{SC} \end{array} \right) =_c + \wedge \left(\begin{array}{c} \leftarrow \text{ACM} \\ \leftarrow \text{REC} \end{array} \right) \rightarrow \left(\begin{array}{c} \leftarrow \text{CASE ACC} \\ \leftarrow \text{ACC} \end{array} \right) = +$$

(20) says that – in Polish – there are no semantically vacuous (expletive) subjects, i.e., each subject has a `PRED` value. This part of the statement is trivial. The main import of the statement is given in the off-path constraint part: for each such `PRED`, if the value of `SC` (at the same level as the `PRED`) is “+” and the value of `ACM` (again, at the same level) is “`REC`”, then the value of `CASE ACC` (again, starting from the same level as `PRED`) must be “+”. This way the whole implication is interpreted independently for each conjunct.

7 Comparison and Conclusion

The aim of this article was to demonstrate the limits of the standard approach to distributivity in coordination. The main problem concerns the possibility of distribution of complex statements to all conjuncts in a hybrid feature structure. One solution, discussed in Section 5, is to extend the LFG formalism so that such non-trivial distribution can be stated explicitly. The obvious disadvantage of this solution is the need to tweak the well-established machinery of LFG.

A more conservative solution, due to Mary Dalrymple, is to let such complex statements “piggyback” on distributive features, e.g., on `PRED`, as discussed in Section 6. This recycles the mechanism of off-path constraints and makes it possible to retain the standard LFG approach to distributivity, where it is some features, e.g., `CASE`, not statements, that are distributive. While this solution seems rather technical, it solves the basic problem stated in Section 4.

Ultimately, the choice between the two solutions must be made on the basis of empirical facts, and the possibility of a regular subject-verb agreement with coordinated subjects, where one of the conjuncts is an accusative numeral phrase (see the discussion at the end of Section 5), seems to favour the more liberal solution, which allows for the whole coordinate structure to be nominative even if one of the conjuncts is accusative. But this preference is only as strong as the generalisation that subject-verb agreement in Polish (and other Indo-European languages) involves solely nominative subjects; a conservative analysis violating this generalisation is readily available.¹⁰

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¹⁰See also Przepiórkowski and Patejuk 2012 (in these proceedings) for an analysis of another phenomenon where the non-distributivity of CASE is crucially assumed.

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