

DEFICIENT MEASURES

Workshop on the occasion of Heidi Klockmann's defense, Utrecht, June 28, 2017

1. INTRODUCTION

Cross-linguistically measure nouns in plural NPs may fail to bear plural morphology despite the existence of a plural form:

- | | | | |
|-----|----|---|---|
| (1) | a. | xamiša kilo kemax
five kilo flour
<i>five kilos of flour</i> | Hebrew, Rothstein 2009 |
| | b. | sidzi bərčəqwa əyoši
four glassful milk
<i>four glasses of milk</i> | Agaw, Hetzron 1967 |
| (2) | a. | pump o geiniogau
five of penny.PL
<i>five pennies</i> (coins) | Welsh, Thomas 1996:314 via Borsley, Tallerman and Willis 2007 |
| | b. | pum ceiniog
five penny.SG
<i>five pence</i> (amount of money) | |
| (3) | a. | zwei Glas Wasser
two glass water
<i>two glasses of water</i> (quantity) | German, Grestenberger 2015 |
| | b. | zwei Gläser Wasser
two glass.PL water
<i>two glasses of water</i> (container) | |

The failure may be related to a particular cardinal or vague cardinal, as in Dutch:

- (4) a. drie liter wijn
three liter.SG wine
three liters of wine
- b. drie liters wijn
three liter.PL wine
three one-liter units of wine
- c. **vele liters** wijn
many liter.PL wine
many liters of wine
- Dutch, Ruys 2017

Or affect only a subset of measure nouns (Klooster 1972:9-10), with minimal pairs like *jaar* ‘year’ vs. *maand* ‘month’; *uur* ‘hour’ vs. *minuut* ‘minute’:

- (5) a. twee jaar/maanden geleden Dutch
two year/month.PL ago
two years/months ago
- b. vijf uur/minuten
five hour/minute.PL
five hours/minutes

Similar facts in Western Armenian (Donabédian 1993:185-187): while plural marking is only possible in specific (or definite) NPs, measure nouns are singular even in definite NPs

Questions:

- What is this plural marking failure due to: syntax, semantics or morphology?
- Why does it affect measure nouns?

Answers:

- It is primarily syntax
- It is about phi-feature deficiency

General conclusion: the need for an additional phi-feature

2. THE IRRELEVANCE OF MORPHOLOGY

The plural form is available, e.g., in plurals of abundance (a.k.a. *the greater plural* in Corbett 2000:31-35), as in (6a),(7), with vague cardinals, as in (4c), or in non-measure readings:

- (6) a. kilo's en kilo's zand Dutch
 kilo.PL and kilo.PL sand
kilos and kilos of sand
- b. Die kilo's die ik ben aangekomen zitten voornamelijk op mijn heupen.
 the kilo.PL that I am gained sit.PL mostly on my hips
The kilos that I have gained are mostly on my hips.
- c. Kilo's zijn zwaarder dan ponden.
 kilo.PL are heavier than pound.PL
Kilos are heavier than pounds.
- (7) a. šasarot kilogramey zehav Hebrew
 ten.F.PL(CS) kilogram.M.PL.CS gold
tens of kilograms of gold
- b. milyoney dunamey adama
 million.M.PL.CS dunam.M.PL.CS ground
millions of dunams of land

Acquaviva 2008: the plural of abundance as a lexical plural (see also Alexiadou 2011):

- (8) a. The river discharges its water/waters into the lake. Acquaviva 2008:109
- b. hithikan nera sto patoma. Greek, Alexiadou 2011
 dripped water.PL on floor
A lot of water dripped on the floor.

Not likely lexical for measure nouns and lexical powers: fully productive

3. THE IRRELEVANCE OF SEMANTICS

What does the lack of plural marking with measure nouns tell us about the plurality of the NP combining with a cardinal?

- standard view: cardinals combine with plural lexical NPs
- modified standard view: cardinals as measures of cardinality

The plural approach to the semantics of cardinals:

- (9) a. $\llbracket \text{three} \rrbracket = \lambda x \in D_e . |x|=3$ predicate analysis
 b. $\llbracket \text{three} \rrbracket = \lambda f \in D_{\langle e, t \rangle} . \lambda x \in D_e . f(x) \wedge |x|=3$ modifier analysis
 c. $\llbracket \text{three} \rrbracket = \lambda f \in D_{\langle e, t \rangle} . \lambda g \in D_{\langle e, t \rangle} . \exists x f(x) \wedge g(x) \wedge |x|=3$ quantifier analysis

In all these proposals the cardinal combines with a plural, the only major innovations are the separation of the existential force and cardinality (Landman 2003 et seq.) and the reanalysis of cardinals as degrees (Scontras 2013, 2014, Kennedy 2013, 2015, Rothstein 2013, 2016, [to appear], and Ouwayda 2014)



Why this doesn't work: because in many languages **cardinals can require a singular lexical NP** (see Ionin and Matushansky [submitted] for more evidence):

- (11) Yhdeksän omena-a puto-si maa-han. Finnish, Nelson and Toivonen 2000
 nine.NOM apple-SG.PART fall-3SG.PAST earth-ILL
Nine apples fell to earth.

Finnish has no general number/numberlessness/transnumerality:

- (12) a. Luin kirjan/kirjaa. Finnish
 read.1SG book.ACC/PART
I read a book/the book. (≠ I read (the) books)
- b. Luin kirjat/kirjoja.
 read.1SG book.PL.ACC/PART
I read the books/books. (≠ I read a/the book)
- c. Olemme suomalaisia.
 be.1PL.PRES Finnish.N.PL.PART
We're Finnish.

If #° encodes semantic plurality (Link's (1983) *-operator), **a higher cardinal should have no effect on number marking**

There is also conditioned plurality with cardinals (see Ionin and Matushansky [submitted] for more examples):

- conditioned by the choice of the cardinal (e.g., Arabic)
- conditioned by the features of the NP (e.g., Miya: animacy; **Dutch: measures**)
- conditioned by both (e.g., Scottish Gaelic, Irish)

Scottish Gaelic (Greene 1992, more data in Acquaviva 2006):

- the cardinals *one* and *two* combine with a singular lexical NP
- other lower simplex cardinals ('three' through 'ten') combine with a plural lexical NP, except if merging with the cardinals *fichead* 'twenty', *ceud* 'hundred' and *mile* 'thousand', as well as with the nouns *dusan* 'dozen', *duine* 'person', *latha* 'day' and *bliadhna* 'year' (much dialectal variation in the choice), which remain singular
- the higher simplex cardinals (*twenty*, *hundred*, etc.) combine with a singular lexical NP

Such patterns indicate a very narrow connection between the cardinal and the plural marking on the lexical NP

Further evidence: word-internal plurals, semantics of modifiers (which would also have to be plural)

+ Ruys 2017: "if Link's (1983) standard operation of semantic pluralization were to apply to liters of wine, this would yield the set of all individual sums of one-liter portions of wine (not necessarily measuring multiple liters, since the original portions may overlap materially)."

Ionin and Matushansky 2006: cardinals combine with singular lexical NPs

Where does plural morphology come from?

4. NOMINAL NUMBER AGREEMENT IN DUTCH

Proposal (cf. Krifka 1995): plural marking on the noun in a plural NP results from agreement:

- with a cardinal
- with a *-operator
- with the subject (for predicates)

(13) a. We are doctor*(s).

b. Jan en Karel spraken als dominee. Dutch, de Swart, Winter and Zwarts 2007
 Jan and Karel spoke as vicar
Jan and Karel spoke in their capacity of vicar.

A noun is normally endowed with a [u#] feature (obvious exception: pluralia tantum)

Problem: the uninterpretable unvalued number feature on N does not c-command its valued counterpart:



Two ways of resolving this problem:

- appeal to more general solutions (e.g., Béjar 2003, Rezac 2003, Béjar and Rezac 2009, etc.)
- introduce an agreement trigger on #° (but potentially not on Card°)

Conditioned agreement for number is possible, especially with cardinals

4.1. Conditioned agreement for number

Proposal: Card° can be endowed with an uninterpretable feature triggering agreement

Estonian Swedish (Rendahl 2001:156, Koptjevskaja-Tamm and Wälchli 2001:701): feminine nouns take on the plural form in cardinal-containing NPs, while masculine and neuter nouns remain singular:

(15) a. tri mann Estonian Swedish, Koptjevskaja-Tamm and Wälchli 2001:701
 three man.M.SG
three men

b. fem bärki-ar
 five birch.F-PL.INDEF
five birches

(16) Han gik e lada ø kep gris-ar. Estonian Swedish, Rendahl 2001
 he went into market Ø buy pig.M-PL.INDEF
He went to the market to buy pigs.

Core intuition: agreement for one phi-feature can be conditional on the presence of another

Solution: Card° probes for [uγ] (or [uF]) in Estonian Swedish, #° probes for [uN]

Similar patterns: animacy, specificity; distinctions for different types of cardinals

Agreement failure leads to default realizations (Preminger 2011)

Issue: how can you probe for a privative feature?

4.2. The phi-feature lacking in measure nouns

What is needed: the morphosyntactic counterpart of the core semantic property distinguishing measure nouns from regular nouns

Matushansky and Ruys 2014, 2015a, b: **individuation** ([ind])

Problems: remains intuitive, confusion with the notion of individuation used in the literature on prominence hierarchies

Is this a purely diacritic feature?

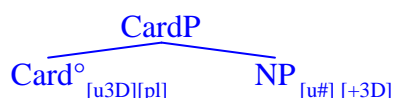
Alternative proposal: location in concrete space (abbreviated as [3D]) following the proposal by Matushansky and Zwarts 2016 that measure nouns denote containers in one dimensional space

Advantage: multi-modular connection between the measure and container readings of nouns such as *bottle* or *glass*:

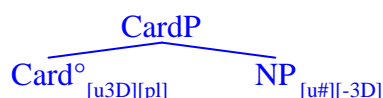
- semantically: concrete (object) vs. abstract container
- morphosyntactically: a semantically rooted phi-feature [3D]: all nouns that do not denote measures are [+3D]

Natural non-semantic explanation for plural-marked measure nouns, such as *maand* ‘month’ and *minuut* ‘minute’: **lexical specification as [-3D]**

(17) a. cardinal + lexical NP



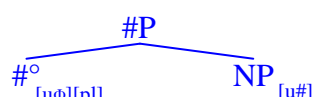
b. cardinal + exceptional measure NP



c. cardinal + measure NP



d. *-operator + any NP



Assuming that cardinals are specified for the uninterpretable feature that measure nouns lack and all other nouns have (whereas #°, as well as vague cardinals, probe for [uΦ], hence for any noun) entails that most measure nouns will not show plural marking under cardinals yet will be marked as plural with vague cardinals and when functioning as a regular noun

The [-3D] specification of the “integer-dependent” (plural with cardinals higher than ‘one’) measure nouns listed by Klooster 1972 is not unintuitive and allows us to use the distinction between the lack of a feature and its negative specification

What happens with vague cardinals, such as *many*, and the definite article, which both require plural marking on the NP?

D° is specified as [u#] and therefore agrees unconditionally

For vague cardinals two options are available:

- vague cardinals combine with a semantic plural, i.e., with a #P, as in (17d)
- vague cardinals are just like cardinals (i.e., combine with a semantic singular) but have the featural specification that has [uΦ] rather than [3D], i.e., as in (17d)

Given the incompatibility of measure nouns with a semantic plural, (ii) is better

Doetjes 1997: distinction between obligatorily singular measure nouns and all other nouns in *there*-construction:

- (22) a. Er zit/*zitten twee liter wijn in de kaasfondue. Doetjes 1997:189
 there sit.SG/PL 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. Doetjes 1997:190
 there sit.SG/PL two glass.PL wine in the cheese-fondue
There are two glasses of wine in the cheese fondue.

Actually, two dialects:

- (23) a. Er werd/*werden vijf pond uitgegeven aan kleren.
 there AUX.SG/PL five pound.NSG spend.PPP on clothes
£5 were spent on clothes.
- b. Er %werd/%werden vijf maanden uitgetrokken voor dit project.
 there AUX.SG/PL five month.PL reserve.PPP for this project
Five months were reserved for this project.

Not attested: plural predicate agreement with an obligatorily singular measure noun

<i>Er GO drie ... voorbij.</i>	dialect 1	dialect 2	not attested	not attested
<i>jaar</i>	ging	ging	gingen	gingen
<i>maanden</i>	ging	gingen	gingen	ging

Potential solution: formal [3D] feature in dialect 2 and its semantic counterpart in dialect 1

Further evidence for the relevance of formal features comes from **coordinated measure NPs**:

- (24) Er zit een liter wijn en een liter appelsap in de cocktail.
 there sit.SG a liter wine and a liter apple.juice in the cocktail
There is a liter of wine and a liter of apple juice in the cocktail.

There is no way for a sum to not be semantically plural

5.2. Number agreement with definite measure subjects

Needless to say, plural agreement is obligatory for non-measure nouns

Obligatorily singular measure nouns trigger singular agreement on the verb, except when in a pseudo-partitive:

- (25) a. Die vijf pond werd/*werden uitgegeven aan kleren.
 that.PL five pound.NSG PASS.AUX.SG/.PL spend.PPP on clothes
Those five pounds (sterling) were spent on clothes.
- b. Deze vijf pond brood ligt/*liggen me zwaar op de maag.
 this.PL five pound bread lie.SG/PL me heavy on the stomach
These five pounds of bread are hard for me to stomach.
- c. Deze vijf pond bonen %ligt/liggen me zwaar op de maag.
 this.PL five pound beans lie.SG/PL me heavy on the stomach
These five pounds of beans are hard for me to stomach.

The number of the substance NP appears to influence the number marking on the predicate

Obligatorily plural measure nouns allow both singular and plural agreement (possible for the same speaker):

- (26) Die vijf maanden ?ging/gingen heel snel voorbij.
 that.PL five month.PL go.SG/PL very fast over
Those five months went by very fast.

But unclear if the plural agreement retains the measure reading

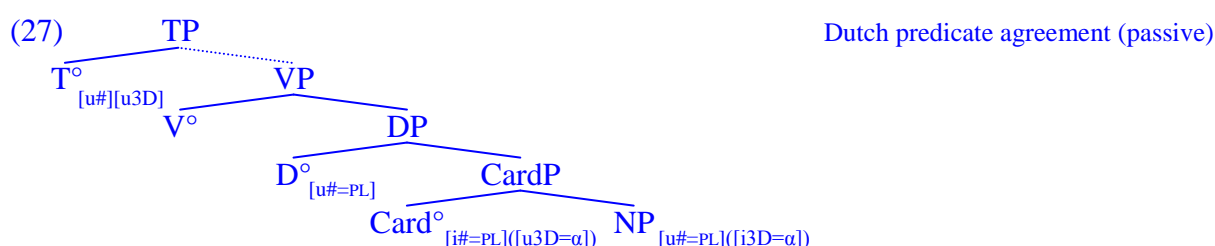
5.3. The source of plural marking on the predicate

If the derivation above is correct, there is a [plural] feature on all numeral NPs (interpretable number on the cardinal)

The **obligatorily plural determiner** confirms this

The lack of plural agreement on the predicate therefore suggests **agreement failure for DPs headed by a measure noun**: conditioned agreement again

Same solution: a feature bundle containing an uninterpretable [3D] feature but this time the number feature on the predicate is also uninterpretable:



Two features in the same bundle cannot probe separately (Chomsky 2001), so D° (lacking the [3D] feature) won't do as a goal

NB: Is D° a defective intervener? See below

If the [i3D] feature on the noun is specified as positive (for regular nouns) or negative (for plural measure nouns), the feature bundle on T° is valued and plural agreement arises

If the noun does not carry the [i3D] feature (for singular measure nouns), then probing by [u3D] on T° fails, the feature bundle on T° cannot find an appropriate goal and all agreement fails

In pseudo-partitives, the substance NP can determine agreement:

- (28) a. Deze vijf pond bonen %ligt/liggen me zwaar op de maag.
 this.PL five pound beans lie.SG/PL me heavy on the stomach
These five pounds of beans are hard for me to stomach.
- b. Deze vijf pond brood ligt/*liggen me zwaar op de maag.
 this.PL five pound bread lie.SG/PL me heavy on the stomach
These five pounds of bread are hard for me to stomach.
- (29) a. Deze kilo snoepjes %kost/kosten vijf euro. singular measure phrase
 this.C kilo.C sweets cost.SG/PL five euro
The kilo of candies costs five euros.
- b. Deze kilo snoep kost/*kosten vijf euro.
 this.C kilo.C sweets.N cost.SG/PL five euro
This kilo of candies costs five euros.

Intuition: the pseudo-partitive as a whole can acquire number and [3D] specification in virtue of its denotation rather than inherit them (i.e., as semantically determined phi-features, giving rise to semantic agreement (cf. Corbett 1979 et seq.))

Remaining issue: **optional singular predicate agreement with plural measure nouns**:

- (30) a. Er [%]ging/[%]gingen drie minuten voorbij.
 there go.SG/PL three minute.PL over
Three minutes passed.
- b. Die vijf maanden ?ging/gingen heel snel voorbij.
 that.PL five month.PL go.SG/PL very fast over
Those five months went by very fast.

Issue: which is it that requires explanation: the singular marking or the plural?

5.4. Semantic agreement with measure NPs

Question: what is the phi-featural specification of the DP as a whole?

Possibilities:

- i. the phi-feature bundle on D° probes and inherits the feature values of its goal
 - D° does not have [u3D], must not be an intervener, agreement is with N° or Card°/#°
- ii. phi-feature values on D° are semantically determined (cf. Sauerland's (2004) φP)
 - in function of the denotation of the DP as a whole, D° is either specified as [+3D] (concrete entity), or not specified for the [3D] feature (measure)
 - in pseudo-partitives, other feature values are determined by the properties of the substance NP

(i) corresponds to syntactic/formal agreement, (ii) corresponds to semantic agreement

(i) yields plural marking on the predicate for plural measure nouns, (ii) predicts singular

6. CONCLUSION

In order to account for plural marking patterns with Dutch measure nouns it is necessary to:

- introduce a feature distinguishing measure nouns from all others
- make number agreement conditional on that feature

Proposal: the semantically based [α 3D] phi-feature:

- *boek* 'book': [+3D]
- *jaar* 'year': no [3D]
- *maand* 'month': [-3D]

Assuming that number agreement takes place concurrently with valuing the [u3D] feature on the probe yields correct results

Measure nouns can then be regarded as deficient: for the most part they do not bear the [3D] feature

Extensions

- classifiers are probably unspecified for [3D], predicting number impoverishment
- cardinals are all unspecified for [3D], even when they seem to be nominal (but this need not be there only deficiency)

7. APPENDICES

7.1. More on the plural of abundance

In some languages the plural of abundance (Corbett 2000) is not restricted to measure nouns

Special morphology in Norwegian (Kinn 2004) and in Syrian Arabic (Corbett 2000):

- (31) a. million-vis/million-ar av student-ar Norwegian, Kinn 2004
 million-ABU/million-PL.INDEF of student-PL.INDEF
millions of students
- b. liter-vis med vatn
 litre-ABU with water
litres of water
- (32) a. dabbān 'flies (collective)' Syrian Arabic (Corbett 2000:32)
 b. dabbāne 'a fly (singulative)'
 c. dabbānāt 'flies (plural)'
 d. dababīn 'many flies'

Double plural marking in Miya (Schuh 1998):

- (33) a. sèbə 'people' : sèbabáw 'large number of people' Schuh 1998:199
 b. kùtə 'thing (pluralia tantum)' : kùtatáw 'large number of things'

In other languages it is lexically restricted (e.g., *waters, skies, heavens* vs. *wines, grounds*)

Strikingly, the plural of abundance seems to be possible on measure nouns only when part of a pseudo-partitive

7.2. Conditional agreement extensions: other phi-features

Western Armenian: overt plural marking only possible with specific or definite NPs (Sigler 1992, 1996, Donabédian 1993):

- (34) a. gentanapanagan bardezin meč pirκ(#er) desak Sigler 1996
 zoological garden.GEN.DEF in elephant(.PL) see.AOR.2PL
Did you see elephants at the zoo?
- b. gentanapanagan bardezin meč pirκ-*(er)-ə desak
 zoological garden.GEN.DEF in elephant.PL.DEF see.AOR.2PL
Did you see the elephants at the zoo?

Donabédian 1993:185-187: measure nouns are singular even in definite NPs:

NB: plural marking on the measure noun is not ungrammatical, but yields the interpretation of excessive quantity

- (35) mayrak' a lak' -ə T'ōnnēr-ē-n bažnol 180 k'ilometrō-n
 capital-DEF Tonnerre-from-DEF separating 180 kilometer-DEF
the 180 km separating the capital from Tonnerre

Assuming an interpretable number feature on D and sensitivity to [3D]:

- (36)
-
- ```

graph TD
 DP --> Ddeg[D°]
 DP --> CardP
 Ddeg --- Ddeg_feats["[i# = PL][u3D]"]
 CardP --> Carddeg[Card°]
 CardP --> NP
 Carddeg --- Carddeg_feats["[i# = PL]"]
 NP --- NP_feats["[u# = PL]([i3D = α])"]

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Number marking is sensitive to the presence of the D-layer; Card°/#° is inactive

The sensitivity of number marking to definiteness/specificity is syntactic rather than semantic

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