Coordination of unlikes in Turkish

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Abstract

One widely accepted view posits that the grammaticality of a coordinate structure depends on its conjuncts having the same grammatical properties, such as case and syntactic category. Although this assumption has been repeatedly challenged, the debate still centers on limited data mainly from Polish and English. In this study, we further challenge the assumption that conjuncts must be alike with various corpus examples and judgments of native speakers. We analyze our findings within the framework of Lexical-Functional Grammar, following the approach proposed by Przepiórkowski & Patejuk (2021), and validate the analysis with an XLE implementation. Our results add to the growing body of research questioning the assumption that conjuncts must be alike.

1 Introduction

It is generally assumed that conjuncts must share the same syntactic category (Chomsky 1957: 35–36; Williams 1981: §2; Bruening & Al Khalaf 2020). However, this assumption is challenged by data that appears to contradict it, as shown in (1a–b).

(1) a. Pat is [[$_{\text{NP}}$ a Republican] and [$_{\text{ADJP}}$ proud of it]].
(Sag et al. 1985: 117, ex. (2b))

b. We walked [[$_{\text{ADVP}}$ slowly] and [$_{\text{PP}}$ with great care]].
(Sag et al. 1985: 140, ex. (57))

In an attempt to reconcile this assumption with conflicting evidence, two types of accounts have been proposed, both seeking to demonstrate that the categorical mismatch between the conjuncts is only superficial.

The first account suggests that examples like those in (1) involve coordination of same supercategories. In a recent development of this account, Bruening & Al Khalaf (2020) introduce the supercategories PRED(icate) for predicative phrases and MOD(ifier) for modifier phrases. Their analysis interprets the coordination of mismatching predicative arguments in (1a) as the coordination of the same supercategory PRED, as shown in (2a). Similarly, the coordination of unlike verbal modifiers in (1b) is understood to be the coordination of the same supercategory, MOD, as shown in (2b).

(2) a. Pat is [$_{\text{PRED:\{NP, ADJP\}}}$ [$_{\text{PRED:NP}}$ a Republican] and [$_{\text{PRED:ADJP}}$ proud of it]].

b. We walked [$_{\text{MOD:\{ADVP, PP\}}}$ [$_{\text{MOD:ADVP}}$ slowly] and [$_{\text{MOD:PP}}$ with great care]].

As Patejuk & Przepiórkowski (2023) point out, Bruening & Al Khalaf's supercategory analysis fails to account for corpus evidence that extends to various argument positions. Two such examples are found in (3), where the unlike conjuncts are the coordinated arguments of the verbs *believe* (see, (3a)) and *hope* (see (3b)).

(3) a. Xenocrates . . . believed [[$_{\text{CP}}$ that stars are fiery Olympian Gods] and [$_{\text{PP}}$ in the existence of sublunary daimons and elemental spirits]].
(Patejuk & Przepiórkowski 2023: 344, ex. (82))

b. We hope [[$_{\text{PP}}$ for another good year], and [$_{\text{CP}}$ that we continue to grow]].
(Patejuk & Przepiórkowski 2023: 346, ex. (95))

According to the second account (e.g., Beavers & Sag 2004; cf. Bruening & Al Khalaf 2020), ellipsis – specifically, some form of *conjunction reduction* – creates an illusion of a categorical mismatch between the conjuncts. For example, the apparent coordination of an NP and an AdjP in (1a), *a Republican and proud of it*, is actually a coordination of two VPs, with the repeated verb in the second conjunct, *is*, omitted, as shown in (4).

(4) Pat [$_{VP}$[$_{VP}$ is a Republican] and [$_{VP}$ ~~is~~ proud of it]].
(cf. Beavers & Sag 2004: 54, ex. (12a))

However, there are numerous examples that cannot be explained through such elliptical processes (see, e.g., Peterson 2004: 648–649; Levine 2011; Abeillé & Chaves 2021: 755–756; Patejuk & Przepiórkowski 2023: 330–336). For instance, in correlative structures involving conjuncts with different categories, as in (5a), it is unclear what the supposed underlying parallel coordination would be. Moreover, the fact that unlike coordination can be pseudo-clefted (see (5b)) suggests that it is a constituent, contrary to the predictions of the ellipsis account.

(5) a. This boycott would show [not only [$_{NP}$ unity] but [$_{CP}$ that there is a price to pay for killing us]].
(Patejuk & Przepiórkowski 2023: 335, ex. (41))

b. [Not only [$_{NP}$ our great unity in the face of oppression] but also [$_{CP}$ that there is a price to pay]] is what this boycott would show.
(Patejuk & Przepiórkowski 2023: 335, ex. (42))

Most recent work on coordination (e.g., Bruening 2023; Neeleman et al. 2023) acknowledges that unlike categories can be coordinated. However, other research, such as Fortuny (2024), remains skeptical of this conclusion. Consequently, the issue is still a topic of ongoing debate and controversy.

Another less-explored controversy surrounds the possibility of coordinating different grammatical cases, as exemplified by the Polish example in (6), where *wina*, an NP in genitive, is coordinated with *całą świnię*, an NP in accusative.

(6) Dajcie [wina i całą świnię]!
give wine.GEN and whole.ACC pig.ACC
'Serve (some) wine and a whole pig!'
(Przepiórkowski 1999: 175, ex. (5.269))

Weisser (2020) proposes a cross-linguistic generalization called the "Symmetry of Case in Conjunction," which asserts that the grammatical cases of conjuncts always match at a fundamental level, with apparent mismatches attributed to ellipsis and other surface-level morphological processes.

Challenging Weisser's generalization, Przepiórkowski (2022) provides multiple examples of order-independent case mismatches similar to the one in (6), with case morphologically realized on multiple words within each conjunct. Hence, there is also a lack of agreement regarding the possibility of coordinating NPs with mismatching cases.

Research on coordination of unlikes has been hindered by two empirical limitations. First, existing work has predominantly focused on Indo-European languages, with most

of the discussion limited to English and Polish. Second, while recent work is to some extent based on data extracted from corpora, there appears to be no prior research on the coordination of unlikes supported by acceptability judgment experiments (but see Bruening 2023 and Przepiórkowski & Patejuk 2024 for recent related work).

The present work contributes to rectifying these two shortcomings. First, it explores Turkish, a non-Indo-European language. Second, it reports the results of both a corpus study and an acceptability judgment experiment, the details of which are outlined in §2 and §3, respectively. The results of our empirical findings corroborate the LFG analysis of the coordination of unlikes proposed in Przepiórkowski & Patejuk (2021) and Przepiórkowski (2022). Accordingly, the LFG formalization of Turkish coordination facts closely follows the approach developed in these works, as detailed in §4.

2 Corpus study

The corpus investigation relied on a large (3.3 billion words) morphosyntactically annotated Turkish corpus, Turkish Web 2012 (trTenTen12; Baisa & Suchomel 2012). A variety of CQL (Corpus Query Language) queries were formulated in SketchEngine (http://www.sketchengine.eu; Kilgarriff et al. 2014) to qualitatively identify instances of coordination involving unlike categories and cases. During the verification process, examples containing annotation errors or those resolved to like coordination due to suspended affixation were identified and rejected.[1]

2.1 Coordination of unlike categories

Table 1 provides an overview of the unlike category coordination configurations investigated in the corpus. We imposed a set of limitations on search patterns to minimize the number of false positives. For instance, NP & PP configuration tends to produce examples where the NP serves as the complement of the postpositional head that follows the second conjunct (i.e., [[NP & NP] P]). Similarly, AdjP & NP and AdvP & NP configurations typically produce false positives due to nominalizing suffixes that extend their scope over the entire coordination (see Akkuş 2016; Şenşekerci 2022), transforming the initial AdjP or AdvP conjuncts into NPs derived from adjectival or adverbial roots, respectively.

Out of a sample of 1687 results[2] from 227,177 hits, 137 were identified as true positives (TPs). Hence, 18,000–19,000 such TPs among all hits can be expected. The examples we confirmed[3] were mostly coordinations of predicates and adjuncts, similar to (1a)–(1b), but also coordinations of arguments, as in (7)–(8).

[1] Suspended affixation is a morphosyntactic phenomenon where an affix, or a series of affixes, found in the outermost conjunct takes phrasal scope over the entire coordination. In Turkish, this particular conjunct is the rightmost one, and the case suffixes are implicated in this process if the preceding conjunct(s) lacks case marking. This may lead to the false impression that conjuncts with different cases are coordinated.

[2] The imbalance in sample numbers across configurations is due to most queries generating an excessive number of duplicate or poorly annotated sentences. This necessitated a flexible adjustment of sampling rates for different queries.

[3] Unless otherwise stated, all Turkish examples presented in this paper are drawn from the Turkish Web 2012 corpus. For clarity, most examples have been simplified. Readers interested in the original examples can locate them in the Turkish Web 2012 by querying *only* the coordination parts of the examples.

Configuration	Hits	Sampled	TPs
PP & NP	173,774	527	33
PP & AdvP	1,523	240	20
PP & AdjP	25,272	240	29
NP & AdjP	26,318	390	29
NP & AdvP	290	290	26
Total:	227,177	1687	137

Table 1: General results of unlike category investigation in the corpus

(7) Bu program [[$_{NP}$ her hafta] ve [$_{ADVP}$ saat-ler-ce]] sür-ecek.
this program every week and hour-PL-ADVZ last-FUT
'This program will run every week and for hours.'

(8) Kolektör-ler sıklıkla [[$_{PP}$ antik enstrüman-lar hakkında] veya [$_{NP}$ ticari bilgi]] konuş-ur-lar.
collector-PL frequently antique instrument-PL about or commercial information talk-AOR-3PL
'Collectors frequently talk about antique instruments or commercial information.'

The verbal stem *sür-* in the sense of 'last/continue' combines with a temporal argument, whether it is an NP or an AdvP – or a coordination of such categories, as in (7). Similarly, the direct object of *konuş-* 'talk, speak' may be an NP or a PP headed by *hakkında* 'about';[4] (8) shows that this object may be realized by a coordination of such NPs and PPs. Such examples are analogous to attested English examples used in Patejuk & Przepiórkowski (2023) to argue against Bruening & Al Khalaf's (2020) attempt at explaining away coordination of unlikes, and they provide further evidence that coordinating unlike categories is possible across different languages.

2.2 Coordination of unlike cases

The investigation also extended to the coordination of unlike cases. Currently, the literature lacks consensus on the number of cases in Turkish due to the dubious morphosyntactic status of the bound morpheme *-(y)lA*, which is either classified as the cliticized form of the postposition *ile* 'with' (Lewis 1967; Kornfilt 1997), or an instrumental/comitative case marker (Göksel & Kerslake 2010; van Schaaik 2020). Our work aligns with more recent descriptive grammars of Turkish by Göksel & Kerslake (2010) and van Schaaik (2020) and acknowledges an instrumental/comitative case realized by *-(y)lA*.[5]

[4] *Konuş-* may also combine with another postposition, namely, *üzerine* 'upon/over', which will be considered in §4. However, we did not observe any instances of unlike category coordination with this postposition.

[5] As there is no empirical work confirming or refuting the existence of an instrumental/comitative case, it is possible that all NPs labeled as instrumental/comitative in this study could instead be classified as PPs projected by *ile*. In such a scenario, examples of unlike case coordination involving instrumental NPs would be reinterpreted as instances of unlike category coordination.

Ultimately, we recognize 6 grammatical cases in Turkish: accusative, genitive, dative, ablative, locative, and instrumental/comitative. As it makes sense to claim that unmarked nominals lack case altogether instead of bearing a specific (nominative) case (e.g., de Hoop & Malchukov 2008), they are not taken into account here.

We searched for patterns such as "NP-¬ABL & NP-ABL", where "NP-¬ABL" stands for an NP with a case suffix other than ablative. The outcomes of these searches are detailed in Table 2.

Configuration	Hits	Sampled	TPs	Breakdown of TPs
NP-¬INS & NP-INS	9,524	140	30	26 × LOC & INS, 4 × ABL & INS
NP-¬ABL & NP-ABL	8,437	140	5	3 × LOC & ABL, 2 × INS & ABL
NP-¬LOC & NP-LOC	15,709	140	15	13 × INS & LOC, 2 × ABL & LOC
Total:	33,670	420	50	

Table 2: General results of unlike case coordination investigation in the corpus

Similar searches focusing on the other three overtly marked cases – accusative, genitive, and dative – only returned false positives, as is expected, given that true positives would involve coordination of different grammatical functions (e.g., an accusative direct object with a locative adjunct), which we hypothesize to be not allowed in Turkish.[6]

Among the results, including the ones in (9)–(11), 50 relevant examples were found in a 420-hit sample from the population of 33,670 hits. This suggests the presence of around 4,000 similar unlike case coordinations among all hits, indicating the availability of unlike case coordination.

(9) [Doğru yer-de ve doğru antrenör-le] çalış-ıyor-uz.
right place-LOC and right trainer-INS work-PRES.PROG-1PL
'(We) work in the right place and with the right trainer.'

(10) Proje-ye [doğru zaman-da ve doğru fiyat-tan] gir-di-m.
project-DAT right time-LOC and right price-ABL enter-PST-1SG
'I joined the project at the right time and at the right price.'

(11) Pamuk-lu çarşaf-lar-ı [yumuşak deterjan-la ve soğuk su-da] yıka-yın.
cotton-ADJZ sheet-PL-ACC soft detergent-INS and cold water-LOC wash-2P.IMP
'Wash the cotton sheets with mild detergent and in cold water.'

3 Acceptability judgment experiment

In order to validate the corpus findings, we conducted an acceptability judgment experiment with Turkish native speakers ($n = 48$) who assessed sentences on a 7-point Likert

[6]However, among the results of "NP-¬ABL & NP-ABL" there also was the following example of coordination of dative and ablative, which is marginal, but not entirely unacceptable according to our native speaker informants (n = 6).

(i) Öğretmen-im-le [aynı yön-e ve aynı yer-den] bak-mı-yor-uz.
teacher-POSS.1SG-with same direction-DAT and same place-ABL look-NEG-PRES.PROG-1PL
'My teacher and I do not look in the same direction and from the same place.'

scale ranging from –3 (completely unnatural) to 3 (completely natural).[7]

The recruitment primarily took place in Bursa Uludağ University in Turkey and the sample consisted mainly of undergraduate and graduate students (Mean age = 30.25 years). Most of the participants ($n = 40$) reported that they have acquired Turkish in a strictly monolingual environment. Notably, a significant number of them ($n = 18$) acquired Turkish in regions outside the recruitment region (Marmara Region).

The experimental hypothesis was that different categories and different cases may be coordinated in Turkish, as long as they express the same grammatical function. The experiment followed the repeated measures factorial design, and was broken down into two blocks, one for unlike categories, the other for unlike cases.

The category block adhered to a standard 2×2 factorial design with the two factors being category (same or different: LCAT vs. UCAT) and grammatical function (same or different: LF vs. UF). A similar design was intended for the case block, considering same or different cases (LCASE vs. UCASE) and grammatical functions (LF vs. UF) – however, here only three configurations were viable, excluding LCASE-UF, since in Turkish there is a rather consistent mapping between grammatical cases and grammatical functions (e.g., accusative NPs are always direct objects, so no examples of the coordination of accusative NPs bearing different functions could be constructed).

The study employed the token-set methodology (Cowart 1997), with 12 token sets for each block, i.e., with $12 \times 4 + 12 \times 3 = 84$ target sentences. The materials were divided into 4 surveys (following the Latin square procedure), each featuring 21 target sentences and supplemented with 22 uncontroversially grammatical or ungrammatical fillers. Each survey also included 3 practice sentences for participants to familiarize themselves with the survey platform.[8] Consequently, for each survey, there were 46 distinct sentences to be assessed, including the practice sentences.

3.1 Category block

In the 12 token sets in the category block, the crucial UCAT-LF tokens with coordinations of unlike categories involved different categories of adjuncts (9 examples, with different categories taken from: AdvP, NP, and PP), predicates (1 example of "NP & AP" coordination), and arguments (2 examples of "PP & NP" coordinations), including (12) below.

(12) Bu isyan-lar [[$_{PP}$ yıl-lar boyunca] ve [$_{NP}$ her gün]] sür-dü.
this rebellion-PL year-PL throughout and every day continue-PST
'These revolts lasted for years and every day.'

As can be seen in Figure 1, such tokens were judged relatively high on the average (Mdn = 2.5, M = 1.88, SD = 1.53), although somewhat lower than examples featuring fully parallel LCAT-LF coordinations (Mdn = 3.0, M = 2.45, SD = 1.10). However, this difference did not reach statistical significance ($p = .11$; LCAT-LF vs. UCAT-LF).[9] By

[7]We would like to express our gratitude to Katarzyna Kuś, Erkan Şenşekerci, and Szymon Talaga for providing assistance in the implementation of the experiment.

[8]The experiment was implemented and distributed through LimeSurvey (https://www.limesurvey.org/).

[9]All inferential statistics were conducted using linear mixed-effects models, fitted and analyzed in R (version 4.1.2; R Core Team 2021) with *lme4* (Bates et al. 2015) and *emmeans* (Lenth 2024) packages.

contrast, coordinations of unlike grammatical functions – both LCAT-UF and UCAT-UF – were judged dramatically lower (in both cases, Mdn $= -1.0$, M ≈ -0.8, SD ≈ 1.9, $p < .001$ with respect to UCAT-LF). In conclusion, the data suggests that Turkish permits the coordination of unlike categories but not unlike functions, under the assumption of binary grammaticality.

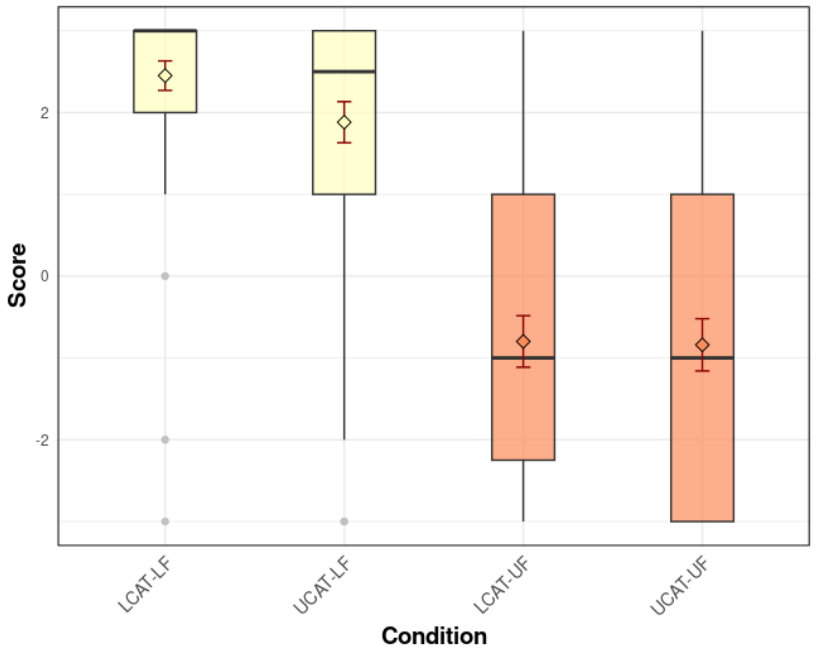

Figure 1: Raw scores of the category block stimuli by sentence type (x-axis), with 95% confidence intervals

3.2 Case block

Similarly, the 12 crucial sentences with unlike cases but the same adjunct grammatical function (see UCASE-LF in Figure 2) were analogous to those found in the corpus, i.e., they each involved two of the three cases typical for NP adjuncts: ablative, instrumental, and locative. For example, there were 4 sentences with coordinations of the type "NP-LOC & NP-ABL", including (13) below.

(13) Dünya-da-ki gelişme-ler-i [küçük yurt oda-m-da
world-LOC-ADJZ development-PL-ACC small dormitory room-1SG.POSS-LOC
ve internet-ten] takip ed-iyor-um.
and internet-ABL follow do-PRES.PROG-1SG
'I follow the developments in the world in my small dormitory room and over the internet.'

As is standard practice, participants and items were treated as random effects with random intercepts and slopes, while the experimental conditions were treated as fixed effects.

As can be seen in Figure 2, such UCASE-LF coordinations are judged (statistically significantly) lower than LCASE-LF coordinations with fully parallel conjuncts (LCASE-LF: Mdn $= 3.0$, M $= 2.32$, SD $= 1.38$; UCASE-LF: Mdn $= 2.0$, M $= 1.58$, SD $= 1.71$, $p < .001$ with respect to LCASE-LF). Nonetheless, the average acceptability becomes negative only in the case of coordinations with different grammatical functions (UCASE-UF; Mdn $= -1.0$, M $= -0.37$, SD $= 2.04$, $p < .001$ with respect to UCASE-LF). Therefore, assuming binary grammaticality, unlike case coordination must be considered grammatical in Turkish, in contrast to unlike function coordination.

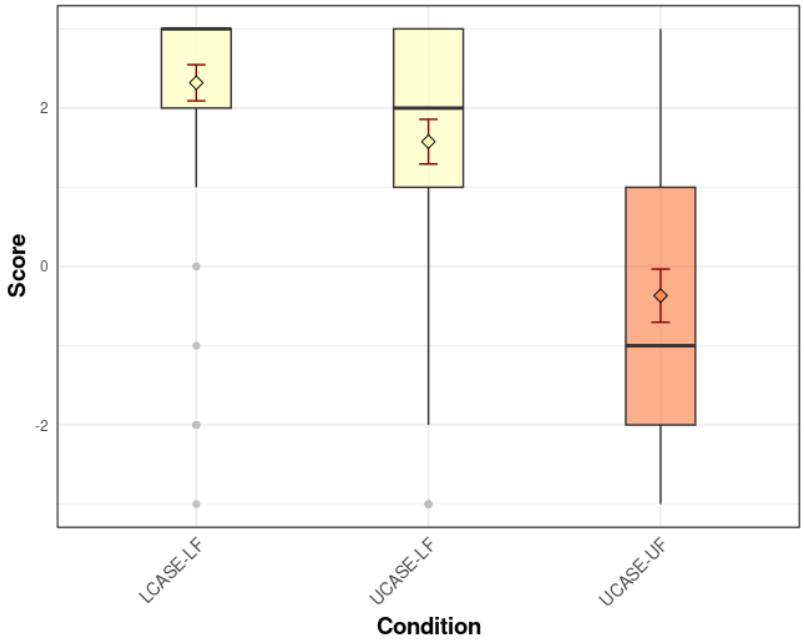

Figure 2: Raw scores of the case block stimuli by sentence type (x-axis), with 95% confidence intervals

In summary, the experimental findings reveal that Turkish allows for the coordination of unlike categories and cases but not unlike functions. We attribute the small difference between LCAT-LF and UCAT-LF in the category block and LCASE-LF and UCASE-LF in the case block to frequency factors on acceptability[10] (Bresnan 2007; Francis 2021) and/or unlike coordination being more difficult to process (Frazier et al. 2000).[11]

4 Formalization

4.1 Evaluating possible solutions

There are two recent LFG analyses of coordination of unlikes: Dalrymple (2017) (henceforth, D) and Przepiórkowski & Patejuk (2021) and Przepiórkowski (2022) (henceforth, P&P).

[10] We observed that fully parallel coordination is far more common in various Turkish corpora.

[11] Şenşekerci (2024) proposes a gradient analysis of the experimental results described in this section.

On D's analysis, syntactic category labels are replaced with feature matrices. For instance, nominal nodes conventionally denoted as N and NP are represented as [N +, V −, P −, ADJ −, ADV,−]. In coordinate structures, the feature matrix of the mother node that dominates the conjuncts aggregates the categorical information from each conjunct. For instance, a coordination of an NP and a PP, as in (8) or (12), yields [N +, V −, P +, ADJ −, ADV,−] as the ultimate category of the coordination.

Categorical restrictions imposed by predicates on their arguments are encoded through feature matrices coupled with the CAT predicate (Kaplan & Maxwell 1996) to specify the prohibited categories, allowing for the co-occurrence of permissible ones. To illustrate this, consider again the Turkish verb *konuş-* 'talk, speak'. The object of *konuş-* can either be an NP or a PP, as shown in the attested examples in (14) and (15), respectively. As illustrated in the previous section, NP & PP coordination (irregardless of order) is also possible in the object of position of *konuş-* (see (8)).

(14) Obama Kuzey Kore hakkında konuş-tu.
Obama North Korea about talk-PST.3SG
'Obama talked about North Korea.'

(15) Zengin ile Türk yemek kültür-ü-nü konuş-tu-k.
Zengin with Turkish food culture-3P-ACC talk-PST-1PL
'With Zengin, we talked about the Turkish food culture.'

Consequently, we would encode these restrictions by including the CAT predicate constraint from (16) in the lexical entry of *konuş-*. Notably, the feature matrix of the coordination between an NP and a PP, [N +, V −, P +, ADJ −, ADV −], would be compatible with this CAT predicate constraint since the prohibited categories are negatively valued.

(16) CAT((↑ OBJ), %C)
(%C V) = −
(%C ADJ) = −
(%C ADV) = −

P&P point out that it is not clear how to extend D's analysis to address more complex selectional restrictions targeting specific morphosyntactic and lexical properties. Consider the verb *believe*, which can combine either with a PP or a CP. However, as shown in (17), the PP must be projected by *in* (and not, for instance, *on*), while the CP must be projected by *that* (and not, for example, *until*).

(17) We all believe [[$_{PP}$ in/*on positive energy] and [$_{CP}$ that/*until what you give comes back]].

(Przepiórkowski & Patejuk 2021: 210, ex. (11))

The same issue arises in Turkish. (8) (repeated below as (18)) and (19) feature a PP & NP coordination that is the object of the verb *konuş-* 'talk/speak'. However, not just any NP or a PP is permitted in this position. The object NP must either be unmarked (indicating non-specificity), as in (18), or carry the accusative case marker (indicating specificity), as in (19).

(18) Kolektör-ler sıklıkla [[$_{PP}$ antik enstrüman-lar hakkında] veya [$_{NP}$ ticari
collector-PL frequently antique instrument-PL about or commercial
bilgi]] konuş-ur-lar.
information talk-AOR-3PL
'Collectors frequently talk about antique instruments or commercial information.'

(19) Kendi-si ile [[$_{PP}$ Sofya baş müftü yardımcısı Necati Ali hakkında] ve [$_{NP}$
self-3P with Sofia chief mufti deputy Necati Ali about and
yap-tık-ları hizmet-ler-i]] konuş-tu-k.
do-PTCP-3PL.POSS service-PL-ACC talk-PST-1PL
'With him/her, we talked about Necati Ali, the deputy chief mufti of Sofia, and the services they provide.'

Additionally, the head of the PP must either be the postposition *hakkında* 'about', as in (18) and (19), or *üzerine* 'upon/over', as in (20). Hence, specifying the selectional restrictions of *konuş-* as [V −, ADJ −, ADV −] is insufficient.

(20) Sayın vali ile Ortadoğu-da-ki son gelişme-ler üzerine konuş-tu-k.
honorable governor with Middle East-LOC-ADJZ last development-PL over talk-PST-1PL
'With the honorable governor, we talked about the latest developments in the Middle East.'

A possible solution to D's account involves the introduction of complex categories, where the relevant morphosyntactic properties, such as case and the form of the postposition, are integrated into the category labels. This solution would entail representing the category of *hakkında* not as a simple P but as a complex category P[*hakkında*]. Similarly, the grammatical case of an NP would need to be encoded using complex categories. Since practically all Turkish grammatical cases are involved in unlike coordination, this would require 7 distinct nominal categories (including the non-marked form) in the form of NP[x], where x stands for a Turkish case.

Nonetheless, as highlighted by P&P, this solution is not without its shortcomings. First, it is in conflict with LFG's parallel correspondence architecture, where universal and abstract grammatical features, such as CASE, are represented in f-structure. The introduction of numerous complex c-structure categories that incorporate such information leads to significant redundancy with respect to information already present in f-structure. Second, even if complex categories were adopted, they would not guarantee comprehensive coverage. P&P substantiate this argument with Polish examples that illustrate how the case assignment for a nominal can vary based on the presence of negation, further complicating the complex category and CAT predicate analysis.

To address these limitations, P&P propose moving syntactic category information from c-structure (or l-structure; Lowe & Lovestrand 2020) to f-structure whereby syntactic categories are encoded as values of a distributive CAT attribute in f-structure. This allows for such complex selectional restrictions to be uniformly formulated as constraints on f-structure. Accordingly, the selectional restrictions of *konuş-* 'talk/speak' could be formalized as in (21), utilizing P&P's approach.

(21) $(\uparrow \text{OBJ}) = \%\text{C} \ \wedge$
$[\,[(\%\text{C CAT}) =_c \text{N} \wedge (\%\text{C CASE}) \in_c \{\text{NOM, ACC}\}] \ \vee$
$[(\%\text{C CAT}) =_c \text{P} \wedge [(\%\text{C PFORM}) =_c \text{HAKKINDA} \vee$
$(\%\text{C PFORM}) =_c \text{ÜZERINE}\,]]\,]$

According to this constraint, the f-structure associated with the OBJ(ect) of the predicate, which is assigned the local name %C, must either 1) have the N(ominal) CAT(egory) and either bear the NOM(inative) or the ACC(usative) case, or 2) have the P(ostpositional) CAT(egory) and be projected by either *hakkında* or *üzerine*.

Unfortunately, in case of coordination, this statement is assessed only once for the whole coordination object in vanilla LFG, rather than for each conjunct (each set member) separately – i.e., all conjuncts are forced to uniformly conform to one possibility, such as all conjuncts being PPs headed by *üzerine* or NPs in accusative.

To indicate that a constraint is to be evaluated for each conjunct (i.e., each set member), Przepiórkowski (2022) proposes the notation "%X: ϕ(X)" as an extension to the standard LFG framework. According to this notation, when the value of the local name %X is a set, the property ϕ has to separately hold for each set member.

Therefore, the statement in (21) should be revised with this notation as in (22) (preliminary version, further modified in (23)).

(22) $(\uparrow \text{OBJ}) = \%\text{C} \ \wedge$
$\%\text{C}: [\,[(\%\text{C CAT}) =_c \text{N} \wedge (\%\text{C CASE}) \in_c \{\text{NOM, ACC}\}] \ \vee$
$[(\%\text{C CAT}) =_c \text{P} \wedge [(\%\text{C PFORM}) =_c \text{HAKKINDA} \vee$
$(\%\text{C PFORM}) =_c \text{ÜZERINE}\,]]\,]$

4.2 Unlike arguments

The proposed constraint remains problematic as it allows for the coordination of nominative and accusative objects. Kalin & Weisser (2019) note that, in contrast to some other languages, such a coordination is ill-formed in Turkish and we confirm this observation through informal judgments from native speakers (and by failing to find such examples in corpora).

The choice of nominative or accusative in Turkish direct objects is relatively complex: it depends mainly on specificity (von Heusinger & Kornfilt 2005), but also on animacy (Krause & von Heusinger 2019) and affectedness (Kizilkaya et al. 2022). In line with much of the literature on such Differential Object Marking (DOM), we assume that – while the marking of the "strength" of the object depends to a large extent on semantic and discourse properties of particular NPs – what is marked as "strong" is the whole object, rather than individual NPs within it.

We propose to formalize this with the distributive binary feature DOM, with strong objects specified as DOM +, and weak as DOM −. When the object position is occupied by a coordinate structure, this feature distributes uniformly to all conjuncts, resulting in identical values for DOM.

Revised specifications of the selectional restrictions of *konuş-* are shown in (23). Given that either all conjuncts are DOM +, or all are DOM −, all nominal conjuncts must have the same CASE value, accusative or nominative, respectively.

(23) $(\uparrow \text{OBJ}) = \%\text{C} \ \wedge$
$\%\text{C}: [\,[(\%\text{C CAT}) =_c \text{N} \wedge [[(\%\text{C CASE}) =_c \text{NOM} \wedge (\%\text{C DOM}) =_c -] \vee$
$[(\%\text{C CASE}) =_c \text{ACC} \wedge (\%\text{C DOM}) =_c +]]]$
$\vee \ [(\%\text{C CAT}) =_c \text{P} \wedge [(\%\text{C PFORM}) =_c \text{HAKKINDA} \vee$
$(\%\text{C PFORM}) =_c \text{ÜZERINE}]]\,]$

Crucially, this specification alone cannot ensure that all coordinated objects are either DOM + or DOM −. This generalization must be encoded independently in the grammar. We propose to incorporate this generalization into the lexical entries of all Turkish predicates that take objects using the parametrized template TRANSITIVE, as demonstrated in (24).[12]

(24) $\text{TRANSITIVE(\_P)} \equiv (\uparrow \text{PRED}) = \text{`\_P}\langle \text{SUBJ, OBJ} \rangle\text{'}$
$(\uparrow \text{CAT}) = \text{V}$
$[\,(\uparrow \text{OBJ DOM}) = + \ \vee \ (\uparrow \text{OBJ DOM}) = -\,]$

This template guarantees that all coordinated objects are marked as either + or − due to DOM being a distributive attribute.[13] Ultimately, the lexical entry for the verb in (18), *konuşurlar* '(they) talk', would look as follows:

(25) *konuşurlar* X $@\text{TRANSITIVE(TALK)}$
$(\uparrow \text{SUBJ NUM}) = \text{PL}$
$(\uparrow \text{SUBJ PERS}) = 3$
$(\uparrow \text{TENSE}) = \text{AOR}$
$(\uparrow \text{OBJ}) = \%\text{C} \ \wedge$
$\%\text{C}: [\,[(\%\text{C CAT}) =_c \text{N} \wedge$
$[[(\%\text{C CASE}) =_c \text{NOM} \wedge (\%\text{C DOM}) =_c -] \vee$
$[(\%\text{C CASE}) =_c \text{ACC} \wedge (\%\text{C DOM}) =_c +]]]$
$\vee \ [(\%\text{C CAT}) =_c \text{P} \wedge$
$[(\%\text{C PFORM}) =_c \text{HAKKINDA} \vee$
$(\%\text{C PFORM}) =_c \text{ÜZERINE}]]\,]$

Coordination of unlike arguments was also observed with the verbal stem *sür-* 'last/continue', which selects a temporal argument that can take the form of an AdvP, NP, PP, or a coordination of these categories, as exemplified in (26).

(26) Bu [[$_{\text{NP}}$ her gün] ve [$_{\text{ADVP}}$ yıl-lar-ca]] sür-dü.
this every day and year-PL-ADVZ last-PST
'This continued every day and for years.'

However, not all NPs or PPs can be the oblique argument of *sür-*. The relevant restriction appears to be that the NP must be in the nominative case – as changing the

[12] Since syntactic category labels are no longer represented on c-structure nodes in P&P's approach, the template also includes the f-description for the syntactic category, $(\uparrow \text{CAT}) = \text{V}$.

[13] As one reviewer noted, this template requires the DOM attribute to appear in PP objects as well. While this does not affect the empirical predictions of our analysis, it raises a broader question about whether PP objects need to be marked for "strength." Addressing this question, however, falls outside the scope of our paper. Therefore, we retain the current analysis and leave this issue for future research.

case of the nominal conjunct in (26) results in ungrammaticality – and the PP must be projected by either *boyunca* 'throughout/during', (see (27)), or *kadar* 'until' (see (28)).

(27) Organizasyon ilk- etap-ta üç yıl boyunca sür-ecek.
organization first stage-LOC three year throughout last-FUT
'The organization will initially last for three years.'

(28) Kıbrıs ada-sı-nda bu Arap iktidarı 10. yüzyıl-a kadar sür-dü.
Cyprus island-3P-LOC this Arab rule 10^{th} century-DAT until last-PST
'This Arab rule on the island of Cyprus lasted until the tenth century.'

While no examples of unlike category coordination incorporating such PPs (i.e., [[PP & AdvP] *sür-*] or [[PP & NP] *sür-*]) could be found in the corpus, such environments, as illustrated in the constructed examples in (29) and (30), are still acceptable.

(29) Köy-de-ki düğün [[$_{\text{ADVP}}$ saat-ler-ce] ve [$_{\text{PP}}$ sabah-a kadar]]
village-LOC-ADJZ wedding hour-PL-ADVZ and morning-DAT until
sür-ecek.
last-FUT
'The wedding in the village will last for hours and until the morning.'

(30) Toprak-lar-ımız-da-ki savaş [[$_{\text{PP}}$ mevsim-ler boyunca] ve [$_{\text{NP}}$ her gün]]
land-PL-1PL.POSS-LOC-ADJZ war season-PL throughout and every day
sür-dü.
last-PST
'The war in our lands continued through the seasons and day after day.'

Accordingly, (31) captures the morphosyntactic constraints that *sür-* imposes on its oblique argument.

(31) $(\uparrow \text{OBL}) = \%\text{C} \ \wedge$
$\%\text{C}: [\,[(\%\text{C CAT}) =_c \text{N} \wedge (\%\text{C CASE}) =_c \text{NOM}] \ \vee$
$(\%\text{C CAT}) =_c \text{Adv} \ \vee$
$[(\%\text{C CAT}) =_c \text{P} \wedge [(\%\text{C PFORM}) =_c \text{BOYUNCA} \vee$
$(\%\text{C PFORM}) =_c \text{KADAR}]]\,]$

4.3 Unlike predicates

Turkish predicative arguments can be PPs, NPs, and AdjPs. As expected, there appears to be no prohibition against coordinating predicative arguments that have different syntactic categories, as evinced by the attested examples in (32a–c).

(32) a. [[$_{\text{NP}}$ Çok büyük bir proje] ve [$_{\text{ADJP}}$ çok masraf-lı]] ol-acak.
very big INDF.DET project and very cost-ADJZ be-FUT
'This will be a very big project and very costly.'

b. Konuşma-lar-ınız [[$_{\text{PP}}$ hedef-e yönelik] ve [$_{\text{ADJP}}$ net]] ol-malı.
speech-PL-2PL.POSS goal-DAT towards and plain be-NECESS
'Your speeches should be to the point and plain.'

c. Bu iş [[$_{PP}$ sevgi ile] ve [$_{NP}$ gönül-den]] ol-malı.
This job love with and soul-ABL be-NECESS
'This work should be done with passion and from the heart.'

In (32a), an NP, *çok büyük bir proje*, is coordinated with an AdjP, *çok masraflı*. (32b) involves a coordination of a PP, which is projected by *yönelik*, and an AdjP, while (32c) features a coordination of a PP and an NP.

Moreover, PP predicates can project with virtually any Turkish postposition. Some verified examples of these postpositional heads include *yönelik* 'towards', *ile* 'with', *kadar* 'until', *birlikte* 'together', *karşı* 'against', *göre* 'according to', *için* 'for', *gibi* 'like', *dolayı* 'due to'. Therefore, we can infer that the verb *ol-* 'be/become' leaves the PFORM attribute of its PREDLINK argument underspecified. Likewise, there appears to be no morphosyntactic constraint on predicative AdjPs.

By comparison, NPs are subject to restrictions: only the NPs that are in nominative, locative, ablative or instrumental cases can be predicates. This is because the remaining grammatical cases – i.e., accusative, dative, and genitive – rather consistently denote non-predicative functions in Turkish. The accusative case marks direct objects, while dative is used for oblique arguments and genitive for subjects of embedded clauses (van Schaaik 2020). The absence of corpus examples featuring accusative, dative and genitive nominals as predicates further reinforces this constraint.[14]

Thus, we formalize the relevant morphosyntactic constraints on predicative arguments as follows:

(33) $(\uparrow \text{PREDLINK}) = \%\text{C} \ \wedge$
$\%\text{C}: [\,[(\%\text{C CAT}) =_c \text{N} \wedge (\%\text{C CASE}) \in_c \{\text{NOM, LOC, ABL, INS}\}] \ \vee$
$(\%\text{C CAT}) =_c \text{P} \vee$
$(\%\text{C CAT}) =_c \text{Adj} \ ]$

4.4 Unlike adjuncts

Nominal modifiers can be any PP or AdjP with more specific morphosyntactic properties left underspecified. We formally model this observation with the c-structure rule in (34) that restricts the permissible categories in the nominal modifier position to PP and AdjP.

[14] Apparent counterexamples can be found in corpora, such as the one below:

(ii) Çocuk Ahmet'in ol-acak.
child Ahmet-GEN be-FUT
'(The) child will be Ahmet's.'

At first glance, a genitive NP, *Ahmet'in* "Ahmet's", appears to be the predicative argument of the verb *-ol* "be/become". However, *Ahmet'in* is not a genuine genitive NP, but a nominative NP where the possessed element (in this case, *çocuk* "the child") has been omitted, as illustrated below with the omitted element highlighted in italics:

(iii) Çocuk Ahmet'in *çocuğ-u* ol-acak.
child Ahmet-GEN child-3SG be-FUT
'(The) child will be Ahmet's child.'

(34) $X' \longrightarrow$ XP: $\downarrow \in (\uparrow \text{ADJ})$, $(\downarrow \text{CAT}) \in_c \{\text{P, Adj}\}$ X′: $\uparrow = \downarrow$, $(\downarrow \text{CAT}) =_c \text{N}$

The vanilla LFG counterpart of this c-structure rule would be as in (35). Notably, this rule has to invoke the CAT predicate, as the disjunctive specification on the label alone, {PP | AdjP}, would not be sufficient to permit unlike coordination between these categories (see Przepiórkowski & Patejuk 2021 for details).

(35) $N' \longrightarrow$ {PP | AdjP}: $\downarrow \in (\uparrow \text{ADJ})$, $\text{CAT}(\downarrow, \{\text{PP, AdjP}\})$ N′: $\uparrow = \downarrow$

Verbal items can be modified by any PP, any AdvP or an NP in the locative, ablative, or instrumental case. This observation is formalized with the c-structure rule in (36), which not only specifies the permissible categories for verbal modifiers but also imposes restrictions on the grammatical case when a nominal item fills the modifier position.

(36) $X' \longrightarrow$ XP: $\downarrow \in (\uparrow \text{ADJ})$, $(\downarrow \text{CAT}) =_c \text{P} \vee (\downarrow \text{CAT}) =_c \text{Adv} \vee [(\downarrow \text{CAT}) =_c \text{N} \wedge (\downarrow \text{CASE}) \in_c \{\text{LOC, ABL, INS}\}]$ X′: $\uparrow = \downarrow$, $(\downarrow \text{CAT}) =_c \text{V}$

4.5 Implementation

We implemented the proposed formalization in XLE (Crouch et al. 2017) and verified it through 53 corpus-based sentences that included various configurations of unlike coordination, both well-formed ($n = 31$) and ill-formed ($n = 22$).

As discussed earlier, the solution proposed by Przepiórkowski (2022) extends the definition of distributivity to complex statements. Alas, the notation for representing distributive statements, "%X: ϕ(X)", is not supported in the current version of XLE.

The desired outcome (i.e., a complex statement that is evaluated separately for each set member) can be achieved in vanilla LFG – and consequently in XLE – by formulating such statements as off-path constraints (Przepiórkowski & Patejuk 2012). For example, the off-path equivalent of (33) (repeated here as (37)) would be (38), which is evaluated for each PRED containing f-structure that is the value of the PREDLINK attribute.

(37) $(\uparrow \text{PREDLINK}) = \%\text{C} \ \wedge$
$\%\text{C}: [\,[(\%\text{C CAT}) =_c \text{N} \wedge (\%\text{C CASE}) \in_c \{\text{NOM, LOC, ABL, INS}\}] \ \vee$
$(\%\text{C CAT}) =_c \text{P} \vee$
$(\%\text{C CAT}) =_c \text{Adj} \,]$

(38) $(\uparrow \text{PREDLINK PRED})$
$[\,[(\leftarrow \text{CAT}) =_c \text{N} \ \wedge \ (\leftarrow \text{CASE}) \in_c \{\text{NOM, LOC, ABL, INS}\}]$
$\vee \ (\leftarrow \text{CAT}) =_c \text{P} \ \vee \ (\leftarrow \text{CAT}) =_c \text{Adj} \,]$

As a result, our implementation involved converting the constraints formulated in this paper into their corresponding off-path versions.

5 Conclusion

The present work introduced novel corpus and acceptability judgment data to the ongoing debate on coordination of unlikes. The Turkish data presented here reinforces the claim that there is no universal requirement for conjuncts to be identical in terms of their syntactic categories and cases. The overarching generalization for Turkish appears to be this: if a specific syntactic function can be fulfilled by elements with differing syntactic categories or nominals bearing distinct cases, then we can assume that the coordination of such unlike elements is also acceptable.

To formalize this generalization in LFG, a formal mechanism is required whereby a given morphosyntactic constraint is evaluated individually for each conjunct, rather than for all conjuncts at the same time. For this reason, we formalized the empirical facts using the formal mechanisms proposed in Przepiórkowski & Patejuk (2021) and Przepiórkowski (2022), which allow relevant selectional restrictions to be not only uniformly formulated as f-structure constraints but also independently assessed for each conjunct. We further implemented the proposed formalization in XLE and validated with a test suite.

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