

# Number mismatches in coordination: an LFG analysis

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Agreement is usually understood as covariance of a formal property of one element with a semantic or formal property of another element (Corbett 2006: 4), with the target merely reflecting the features of the controller. On this view, standard patterns of agreement between attributive adjective and modified noun are very simply dealt with. This asymmetrical view of adjective agreement, however, is challenged by the behaviour of coordinated attributive adjectives.

In Russian, as in many languages, attributive adjectives generally show agreement in number with the noun they modify. However, it is possible for a plural noun to be modified by two or more coordinated singular adjectives (1). This construction exemplifies a *split reading* of the coordinated adjectives (Heycock and Zamparelli 2005), on which ‘red’ and ‘white’ hold of different flags. There is no direct agreement between each adjective and the noun, but agreement on a more abstract level between the total number of the coordinate adjective set and the number of the noun. In addition, the number marking on the adjectives makes a very clear semantic contribution to the interpretation of the phrase: it is the number marking on each adjective that together determines the cardinality of each conjunct and thus of the whole noun phrase.

- (1) *krasnyj i belyj flagi*  
red.SG and white.SG flag.PL  
‘(the) red and (the) white flag’ [2 flags total] (Russian)

In Russian, this is not the only agreement possibility. In certain contexts it is also possible for a singular noun to be modified by two coordinated singular adjectives; this is most common in the case of natural pairs and opposites (2). In this case, the function of the number marking on the adjectives remains the same, but the number marking on the noun does not reflect the cardinality of the whole noun phrase. That the noun phrase as a whole has a plural INDEX feature is clear from the plural verb agreement.

- (2) *starjij i novyj stil’ budut uravneny*  
old.SG and new.SG style.SG become.FUT.PL equal.PL  
‘The old and new styles will become equal.’ [2 styles total] (Russian)

These two patterns are also found in other languages. In Italian, they are distributed according to the position of the adjective phrase: coordinated singular *postnominal* adjectives can modify only a plural noun (3), while coordinated singular *prenominal* adjectives can modify a singular noun (4).

- (3) *le bandiere rossa e bianca*  
the.PL flag.PL red.SG and white.SG  
‘the red flag and the white flag’ [2 flags total] (Italian)
- (4) *la vecchia e nuova stazione*  
the.SG old.SG and new.SG station.SG  
‘the old and the new station’ [2 stations total] (Italian)

When the adjectives concerned are not semantically incompatible, all singular agreement as in (2) and (4) can also give rise to a *joint reading* as in (5), involving a single station that is both old and small. Any analysis must also be able to account for the difference between split readings and joint readings, in particular the fact that plural agreement outside the noun phrase (as in 2) enforces the split reading.

- (5) *la vecchia e piccola stazione*  
the.SG old.SG and small.SG station.SG  
‘the old and small station(s)’ [1 or 2 stations total] (Italian)

Agreement mismatches are not possible in all languages, however. In Hindi, coordinated adjectives agree in number with the head noun; so coordinated adjectives modifying a plural noun must appear in the plural, even if each adjective refers to a set of cardinality one (6). The only way to get the ‘exactly one of each’ reading is to use a singular noun, with coordinated adjectives in agreement (7).

- (6) *ye hare aur piile jhande*  
this.PL green.PL and yellow.PL flag.PL  
‘these green and yellow flags’ [one or more flags of each colour] (Hindi)
- (7) *yah haraa aur yah piilaa jhandaa*  
this.SG green.SG and this.SG yellow.SG flag.SG  
‘this green and this yellow flag’ [2 flags total] (Hindi)

Although such patterns have been described in the literature, no explicit theoretical analysis has ever been proposed to capture either the language-specific patterns or the broader typological variation. Our analysis makes use of the distinction between CONCORD and INDEX agreement features (Wechsler and Zlatić 2003), and the distinction between distributive and non-distributive features (Dalrymple and Kaplan 2000).

Typically, CONCORD is analyzed as a distributive feature while INDEX is treated as a non-distributive feature (King and Dalrymple 2004), and this accounts for attested patterns of determiner agreement with coordinated nouns (English “[this.SG boy and girl] are.PL...”). However, mismatches within the noun phrase, as in (1), require the assumption that CONCORD may, in certain cases, be non-distributive. The contrast between (1) and (2) can be explained by assuming that CONCORD is non-distributive (and resolved as plural) in (1) but is distributive (and thus forced to be the same for all conjuncts) in (2). Thus, feature distributivity must be treated as construction-specific in order to account for the behaviour of coordinate adjectives. Cross-linguistic variation can be explained on the basis of differing status of CONCORD in different languages. In Hindi and English, CONCORD is a distributive feature. In Italian and Russian, on the other hand, CONCORD is non-distributive, but it is resolved in different ways for different constructions: in certain constructions, distributivity is effectively enforced via c-structure annotations. The whole approach may be informally characterized as a sort of cline with CONCORD fully distributive on the left, and movement to the right correlated with increasing nondistributivity on a construction-by-construction basis (and thus potentially merging with INDEX):

$$(8) \quad \begin{array}{ccc} \text{CONCORD always distributive} & & \text{CONCORD nondistributive in many constructions} \\ \text{English/Hindi} & > \text{Italian} > & \text{Russian} \end{array}$$

Crucially, we assume that number features on adjectives do not just cospecify nominal features, but get their own semantic interpretation; otherwise, it would be impossible to explain where the ‘exactly two’ meaning in (1) and (3) comes from. Thus, *rossa* in (3) is assigned the meaning  $\lambda x.(\forall a \in x, red(a)) \wedge |x| = 1$ . This analysis demonstrates how the modular and lexicalist architecture of LFG allows us to model the complex interplay of semantic and syntactic factors involved in number mismatch.

For all languages, we assume two different coordination rules for adjective phrases, one the normal set-forming coordination rule (giving the joint reading), and the other creating two separate f-structures, with each adjective conjunct appearing as a modifier (giving the split reading). For languages in which adjectives show number agreement, variations in annotations on the rule in (10), and the different status of CONCORD as a distributive or nondistributive feature, give rise to the different agreement patterns.

$$(9) \quad \begin{array}{ccc} \text{AP} & \rightarrow & \text{AP}^+ \quad \text{Cnj} \quad \text{AP} \\ & & \downarrow \in \uparrow \quad \uparrow = \downarrow \quad \downarrow \in \uparrow \end{array} \quad \begin{array}{l} \text{f-structure (joint reading): } \{[\text{AdjP1}], [\text{AdjP2}]\} \\ \\ \text{f-structure (split reading): } \left[ \begin{array}{l} \text{CONCORD PL} \\ \text{INDEX PL} \\ \left\{ \left[ \begin{array}{l} \text{ADJ} \quad [\text{AdjP1}] \end{array} \right] \right\} \\ \left\{ \left[ \begin{array}{l} \text{ADJ} \quad [\text{AdjP2}] \end{array} \right] \right\} \end{array} \right] \end{array}$$

We assume an analogous pair of rules at the  $A^0$  level for Italian and Russian  $A^0$  adjectives adjoined at the  $N^0$  level. This means that the  $A^0$  or AdjP is either a functional co-head with the noun (as in 10), or specified by the phrase structure rule as appearing in the ADJ set (as in 9). The co-head option allows the modified nominal to distribute into each conjunct, and creates a f-structure structure similar to “the red flag and the white flag” for “the red and white flag”. Particular phrase structure configurations may allow both possibilities, or only one or the other. A rule allowing both possibilities is given in (11).

$$(11) \quad \begin{array}{ccc} \text{N}' & \rightarrow & \text{AP} \quad \text{N}' \\ & & \{\downarrow \in (\uparrow \text{ADJ}) \mid \uparrow = \downarrow\} \quad \uparrow = \downarrow \end{array}$$

In Hindi, CONCORD is a distributive feature, and the rule in (10) needs no additional constraints: the CONCORD features of the noun must match the CONCORD features of each adjective. The rule in (10) is also used for the Russian pattern illustrated in (1), with the crucial difference that CONCORD is nondistributive in Russian. This allows singular conjoined adjectives to combine with a plural noun.

In Italian, as in Russian, CONCORD is nondistributive. For Italian pronominal adjectives (4) and Russian examples such as (2), the apparent distributivity of the CONCORD feature is enforced by the c-structure rule in (12), a variant of (10) that does not specify a CONCORD value for the phrase as a whole, but requires the CONCORD of the AP to match the CONCORD of each conjunct.

$$(12) \quad \begin{array}{ccc} \text{AP} & \rightarrow & \text{AP}^+ \quad \text{Cnj} \quad \text{AP} \\ & & \downarrow \in (\%C \text{ ADJ}) \quad \uparrow = \downarrow \quad \downarrow \in (\%C \text{ ADJ}) \\ & & \%C \in \uparrow \quad (\uparrow \text{INDEX}) = \text{PL} \quad \%C \in \uparrow \\ & & (\uparrow \text{CONCORD}) = (\downarrow \text{CONCORD}) \quad (\uparrow \text{CONCORD}) = (\downarrow \text{CONCORD}) \end{array}$$

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