Coordination of prepositions that require different values of case

Introduction This paper offers an LFG analysis of a coordination phenomenon occuring in Polish, where two (or more) prepositions requiring different cases can be coordinated, but their shared nominal complement bears case that is appropriate only for one of the prepositions: the closest one. This phenomenon presents an interesting challenge to existing analyses of case as it cannot be explained by case syncretism: the shared object cannot be interpreted as being marked for each of the cases required by the coordinated prepositions.

Data Let us start with an attested example from Polish. According to existing analyses of case and coordination, examples such as (1) should not be acceptable, because the shared object of coordinated prepositions (*wyborach* 'election') is unambiguously locative – it is not a syncretic locative/instrumental form:[1]

(1) mające ograniczać możliwość korupcji partii przed i po wyborach
having restrict.INF possibility.ACC corruption.GEN party.GEN before.INST and after.LOC elections.LOC/*INST
'intended to restrict the possibility of party corruption before and after the election' (NKJP)[2]

As shown below, PRZED 'before' cannot take locative case and PO 'after' cannot take instrumental case:

(2) przed wyborami/*wyborach
before.INST elections.INST/*LOC
'before the election'

(3) po wyborach/*wyborami
after.LOC elections.LOC/*INST
'after the election'

Apart from coordination such as in (4), repeated from (1), it is also possible to find examples such as (5), where these prepositions are in a reversed order[3] and the shared nominal object is marked for instrumental case:

(4) przed i po wyborach
before.INST and after.LOC elections.LOC/*INST
'before and after the election' (NKJP)

(5) po i przed wyborami
after.LOC and before.INST elections.INST/*LOC
'after and before the election' (NKJP)

Now, consider (6) where the preposition PRZED 'before' requiring instrumental case to express the temporal meaning is coordinated with the preposition PODCZAS 'during' that always requires genitive case – the shared nominal object in (6) is marked for genitive case, it is not syncretic with instrumental case, as shown below:

(6) przed i podczas mszy
before.INST and during.GEN mass.GEN/*INST
'before and during the mass' (NKJP)

(7) przed mszą/*mszy
before.INST mass.INST/*GEN
'before the mass'

(8) podczas mszy/*mszą
during.GEN mass.GEN/*INST
'during the mass'

It is also possible to find these prepositions in a reversed order (again, such an order is less frequent), as in (9) – this time the shared nominal object is marked for instrumental case:

(9) podczas i przed kampanią wyborczą
during.GEN and before.INST campaign.INST/*GEN electoral.INST/*GEN
'during and before the election campaign' (NKJP)

Since it is possible to coordinate prepositions PRZED 'before' and PO 'after', as well as PRZED 'before' and PODCZAS 'during', it is expected that it is possible to coordinate PODCZAS 'during' and PO 'after', see (10) where the shared object is marked for locative case. Furthermore, as shown in (11), the reversed order of these prepositions is also possible (though less frequent), with the shared object marked for genitive case.

(10) podczas i po wojnie
during.GEN and after.LOC war.LOC/*GEN
'during and after the war' (NKJP)

(11) po (i podczas) niedzielnego meczu
after.LOC and during.GEN Sunday.GEN/*LOC match.GEN/LOC
'after (and during) the Sunday match' (Google)

Note that while the noun *meczu* is a syncretic form (genitive/locative), making it compatible with both PO and PODCZAS in (11), its adjectival modifier *niedzielnego* is unambiguously genitive, so it is incompatible with PO.

Finally, it is possible to coordinate the 3 different prepositions discussed above, even though each of these has different case requirements – as mentioned earlier, in order to express the temporal meaning, PRZED 'before' takes instrumental case, PODCZAS 'during' takes genitive case and PO 'after' takes locative case, but their shared nominal object is marked for locative case in (12):

(12) przeanalizuj wszystkie emocje, jakie były w tobie przed, podczas i po wydarzeniu
analyse all emotions which were in you before.INST during.GEN and after.LOC event.LOC/*GEN/*INST
'Analyse all the emotions that were inside you before, during and after the event' (NKJP)

[1] In (1), each preposition is glossed with one case, even though both can in principle require more than one case. While PRZED can also occur with accusative case, it must take instrumental case in order to express the temporal meaning of *before the election*. Similarly, PO can also occur with accusative case, but it must take locative case to express the temporal meaning of *after the election*.

[2] Example from the National Corpus of Polish (`https://nkjp.pl/`; Przepiórkowski *et al.* 2012).

[3] Such examples are less frequent, possibly due to pragmatic reasons: chronological order seems to be preferred.

Challenge As shown above on the basis of attested data, when prepositions with different case requirements are coordinated in Polish, it is possible for their shared nominal object to bear case that is appropriate only for the closest preposition, while it is not compatible with more distant prepositions. Interestingly, this does not cause ungrammaticality – such examples are acceptable in Polish. By contrast, outside of coordination, violating case requirements of a preposition results in stark ungrammaticality.

Case in LFG Under the analysis of Dalrymple *et al.* 2009, the CASE attribute of a specific nominal form is modelled as a complex feature structure in the following way: if this form cannot be analysed as corresponding to a given case, the attribute corresponding to this case (such as NOM for nominative, ACC for accusative, GEN for genitive, etc.) is assigned a negative value (−). For the remaining values of case, it is specified positively (+) in different ways, depending on whether a given form is syncretic or not. When a particular form is syncretic (it can correspond to more than one case), a more complex solution is used: its value of CASE is specified positively using functional uncertainty, as a disjunction of values of case that are possible for this form.

Let us consider this analysis of case in the context of the focus of this paper, namely coordination of Polish prepositions with a shared object, starting with (13) below – it is a modified version of (11), without the adjective:

(13) po (i podczas) meczu
after.LOC and during.GEN match.GEN/LOC
'after (and during) the match'

While the coordinated prepositions select for different cases (locative and genitive), (13) is grammatical, because the shared object *meczu* is a syncretic form (genitive/locative/vocative), as specified in its lexical entry in (14):

(14) meczu N (↑ PRED)='MATCH'
(↑ CASE {GEN|LOC|VOC})= +
(↑ CASE NOM)= − (↑ CASE ACC)= − (↑ CASE DAT)= − (↑ CASE INST)= −

Let us assume the following lexical entries for semantic prepositions used in (13):

(15) po P (↑ PRED)='AFTER<(↑ OBJ)>'
(↑ OBJ CASE LOC)= +

(16) podczas P (↑ PRED)='DURING<(↑ OBJ)>'
(↑ OBJ CASE GEN)= +

The analysis of Dalrymple *et al.* 2009 can handle (13) out of the box, producing the f-structure in (17) in XLE:

(17)
$$\left[\left\{\left[\begin{array}{ll}\text{PRED} & \text{'AFTER}\langle\boxed{1}\rangle\text{'}\\ \text{OBJ} & \boxed{1}\left[\begin{array}{ll}\text{PRED} & \text{'MATCH'}\\ \text{CASE} & \left[\begin{array}{ll}\text{LOC} & +\\ \text{NOM} & -\\ \text{ACC} & -\\ \text{DAT} & -\\ \text{INST} & -\end{array}\right]\end{array}\right]\end{array}\right], \left[\begin{array}{ll}\text{PRED} & \text{'DURING}\langle\boxed{2}\rangle\text{'}\\ \text{OBJ} & \boxed{2}\left[\begin{array}{ll}\text{PRED} & \text{'MATCH'}\\ \text{CASE} & \left[\begin{array}{ll}\text{GEN} & +\\ \text{NOM} & -\\ \text{ACC} & -\\ \text{DAT} & -\\ \text{INST} & -\end{array}\right]\end{array}\right]\end{array}\right]\right\}\right]$$
CONJ AND

However, this analysis cannot handle the full example in (11), because the adjective *niedzielnego* 'Sunday' specifies the nominal head that it modifies as unambiguously genitive (see the lexical entry in (18)) – this constraint clashes with the constraint imposed by the preposition *po* that specifies its object as locative (see (15)), which leads to inconsistency resulting from the fact that LOC has two conflicting values (+ from (15) and − from (18)).

(18) niedzielnego A (↑ PRED)='SUNDAY'
(ADJ ↑)= %A (%A CASE GEN)= + (%A CASE NOM)= − (%A CASE ACC)= −
(%A CASE DAT)= − (%A CASE INST)= − (%A CASE LOC)= − (%A CASE VOC)= −

While in (11) it is the adjectival modifier that causes incompatibility with case requirements of the more distant preposition, in other examples the clash is caused directly by the value of case of the shared nominal object.

Analysis Examples presented so far show that in Polish it is possible for the shared nominal object to be marked for the case which is appropriate only for the closest preposition – rather than for each of the coordinated prepositions. Similar phenomena are well-known in the domain of agreement, namely single conjunct agreement (SCA; Kuhn and Sadler 2007, Dalrymple and Hristov 2010) where the agreement target can agree not only with the resolved features of the entire coordinate phrase, but also with a single conjunct, typically the closest conjuct (CCA). In Polish, it is the closest preposition whose case constraints are satisfied by the shared nominal object, while case requirements of the remaining, more distant prepositions can be ignored – without causing ungrammaticality. This insight can be modelled in LFG using a solution inspired by existing analyses of CCA

– the schematic lexical entry for semantic prepositions in (19) is a modified version of the standard (20):

(19) form P (↑ PRED)='LEMMA<(↑ OBJ)>'
[(↑ OBJ CASE VALUE)= +
∨
[((∈ ↑) CONJ)
↑ <$_f$ ((∈ ↑) ∈)
(↑ OBJ)=((∈ ↑) OBJ)]]

(20) form P (↑ PRED)='LEMMA<(↑ OBJ)>'
(↑ OBJ CASE VALUE)= +

The lexical entry in (19) has two disjuncts: the first one, (↑ OBJ CASE VALUE)= +, is the same as in (20) – it makes it possible for the preposition to assign the relevant VALUE of case to its object. By contrast, the second disjunct does not assign any case – instead, it introduces three constraints that restrict when it can be used: all three must be satisfied. The first constraint, ((∈ ↑) CONJ), ensures that the preposition is part of a coordinate structure (rather than a member of the ADJUNCT set) by checking that there is a conjunction (CONJ) in the hybrid f-structure containing the set with the preposition. The second constraint, ↑ <$_f$ ((∈ ↑) ∈),[4] ensures that the preposition precedes some other set element – it follows that the preposition introducing this constraint is not closest to its object. The last constraint, (↑ OBJ)=((∈ ↑) OBJ), ensures that the object of the preposition introducing this constraint is the object of the coordinate structure that contains this preposition – as a result, this disjunct can only be used when prepositions are coordinated (so it cannot be used when prepositional phrases are coordinated).

After modifying the lexical entries of all semantic prepositions as in (19), (11) gets a well-formed f-structure representation – it is not shown here due to limited space. Instead, consider the f-structure in (21) produced by this modified analysis for (12) where 3 prepositions with different case requirements are coordinated: PRZED 'before' takes instrumental case, PODCZAS 'during' takes genitive case and PO 'after' takes locative case, but their shared nominal object is marked for locative case in (12), it is not compatible with genitive or instrumental, see (22).

(21)
$$\begin{bmatrix} \left\{ \begin{bmatrix} \text{PRED} & \text{'BEFORE}\langle \boxed{1} \rangle\text{'} \\ \text{OBJ} & \boxed{1} \end{bmatrix}, \begin{bmatrix} \text{PRED} & \text{'DURING}\langle \boxed{1} \rangle\text{'} \\ \text{OBJ} & \boxed{1} \end{bmatrix}, \begin{bmatrix} \text{PRED} & \text{'AFTER}\langle \boxed{1} \rangle\text{'} \\ \text{OBJ} & \boxed{1} \begin{bmatrix} \text{PRED} & \text{'EVENT'} \\ \text{CASE} & \begin{bmatrix} \text{NOM} & - \\ \text{ACC} & - \\ \text{GEN} & - \\ \text{DAT} & - \\ \text{INST} & - \\ \text{LOC} & + \\ \text{VOC} & - \end{bmatrix} \end{bmatrix} \end{bmatrix} \right\} \\ \text{CONJ} \quad \text{AND} \end{bmatrix}$$

(22) wydarzeniu N (↑ PRED)='EVENT'
(↑ CASE {DAT|LOC})= + (↑ CASE NOM)= − (↑ CASE ACC)= −
(↑ CASE GEN)= − (↑ CASE INST)= − (↑ CASE VOC)= −

To produce the f-structure in (21), the lexical entries of the prepositions PRZED and PODCZAS use the second disjunct in the schematic lexical entry in (19), so they do not impose any case – this is possible because each of these prepositions is followed by another preposition in (12): PRZED is followed by PODCZAS and PODCZAS is followed by PO. By contrast, PO, the preposition closest to the shared object in (12), uses the first disjunct of (19) – there are no constraints restricting its use. The locative case requirement of PO is compatible with its object *wydarzeniu* 'event' (see (22)), making it possible to produce a well-formed f-structure (instead of the inconsistent f-structure that would be produced by the unmodified analysis of Dalrymple *et al.* 2009).

The analysis in (19) can be adapted to coordination of verbs that require different cases from a shared object.

References • **Dalrymple, M. and Hristov, B.** (2010). Agreement patterns and coordination in Lexical Functional Grammar. In M. Butt and T. H. King, eds., *Proceedings of the LFG '10 Conference*, pp. 186–206. CSLI Publications. • **Dalrymple, M., King, T. H., and Sadler, L.** (2009). Indeterminacy by underspecification. *Journal of Linguistics*, **45**, 31–68. • **Kuhn, J. and Sadler, L.** (2007). Single conjunct agreement and the formal treatment of coordination in LFG. In M. Butt and T. H. King, eds., *Proceedings of the LFG '07 Conference*, pp. 302–322. CSLI Publications. • **Przepiórkowski, A., Bańko, M., Górski, R. L., and Lewandowska-Tomaszczyk, B.**, eds. (2012). *Narodowy Korpus Języka Polskiego*. Wydawnictwo Naukowe PWN.

[4]The XLE implementation uses <$_h$ (head precedence) instead of <$_f$, because the latter is not implemented in XLE.