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## WHEN CARDINALS AGREE (A CATHOLIC POINT OF VIEW)

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### 1. INTRODUCTION

Plural marking with cardinals higher than ‘one’:

- |        |                                   |                                    |
|--------|-----------------------------------|------------------------------------|
| (1) a. | two boys/*boy                     | English: obligatory plural marking |
| b.     | iki çocuk(*-lar)<br>two boy(*-pl) | Turkish: obligatory singular       |
| c.     | yergu dəgha(-ner)<br>two boy(-pl) | Western Armenian: optionality      |

Question: why?

Semantic answer (e.g., Farkas and de Swart 2010, Bale et al. 2011): number marking reflects semantic number (plural vs. general number).

Syntactic answer (Ionin and Matushansky 2006): number marking is agreement; for reasons having to do with the semantics of cardinals the lexical NP is always semantically singular.

This work: further support for the syntactic answer.

#### 1.1. Evidence against singular as general number

Finnish: no general number, yet cardinals require singular lexical NP. Similar for Welsh.

- |        |  |                                    |
|--------|--|------------------------------------|
| (2) a. | Luin kirjan/kirjaa.<br>read-1SG book. ACC/PART<br>I read a book/the book. (≠ I read (the) books) | Finnish: no general number         |
| b.     | kaksi kirjaa/*kirjoja.<br>two book. PART/*PL.PART  | Finnish: singular NP with cardinal |

#### 1.2. Evidence against semantic plurality under a cardinal

Hoeksema 2005, Ruys 2014: measure NPs in the plural have only a ‘plural of abundance’ reading:

- |        |  |
|--------|--|
| (3) a. | Jan dronk liters wine.<br>Jan drank liter-PL wine<br>‘Jan drank excessively many liters of wine.’ (Dutch, Ruys 2014) |
| b.     | The kids ate pounds of cake during the birthday party!   |

This is *not* the reading we get with a cardinal: cf. availability of *two liters of wine*, *two pounds of cake* → no abundance.

#### 1.3. Evidence for agreement

Conditions on plural marking in cardinal-containing NPs can be:

- distinct from those in regular plurals
- identical to those in agreement

### 1.3.1. Miya: plural marking conditioned by animacy

Miya (Schuh 1989, 1998): plural marking in numeral NPs and plural concord/agreement are conditioned by animacy. Regular plural marking is not.

With demonstratives (as well as adjectives, quantifiers, etc.):

- (4) a. níykin dzáfə animate: number agreement  
this.PL man.PL  
b. níykin təmakwìy  
this.PL sheep.PL
- (5) a. nákən víyayúw-awàw inanimate: gender agreement only  
this.MSG fireplace.M-PL  
b. tákən tlərkáy-ayàw  
this.FSG calabash.F-PL

With cardinals: number marking on the lexical NP conditioned by animacy:

- (6) a. təvam tsér animate: obligatory number agreement  
woman.PL two  
*two women*  
b. \*'ám tsər  
woman.SG two  
c. 'ám wutə  
woman.SG one  
*one woman*
- (7) a. zəkij-áyàw vaatlə inanimate: optional number agreement  
stone-PL five  
*five stones*  
b. zəkij vaatlə  
stone.SG five  
*five stones*

The same factor (animacy) determines plural marking under a cardinal and plural agreement, *ergo* plural marking under a cardinal is likely to be due to agreement

Optionality? Perhaps cardinals can be adjectival and then not interfere. There is some evidence for this.

### 1.3.2. Dutch: number marking conditioned by individuation

Klooster 1972, Doetjes 1997: most Dutch measure nouns (see section 2.2.1 for the full list) must be singular with cardinals:

- (8) a. drie/vijf/dertig kilo/\*kilo's Matushansky and Ruys 2014  
three/five/thirty kilo-SG/PL  
*three/five/thirty kilos*  
b. drie/vijf/dertig dozen/\*doos  
three/five/thirty box-PL/SG  
*three/five/thirty boxes*

The morphological plural of these nouns is available in other contexts:

- (9) vele kilo's/\*kilo suiker Doetjes 1997:190  
many kilo-PL/kilo sugar  
*many kilos of sugar*

Number marking on T correlates with number marking on the measure nouns:

- (10) a. Er zit/\*zitten twee liter wijn in de kaasfondue. Doetjes 1997:189-190  
there sits/sit two liter wine in the cheese-fondue  
*There are two liters of wine in the cheese fondue.*
- b. Er \*?zit/zitten twee glazen wijn in de kaasfondue.  
there sits/sit two glass.PL wine in the cheese-fondue  
*There are two glasses of wine in the cheese fondue.*

Proposal (Matushansky and Ruys 2014, etc.): [individuation] as a phi-feature distinguishing measure nouns from all others (providing independent evidence from other languages for the special status of measure nouns). Plural marking is sensitive to individuation.

Similar facts: Danish (Hankamer and Mikkelsen 2008), German (Grestenberger 2015)

### 1.3.3. Western Armenian: number marking conditioned by specificity

The optional plural marking with cardinals in Western Armenian correlates with specificity (Sigler 1992, 1996, Donabédian 1993):

(11) Sigler 1996:147-152:

- a. mer dunə kišerə utə hyur(#er) ge-c-av/an  
1PL.GEN house-DEF night-DEF eight guest(-PL) stay-AOR-3SG/3PL  
*Eight guests stayed overnight at our house.*
- b. mer dunə kišerə utə təram č-une.c.ox hyur(er)  
1PL.GEN house-DEF night-DEF eight money NEG-have.AOR.SR guest(-PL)  
gecav/an  
stay-AOR-3SG/3PL  
*Eight guests who had no money stayed overnight at our house.*
- c. mer utə hyur-\*(er)-ə kišerə mer kovə ge-c-an  
1PL.GEN eight guest-PL-DEF night-DEF 1PL.GEN side-DEF stay-AOR-3PL  
*Our eight guests stayed overnight.*

The same effect is observed in the absence of cardinals, in object position (see Sigler 1996 on obligatoriness of plural marking in subject position):

(12) Sigler 1996:152:

- a. gentanapanagan bardezin meč pirč(#er) desak  
zoological garden-GEN-DEF in elephant(#-PL) see-AOR-2PL  
*Did you see elephants at the zoo?*
- b. gentanapanagan bardezin meč pirč-\*(er)-ə desak  
zoological garden-GEN-DEF in elephant-PL-DEF see-AOR-2pl  
*Did you see the elephants at the zoo?*

An appeal to general number fails to explain why the effect is restricted to the object position without a cardinal.

## 1.4. Puzzle

Assuming that number marking on the lexical NP is agreement, how can agreement for one feature (number) be conditioned by another feature (animacy, specificity, individuation...)?

In the clausal domain: failure to raise out of a phase?

NP-internally: movement is an unlikely explanation.

## 2. ANALYSIS: NUMBER ON THE LEXICAL NP

Observation: unvalued features on the lexical NP cannot be valued in its domain!

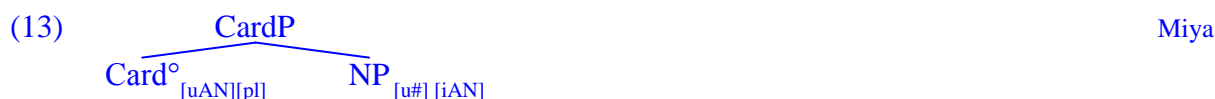
**Hypothesis: number agreement on the lexical NP is contingent on an agreement relation established for another feature (number as a free-rider) and therefore conditioned by it.**

### 2.1. Implementing conditional NP-internal agreement: Miya

Number agreement in Miya may fail in inanimate NPs. However, gender agreement does not fail. In other words, not all agreement is conditioned.

Puzzle: how to condition agreement for one feature but not for another feature. This is not relevant for number marking on the lexical NP.

Proposal: number agreement on the lexical NP in Miya is conditioned by an uninterpretable animacy feature on the higher probe (the cardinal).



The noun is specified for an uninterpretable number feature, which can only be valued if a higher probe bearing its interpretable counterpart enters into an agreement relation with the noun.

Assume that the cardinal is endowed with an uninterpretable animacy feature.

Assumption (Béjar 2000, 2003): An unmarked feature cannot satisfy a Probe (and especially if it is absent!).

If the noun is inanimate, it optionally lacks the animacy feature, the agreement relation is not established and the unvalued features are assigned default values.

If the noun is animate, the agreement relation between the cardinal and the lexical NP is established, and the NP agrees for number. The result is plural number marking for animate NPs with cardinals higher than ‘one’.

NB: This trick will not work for other instances of agreement!

Num<sup>o</sup>, on the other hand, seems to trigger unconditional agreement, so must be specified as [uN]. This is a simplification, since Miya has general number (in the object position?).

### 2.2. Implementing conditional NP-internal agreement: Dutch

Number agreement of cardinal-containing measure nouns in Dutch may fail on the measure noun itself and on the predicate, but not on the determiner or attributive adjective:

- (14) **Deze/\*dit** vijf **pond/\*ponden** bonen **ligt/%liggen** me zwaar op de maag.  
 this-PL/SG five pound beans lie-SG/PL me heavy on the stomach  
*These five pounds of beans are hard for me to stomach.*

NB: Plural agreement on the verb is possible in some idiolects when the lexical NP is plural (*beans*) but not when it is a mass noun (*water*).

Empirical generalization: if the lexical NP is marked for plurality, so is the verb.

#### 2.2.1. Conditional NP-internal agreement patterns for measure phrases: Dutch

**Dutch:** number marking on the lexical NP and number marking on the verb co-vary. For regular lexical nouns, both are plural with cardinals higher than ‘one’; for most measure

nouns, both are singular, but a number of measure nouns can receive and trigger plural agreement (Klooster 1972:9-10).

- (15) a. *dollar* 'dollar' "integer-independent" (singular with cardinals)  
*gulden* 'guilder'  
*cent* 'cent'  
*ton* 'ton'  
*ons* (metric 'ounce', 100 grams)  
*pond* (metric 'pound', 500 grams)  
*kilogram* 'kilo(gram)'  
*gram* 'gram'  
*(kilo)meter* '(kilo)meter', *decimeter* 'decimeter', etc.  
*mijl* 'mile'  
*voet* 'foot'  
*vadem* 'fathom'  
*mud* 'hectolitre'  
*(centi)liter* '(centi)litre', etc.  
*jaar* 'year'  
*uur* 'hour'  
*kwartier* 'quarter of an hour'  
*man* 'man'  
*keer* 'time'  
*maal* 'time'  
*decibel* 'decibel'  
*volt* 'volt', *watt* 'Watt', *farad* 'Farad', *ohm* 'Ohm', etc.  
*bunder* 'hectare' (2.471 acres)
- b. *dubbeltje* '10 cent piece' "integer-dependent" (plural with cardinals higher than 'one')  
*stuiver* '5 cent piece'  
*kwartje* 'quarter' ( $\frac{1}{4}$  of a guilder)  
*seconde* 'second'  
*minuut* 'minute'  
*dag* 'day'  
*week* 'week'  
*maand* 'month'  
*decade* 'decade'  
*eeuw* 'century'  
*millennium* 'millennium'  
*vrouw* 'woman'  
*graad* 'degree'  
*bit* 'bit' (information theory)<sup>1</sup>  
*schepel* 'bushel', 'deciliter'  
*lichtjaar* ('light year')

Semantic minimal pairs: *jaar* 'year' vs. *maand* 'month'; *uur* 'hour' vs. *minuut* 'minute'

Same assumption: conditioned agreement for number occurs when agreement is in fact for another phi-feature.

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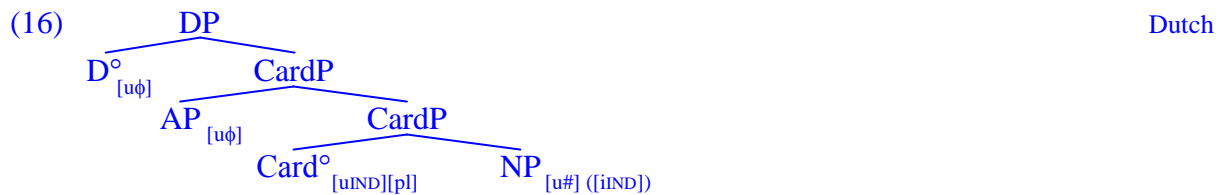
<sup>1</sup> In modern Dutch *bit* and other information-theory measure units (*kilobyte*, *megabyte*, etc.) obligatorily appear in the singular in cardinal-containing NPs.

### 2.2.2. NP-internal plural marking: Dutch

Hypothesis: a formal feature distinguishing measure nouns from all others: individuation.

The Dutch measure nouns in (15b) are lexically specified as [individuated].

Intuition: for structural reasons, plural marking on the lexical NP in cardinal-containing NPs is conditional on agreement for another feature.



The number feature on the NP is uninterpretable and unvalued, and cannot probe. However, when Card° agrees with N° for the [individuated] feature, the [number] feature is valued as a free-rider in the newly established agreement relation

Most Dutch measure nouns (those in (15a)) do not have the [individuated] feature. Agreement for the whole feature bundle fails and so measure NPs do not agree for number.

Agreement failure leads to default realizations (Preminger 2011).

Higher functional projections and modifiers in the extended NP agree unconditionally, since their phi-features can simply probe the number feature on the cardinal.

### 3. CONDITIONAL AGREEMENT ABOVE THE CARDINAL

Two potentially distinct structural configurations:

- a c-commanding head: how can agreement happen for one feature but not for the other?
- a non-c-commanding head of the modifier: cannot probe, cannot be probed for an interpretable feature (otherwise only the highest would agree)

Clear case: animacy-conditioned agreement in Miya

(17) Determiner agreement: Miya, Schuh 1998:197

- a. níykin dzáfə animate: number agreement  
 this.PL man.PL
- b. níykin təmakwiy  
 this.PL sheep.PL

(18) Determiner agreement: Miya, Schuh 1998:197

- a. nákən víyayúw-awàw inanimate: gender agreement only  
 this.MSG fireplace.M-PL
- b. tákən tlərkáy-ayàw  
 this.FSG calabash.F-PL

A c-commanding head potentially agreeing for both number and gender: if number agreement fails, gender agreement takes place

NB: Gender is not distinguished in the plural elsewhere in Miya

(19) Adjective agreement: Miya, Schuh 1998:197

- a. sòbè mbíy-níy [sòm m] animate: number agreement  
people.MPL red-PL  
'red people, Europeans'
- b. dlór-kaw mbíy-níy [dlór-kiy f]  
chicken-PL red-PL  
'red chickens'

(20) Adjective agreement: Miya, Schuh 1998:197

- a. ndùwùl-álàw mbíy-ná [ndùwùl m] inanimate: gender agreement only  
pot.M-PL red-MSG  
'red pots'
- b. təkəm-ámàw mbíy-yá [təkəm f]  
chair.F-PL red-FSG  
'red chairs'

In principle, determiner agreement could be a special case of adjective agreement, but the same pattern is observed for verbal agreement:

(21) Verbal agreement, animate: Miya, Schuh 1998

- a. sòm bə-tá sáy Schuh 1998:178  
man came-MSG.CL TOTALITY.MARKER  
'The man came.'
- b. 'án bə-tlá sáy Schuh 1998:178  
woman come-FSG.CL TOTALITY.MARKER  
'The woman came.'
- c. sòbè ghar-tlən sáy Schuh 1998:198  
people.PL aged-PL.CL TOTALITY.MARKER  
'The people aged.'

(22) Verbal agreement, inanimate singular: Miya, Schuh 1998:178

- a. dzùwkè dà-tá sáy  
kapok fell-MSG.CL TOTALITY.MARKER  
'The kapok fell.'
- b. mùkù dà-tlá sáy  
sun fell-FSG.CL TOTALITY.MARKER  
'The sun set.'

(23) Verbal agreement, inanimate plural: Miya, Schuh 1998:198

- a. zháw-awáw bàl-tá say  
rope-PL broke-MSG.CL TOTALITY.MARKER  
'The ropes broke.'
- b. zháw bàl-tá say  
rope.MSG broke-MSG.CL TOTALITY.MARKER  
'The rope broke.'
- c. \*zháw-awáw bàl-tlón say  
rope-PL broke-PL.CL TOTALITY.MARKER

Gender agreement is not conditional on the absence of number agreement -- simply, gender is not distinguished in the plural (a morphological fact, shared by many languages)

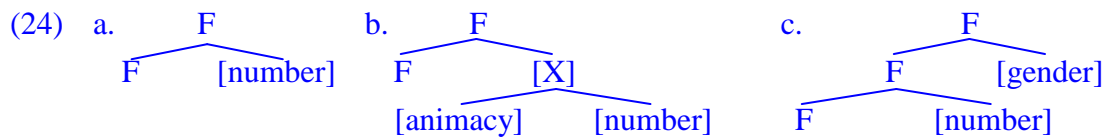


What we want to happen is for agreement for the number feature to occur only as a free-rider on animacy agreement. Except in regular plurals, on the noun itself.

### 3.1. Proposal 1 (rejected): feature bundling

Core intuition: bundle the conditioned feature with the conditioning feature

Chomsky 2001: a  $\phi$ -feature internal to a feature bundle (i.e., a functional head) cannot probe separately



Question: What is the status of the intermediate node (marked [X] in (24b))? (Does it have a label? What is it?)

Problem: if [X] in (24b) is a bundle, why isn't F in (24c)? Concurrent agreement for number and gender on the same probe is widely attested, but conditioning is in the opposite direction: it is frequently the case that only singular NPs trigger gender agreement

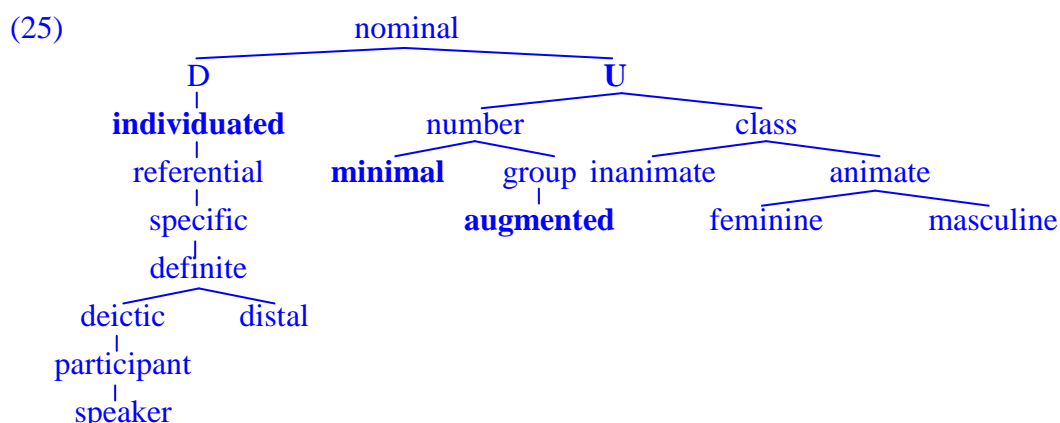
Potential solution: separate agreement for separate phi-features is an epiphenomenon: they are located on different functional heads (cf., e.g., splitting person and number in Béjar 2000, 2003)

Objection: we will potentially need as many functional heads as there are phi-features on top of every probe.

### 3.2. Proposal 2: a structured approach to features

Core intuition: a bundle of phi-features is itself a feature.

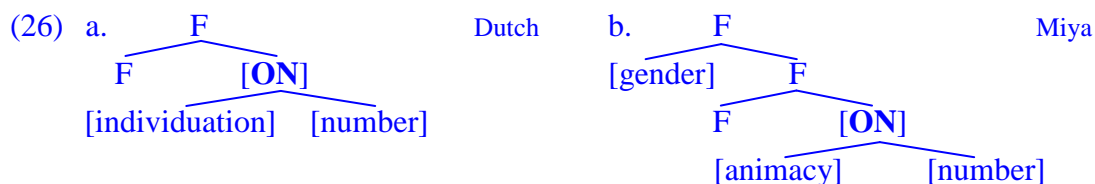
Harley and Ritter's (2002) feature hierarchy, extended by Béjar 2003, Matushansky and Ruys 2015 and us:



The tree structure of D (discourse) is determined by entailments and is therefore universal.

The tree structure of U (universe, discourse-independent properties) is cross-linguistically variable: gender and animacy may function in parallel (as in Russian), other categories (e.g., mass/count, as in Asturian, cf. Mascaró 2011, Bonet 2013) can be distinguished, etc. There are also some indications that [gender] may depend on [number] (Wurmbrand 2015).

Matushansky and Ruys 2015: a specific implementation of Harley and Ritter's (2002) feature hierarchy, in particular, of the intuition behind the notion of "organizing nodes":



Intuition: an uninterpretable feature ([ON]) can be defined by a language in (26) whose value consists of other features:

- the actual label of [ON] may be that of the conditioning feature
- as (26b) suggests, dependents of the conditioning feature can appear on their own

Several issues:

- What constrains the bundling (e.g., can [definite] be bundled with [gender])?
- Are privative features always realized as the same value (e.g., is [number] really [plural], or is [atomic] also an option)? (Values for gender differ from language to language and noun classes do not lend themselves easily to an analysis in terms of privative features. But perhaps gender is indeed special; number is amenable to a binary analysis).
- Does syntactic bundling translate into morphological realization? (Individuation is not realized morphologically in German, Dutch or Danish, nor is animacy in Miya, nor is specificity in Western Armenian).

Prediction: in the structure in (26a) it is not only the case that animacy conditions number, but the opposite is also true: **only plural NPs are predicted to agree for animacy**. Because animacy is not morphologically realized, this prediction cannot be tested.

Unexplained issue: **why is gender agreement only possible in the singular?** It almost looks like [gender] is bundled with [atomicity], yet cross-linguistically, there are systematically more gender distinctions in the singular than there are in the plural: bundling is a brute-force solution here.

Further quirk (Béjar 2003): in the Harley and Ritter hierarchy [animate] dominates gender. Yet it is also entailed by the [participant] feature. Crossing lines?

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