Traditional view: number is in NumP (Ritter 1987, 1991, Bernstein 1991, Valois 1991, etc.) and involves semantic pluralization (the *-operator)

Recent developments: parametric (Bouchard 2002, Déprez 2005, 2006), a.k.a. distributed number (Wiltschko 2008): for a number of different motivations:

- on NP vs. on DP (Bouchard 2002, Déprez 2005, 2006): in French number is only marked on the determiner, in Creole languages likewise, and only if definite
- √P (Wiltschko 2008): the optional Halkomelem plural marking is cross-categorial and internal to derivational affixes and compounds
- nP (Lowenstamm 2007, Acquaviva 2008, Alexiadou 2011, etc.): "lexical plurals": pluralia tantum nouns, plural of abundance
- DivP & #P (Borer 2005, Mathieu 2014): singulatives and measure nouns
- DP (Butler 2012): the optional Yucatec Maya plural marker on conjunctions of singular NPs
- above DP (Sauerland 2003, 2008): mixed agreement

Furthermore, NP-internal number-marking can be:

- manifested on agreeing elements only: Gurr-goni (Green 1995), Manam (Cowper and Hall 2014)
- conditioned by prominence hierarchies: Western Armenian (Sigler 1992, 1996, Donabédian 1993) in function of specificity; Palauan (Josephs 1997), Southern Ute (Oberly 2004), Vera’a (Schnell 2012) in function of animacy; Vai (Welters 1976) and Mandarin (Lan 2010) in function of humanity, Wambon (de Vries and Vries-Wiersma 1992) for kinship nouns only, Haitian Creole (Déprez 2005, 2006) and Yoruba in function of definiteness (Rowlands 1969:41-42), etc.
- differing for cardinal-containing NPs (Ionin and Matushansky [in press])

The problem that I see: most of the discussion centers on the overt number marker and only one type of plurality: additive plurals

Pluralization as defined by Link 1983: closure of an atomic set (the noun denotation) under sum (yielding the set of all subsets of P excluding the empty set)

\[
\{ \ast \} = \lambda P . \varnothing \cup P \setminus \varnothing
\]

This is what should be in Num0

This talk:

- plurality with cardinals is not that in (1) for both syntactic and semantic reasons
- plural number marking can be triggered by non-additive plurality
- plural number marking does not always correspond to semantic plurality
- plural is a formal feature

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Question: is it located on a head?

1. NOMINAL NUMBER MARKING IN CARDINAL-CONTAINING NPs

Core finding (Ionin and Matushansky [in press]): number marking below the cardinal does not come from semantic plurality of the constituent the cardinal combines with

Core results: plural morphology below the cardinal results from agreement and the agreement is not with Num

Evidence: lack of plural marking under cardinals

1.1. Act I: Hungarian and Turkish

In a number of languages, including Hungarian and Turkish, cardinals obligatorily combine with morphologically singular NPs:

nine.NOM apple-SG.PART fall-PAST.3SG earth-ILL
Nine apples fell to earth.

b. y tair cath ddu hynn Welsh, Mittendorf and Sadler 2005
the.PL three.F cat.F.SG black.SG that.PL
those three black cats

Ionin and Matushansky 2006: cardinals combine with semantically singular NPs

1.2. Act II: General number and Western Armenian

Farkas and de Swart 2010, Bale, Gagnon and Khanjian 2011, Bale and Khanjian 2014, etc.: plural can be exclusive or inclusive:

(3) a. \[[\text{plural}] = \lambda P \; \lambda x \; [x \in \text{Sum} \cup \text{Atom} \land *P(x)]\] inclusive plural

b. \[[\text{plural}] = \lambda P \; \lambda x \; [x \in \text{Sum} \land *P(x)]\] exclusive plural

The morphologically unmarked NP appearing with a cardinal corresponds to inclusive plural, a.k.a. transnumerality, a.k.a. general number (Corbett 2000, see also Schroeder 1999, Wiese 2003, Acquaviva 2005)

Western Armenian: plural marking optional with numerals

(4) kasān usanos(-ner)
	twenty student-PL
twenty students

Bale et al. 2011, Bale and Khanjian 2014: two lexical entries for cardinals, one for inclusive plurals (the surface singular) and the other for exclusive plurals (the surface plural)

In their view Turkish and Hungarian use the unmarked inclusive plural (general number) with cardinals

1.3. Act III: Western Armenian and the role of conditioning factors

Big problem: plural marking in Western Armenian is conditioned by specificity (Sigler 1992, 1996, Donabédian 1993):

(5) a. kasān usanos kænutenæmov sakoce-av WA, Sigler 1996:167-168
twenty student exam.ABL.A fail-AOR.3SG
There failed an exam twenty students.
b. kǝsan usanoŋ-ner kǝntenǝmǝ saxoŋe-c-an/*saxoŋe-c-av
twenty student-PL exam.ABL.A fail-AOR-3PL/3SG
Twenty students failed an exam.

This is unexpected if number under the cardinal is interpreted
Bale and Khanjian 2014 discuss the fact that in definite plural numeral NPs singular marking is not possible, yet do not change the semantics of cardinals, tinkering instead with the semantics of the definite article (introducing maximality under the cardinal)

Specificity as a condition on **number agreement** is attested independently

Other discourse-related factors and phi-features can also play a role (cf. Smith-Stark 1974, Corbett 2000, Haspelmath 2005):

(i) **definiteness** (Yoruba (Rowlands 1969:41-42))
(ii) **animacy** (Palauan (Josephs 1997); Miya: numeral NPs only (Schuh 1989, 1998))
(iii) **humanity** (Vai: except in numeral NPs (Welmers 1976:45))
(iv) **measure** (Dutch (Klooster 1972): most measure nouns are not marked plural in numeral NPs, see Matushansky and Ruys 2014, Ruys 2017)
(v) **gender** (Estonian Swedish (Rendahl 2001:156, Koptjevskaja-Tamm and Wälchli 2001:701): only feminine nouns are overtly marked plural in numeral NPs)


1.4. **Act IV: The dissociation of unmarked plurals and plurality under cardinals**

Finnish and Welsh, which require singular under cardinals, do not have general number:

(6) a. Luin kirjan/kirjaa.
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.

(7) a. Gwelodd Rhiannon ddraig.
see.3SG.PAST Rhiannon dragon.SG
Rhiannon saw a dragon/*dragons.

b. Roeddwn i ac Emyr yn ysgrifenwy rhaborol.
was.1SG 1SG and Emyr PRED writer.PL.excellent
Emyr and I were excellent writers.

Renans, Tsoulas, Folli, Ketrez, Tieu, de Vries and Romoli 2017 and Yatsushiro, Alexiadou, Geckin, Harmati-Pap and Sauerland 2018: Hungarian and Turkish plurals are not exclusive

1.5. **Act V: Noun-conditioned plurality under cardinals**

Scottish Gaelic (Greene 1992, more data in Acquaviva 2006 and Ó Maolalaigh 2013):
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 duzan ‘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

This pattern would be inexplicable if plurality were introduced below the cardinal

+ 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).”

In fact, liters of wine is a plural of abundance

Further arguments in Matushansky and Ruys 2014, Ruys 2017, Ionin and Matushansky [in press]

1.6. Epilogue: Number-marking under a cardinal

Cardinals do not combine with semantic plurals

Plural marking can therefore result from factors other than Link’s pluralization

Next step: other semantic contributors to plural marking

2. Non-additive plurals

The gist of the argument: it is not the term that introduces the semantic component creating a plurality that is responsible for plural marking

2.1. Associative plural and plural marking

Daniel and Moravcsik 2013: An associative plural designates a heterogeneous set consisting of the focal referent and the associates:

(8) a. Tanaka-tachi
   Tanaka-APL
   Tanaka and his family or friends or associates
   Japanese, Moravcsik 2003

b. Péter-ék
   Peter-APL
   Peter and his family or friends or associates
   Hungarian, Moravcsik 2003

What is completely self-evident from the semantic standpoint is that associative plurals do not involve semantic pluralization

What is needed is the group notion of Kratzer 2009:

(9) $[[ \text{group} ]]^{g,c} = \lambda x. \text{the group of } x \text{ for } c$

This is the mode of plural formation used for pronouns ($we = I + \text{someone else}$)

It can be unmarked on the NP:

(10) Moj brat tam toža žyli.  
    my.MSG brother.M there also lived.PL  
    My brother and his family also lived there.
Vinokurova 2005:143: in Sakha plural and possessed DPs can appear with an associative marker:
Data from Vinokurova 2005, unless indicated otherwise, glosses somewhat modified

(11) Lena-m aax
Lena-1SG APL
Lena (whom I know) and her folks/another person

Crucially, this marker does not need to add referents:

(12) a. ubaj-ym uonna edjiij-im aax
   brother-1SG and sister-1SG APL
   i. my elder brother and my elder sister and their folks
   ii. my elder brother and my elder sister and one or more persons
   iii. my elder brother and my elder sister

b. ol kyrgyt-tar aax
   that girl-PL APL
   i-ii. those girls and [their folks/one or more persons]
   iii. those girls

My proposal: -aax- is a DP-peripheral marker of non-homogenous plurality, with different potential sources for plurality itself:

- additive plural morpheme (closure under sum)
- conjunction
- (null) associative plural morpheme (“and the associated group”)

This is a marked plural but it does not contribute semantic plurality (i.e., there is no way of arguing that the overt noun phrase -aax- combines with in (12iii) is pluralized by -aax-)

2.2. Yucatec Maya DP-external plural marker

Butler 2012: in Yucatec Maya plural marking is optional:
Lehmann 2002: obligatoriness of plural marking increases with empathy and specificity.

(13) Táan u k’aay(-o’ob) le x-ch’úupal(-o’ob)-o’.
   Yucatec Maya, Butler 2012
   prog A3 sing(-PL) DEF F-girl(-PL)-D2
   The girls are singing.

(14) a. le x-ch’úupal ki’ichpam-o’
   DEF F-girl pretty-D2
   the pretty girl/the pretty girls

b. le x- ch’úupal(-o’ob) ki’ichpam(-o’ob)-o’
   DEF F-girl-PL pretty-PL-D2
   the pretty girls

This plural marker also can appear on conjunctions of singular NPs:

(15) le x-ch’úupal yéetel le ko’olel-o’ob-o’
   DEF F-girl and DEF woman-PL-D2
   the girl and the woman/the girl and the women/the girls and the woman/the girls and the women

Butler 2012: the plural of Yucatec Maya is DP-adjoined rather than located in NumP

- What does this statement mean from the point of view of semantics?
- What about other plural markers, on the verb or on the post-nominal adjective?

What we are dealing with is the question of where plural marking is realized
How is this different from asking where Case is realized DP-externally? Exactly the same set of hosts and the same possibility of spreading are attested

2.3. Other types of non-additive plurals

Plural of politeness (including plural 2nd person pronouns and the majestic and the medical we):

(16) “Mamen’ka plačut,” – šepnula ona. Russian 

“Mother is crying,” – she (the maid) whispered. (Turgenev, Nakanune, ‘On the Eve’, 1860 via Corbett 2006:3)


Virile is [+human, +masculine, +plural]

(17) a. Matka z ojcem wrócił. Polish, Trawinski 2005

mother.F with father.M.INS came back.V.PL

The mother and the father came back.

b. Oddzial z ojcem wrócił. 

department.M with father.M.INS came back.V.PL

The department and the father came back.

Unlike with conjunction plurals, impossible to make the preposition bear [plural].

Collective plural (Maltese, exx. from Corbett 1996):

(18) a. dak id-dubbien il-kbir li hareg mill-bieb dahat that.MSG DEF-flies.COLL DEF-large.MSG that.went.out.MSG through.the door those large flies which went out through the door

b. dawk id-dubbien il-kbar li hargu mill-bieb dahat that.PL DEF-flies.COLL DEF-large.PL that.went.out.PL through.the door those large flies which went out through the door

Potentially includes the root plural of Halkomelem:

(19) Halkomelem, Wiltschko 2008

a. t’ilém ye swíyeqe sing DET man.SG

The man is singing.

b. t’ilém te swíyeqe sing DET.PL man.SG

The men are singing.

c. t’ilém ye s-i:wf:qe sing DET man.PL

The men are singing.

d. t’ilém te s-i:wf:qe sing DET.PL man.PL

The men are singing.


(20) a. The Government is ruining this country. Sauerland and Elbourne 2002

b. The Government are ruining this country.

Plural of abundance (especially with measure and mass nouns):


Jan drank liter.PL wine

Jan drank excessively many liters of wine.

b. The kids ate pounds of cake during the birthday party!
(22) a. hithikan nera sto patoma.  
    Greek, Alexiadou 2011 
    dripped water.PL on floor 
    A lot of water dripped on the floor.

b. The river discharges its water/waters into the lake.  
    Acquaviva 2008:109

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

In none of these cases does it seem reasonable to assume a plurality-introducing functional head inside an NP, the way it has been hypothesized for additive plurals.

2.4. Non-additive plural marking: summary

Plural agreement and NP-internal plural markers may appear with plurals that are not formed by the additive pluralization operator

In a lot of cases of NP-internal plural marking it makes sense to talk about agreement rather than pluralization

The semantic correlate of plural agreement appears to be the property of being non-atomic as defined for pronouns (cf. Heim 2005, Kratzer 2009) or of being augmented (Harbour 2008):

(23) a. $\text{plural} = \lambda x : x \in (*D - D) . x$  
    type $\langle e, e \rangle$

b. $\text{+augmented} = \lambda P . \lambda x : P(x) . \exists y [P(y) \land y \sqsubseteq x] . P(x)$  
    type $\langle \langle e, t \rangle, \langle e, t \rangle \rangle$

Apparent conclusion: the presence of $\varphi P$ (Sauerland 2003, 2008, Kratzer 2009):

(24) \[\varphi P\] 
    \[\text{DP} \quad \text{NP}\] 
    \[
    \begin{array}{c}
    \text{D}
    \end{array}
    \]
    \[
    \begin{array}{c}
    \text{the}
    \end{array}
    \]
    \[
    \begin{array}{c}
    \text{books}_{\text{PL}}
    \end{array}
    \]

Problem: there still needs to be something inside the DP that makes it possible for the plural presupposition to be satisfied

For Sauerland 2003, 2008 plural is the unmarked value, it is singular that is specified as [atomic]

And the question remains what determines the distribution (obligatoriness?) of $\varphi P$

3. The Formal Number

From the syntactic standpoint there has to be a plural feature, because default agreement (in the absence of number features) is always identical to the corresponding singular

3.1. Pluralia tantum

Plural marking does not always correspond to semantic plurality: pluralia and dualia tantum:

(25) a. miškaf.ayim 'glasses.DU', mispar.ayim 'scissors.DU'  
    Hebrew

b. 'erus.in 'engagement.PL', xułyetan.im 'vertebrae.PL'

The status of the plural (dual) marker in pluralia tantum nouns is subject to debate. While the consensus seems to be that it is not interpretable, it is, as with gender, clearly not random

Pluralia and dualia tantum trigger agreement normally:

(26) a. Qerrulliik ang’uk.  
    Yup’ik, Mithun 2010 
    qerrullii-k ange-u-k 
    trouser-DU be.big-INTR.IND-3DU 
    The pants are big (one pair).
b. Niicugnissuuet kumareski!
   niite-yug-neq-i-cuun-et  kumarte-ki
   hear-DESID-result-make-device-PL  ignite-OPT.2SG/3PL
   Turn on the radio!

In other words, number, like gender, need not be semantic
Which means that the φP hypothesis cannot by itself explain number agreement (duh!)

What is needed is a formal number feature (at least) on top of the noun phrase that has to be licensed: either by semantics or by the inherent lexical specification of a noun as a plural or duale tantum
This is essentially the same idea that I was pursuing in Matushansky 2013 for gender agreement
That optional plural marking is systematically associated with a higher level of individuation should be a clue – for future work

3.2. The locus of formal number

Number like gender can be manifested in a number of places NP-externally and internally

   python big=PL six
   six big pythons
b. mburrklerrtji awuni-mukupu {bidjina-ga-tji/  Gurr-goni, Green 1995:70
   child 3.UA.NF-two  3MINA.3UA.NF-o-take-PRE/CON
   *? a-ga-tji}
   a-na-ma-nay
   3MINA.3Io-take-PRE/CON  3ls-twds-go.along-PRE
   He brought along two children.

   exist three book and one magazine take book the.PL/SG
   There are three books and one magazine. Take the books.
b. Gen liv ak magazin sou tab sa. Pran liv *(yo).
   exist book and magazine on table this take book the.PL
   There are books and magazines on the table. Take the books.

And its origin can also be distributed:

(29) a. Outside counsel_{PL}/this committeeSG have very little incentive to be efficient.
b. y tair cath ddu hynny Welsh, Mittendorf and Sadler 2005
   the.PL three.F cat.F.SG black.SG that.PL
   those three black cats
   Sardaana-APL come-PAST-PL/*come-PAST
   Sardaana and {her folks/another person(s)} came.
d. Ta dobra deca dolaze. Serbo-Croatian, Wechsler and Zlatić 2000
   that.F.SG good.F.SG children.F.SG come.3PL
   Those good children came.
e. dawk id-dubbien il-kbar Maltese, Corbett 1996
   that.PL DEF-flies.COLL  DEF-large.PL
   those large flies
f. % Don’t stand between us and these herd of murderers.
g. Vi ste bili dobra/dobry. Slovenian, Corbett 1983:49
   you.PL were.2PL been.PL kind.FSG/PL
   You (female) were kind.

What I haven’t seen (see also the Agreement Hierarchy of Corbett 1983 et seq.):

- a morpho-syntactically plural noun and a singular adjective/determiner
- a singular adjective and a plural determiner (parallel cases exist for gender)
- a singular auxiliary/participle and a plural adjective (cf. Corbett 1983)
- associative plural marked below its semantic location

And we haven’t touched optionality yet

4. TAKE-HOME MESSAGE (NO CONCLUSIONS)

Number is not located in one place, syntactically, semantically or morphologically:

- pragmatic (discourse) plurals: comitative, collective, honorific, abundance
- semantic plurals: additive, associative, conjunctive
- syntactic plurals: phrasal affixes, plural words, features
- morphological plurals: (un)marked pluralia and dualia tantum

Overt plural marking can be conditioned by prominence hierarchies and the conditions can be not the same even within one language

Many questions to ask:

- how to account for Corbett’s Agreement Hierarchy, especially for predicates?
- how to encode dual as a combination of presuppositional features?
- how to encode the interpretable number feature on cardinals (which generally have the morphosyntax of singular nouns)?
- is number located on a particular head or is it a property of phrases?

5. APPENDICES

5.1. Dual marking

Everything I said about plural morphology also applies to dual morphology

It can go on top of the associative plural morpheme without adding a participant:

(30) a. cuna-nku-t ayag-tu-t. Central Alaskan Yup’ik, Corbett and Mithun 1996
   Chuna-APL-PL go-IND-3PL
   Chuna and his family/friends left.

    b. cuna-nku-k ayag-tu-k.
       Chuna-APL-DU go-IND-3DU
       Chuna and his family/friends left.

In Kharia (South Munda, eastern-central India) it is optional and can signal associative plural formation without an overt associative plural morpheme:

   this old.man-DU-OBL-CNTR madness grab-PERF
   My parents have gone mad (lit. Madness has grabbed the old man and his wife).

    b. etwa-kiyar boriya-ga burcha bürhi modi jhan-te sewa karay-oʔ-kiyar.
       Etwa-DU both-FOC old.man old.woman Modi class-OBL service do-ACT.PST-DU
       Etwa and his wife, both of them, the old man and the old woman, helped Modi and his family.
c. u sembo ro ḏakay rani-kiyar  
   this Sembho and Dakay queen-DU  
   *this Sembho and queen Dakay*

And in Yapese it is marked only on the verb, as a dual:

(32) Kea guyrow Tamag.  
   PERF.3SG see.DU Tamag

i. Tamag saw the two of them.
ii. He saw Tamag and someone else.

5.2. **Pluralia & dualia tantum common nouns**

Wierzbicka 1996: pluralia tantum nouns can be divided into three groups **semantically:**

(33) a. mass nouns (oats, bonkers, measles, etc.)  
    b. naturally bipartite nouns (glasses, pajamas, skis, etc.)  
    c. aggregates (bathroom scales, checkers, blinds, etc.)  

Problem: when dualia tantum are distinguished, the choice can be unexpected:

(34) a. šam-ayim ‘sky.DU’, m-ayim ‘water.DU’  

There is no one-to-one mapping

The dual morphology does not always imply bipartite structure (for mass nouns, for sure) and bipartite structure does not entail dual or even plural morphology (cf. ‘ofan-ayim ‘bicycle.DU’ vs. ‘ofno’a ‘motorcycle.SG’ in Hebrew)

(35) cross-linguistic pluralia tantum matches and mismatches


b. Hebrew miškefet and Russian binokl ‘binoculars’, French rubéole and Russian krasnuxa ‘measles’

The status of the plural (dual) marker in pluralia tantum nouns is subject to debate. While the consensus seems to be that it is not interpretable, it is, as with gender, clearly not random.

5.3. **More on Sakha associative plural**

Associative plurals in Sakha can also be formed in two more ways

For singular bare nouns: with a **comitative** (a postposition or a case-marker, phonologically integrated into the preceding word):

   Sardaana-APL Keskil come-PAST-PL/*come-PAST  
   *Sardaana and Keskil came.*

b. Sardaana-laax kel-li-let/*kel-le.  
   Sardaana-APL come-PAST-PL/*come-PAST  
   Sardaana and [her folks/another person(s)] came.

Vinokurova 2005:139: the morpheme -laax- decomposes into the universal verbalizer -laa- plus the nominalizer/adjectivizer -x-; the morpheme -aax- is derived from it. I sort of doubt this.
Ebata 2014 (and the Russian tradition in general) analyzes it as the proprietive suffix:

(37) a. massyyna-laax kihi
car-COM person
a person with a car

b. küüs-teex kihi
strength-COM person
a strong person

c. En massyyna-laax-xyn.
you car-COM-2SG
You have a car.

By the **regular plural suffix**:

(38) Ajaal Tobuukap-tar
Ajaal Tobuukap-PL
i. several persons named Ajaal Tobuukap
ii. Ajaal Tobuukap and his folks/another person(s)

I have no idea how all these forms are different

6. **REFERENCES**


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