

“Some Thoughts on *One* and *Two* and Other Numerals”*

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1. Introduction.

The term ‘numeral’ is a familiar one. It gives the impression that *one*, *two*, *three*..., etc. form a homogeneous class of elements. In this paper, I will try to show that numerals do not form a homogeneous class, and that there are three major subclasses. Numeral *one* is the only member of its subclass. Numeral *one* is associated with a classifier, and is necessarily accompanied by (a possibly silent counterpart of) *single* or *only*. With *two*, *three* and *four*, coordinate structures are involved. From *five* on up, a silent counterpart of *set* is necessarily present.

2. Only one *one* (anti-homophony).

In many languages, what we think of as numeral *one* has the same form as the indefinite article (e.g. French *un*). In English, though, what we think of as numeral *one* is distinct in form from the indefinite article *a(n)*. To apparently complicate things further, English prenominal *one* is itself not always numeral-like, as we can see from:

- (1) John has written only one paper this year.
- (2) Mary has just written one hell of a paper.

The numeral interpretation perceived in (1) is absent in (2). Other examples of a similarly non-numeral prenominal *one* are found in:

- (3) There’s one John Smithfield here to see you.
- (4) One day, he’ll realize that we were right.
- (5) At one time, they were friends.

Perlmutter (1970) took prenominal *one* to be the same element in both (1) and (2). In support of Perlmutter’s unified approach to these two instances of *one* is the fact that all of (1)-(5) are equally incompatible with plural nouns:

- (6) *He’s written only one papers this year.
- (7) *She’s just written one hell of papers.
- (8) *There’s one John Smithfields here to see you.
- (9) *One days, he’ll realize that we were right.
- (10) *At one times, they were friends.

The fact that *one* is the same element in (1) as in (2)-(5) can itself be taken to follow from a general principle that bars homophones. The formulation given in Kayne (to appear), originating in a discussion of English *there*, was (for languages with an English-type orthography):¹

- (11) If X and Y are functional elements and are homophones, then X and Y cannot have the same spelling.

¹I am grateful to Thomas Leu for insightful discussion bearing on this question.

The appeal to orthography in (11) should be interpreted as a stand-in for an appropriate notion of abstract phonology.² For example, (11) allows English to have, as accidental homophones, *to* and *two*, which differ orthographically, but also almost certainly differ phonologically, given the *-w-* in *two*, whose phonological presence is supported by its being pronounced in *twelve*, *twenty* and *twin*.³

It should be further noted that (11) leads to the conclusion that prenominal *one*, in addition to being one and the same element in all of (1)-(5), must be the same element as the *one* of both of the following:

(12) a blue one

(13) blue ones

The *one* of (1)-(5) and the *one* of (12)-(13) cannot be accidental homophones.⁴

3. *One* is a determiner.

The *one* of (1)-(5) looks like a determiner of some sort. And Perlmutter (1970) and Barbiers (2005; 2007) did take there to be a close relation between prenominal *one* and the indefinite article. Perlmutter (p. 234) more specifically took English to have, as a source for the indefinite article, “a rule which obligatorily converts unstressed proclitic *one* to *an*”.⁵

Perlmutter’s formulation/rule was not immediately able, as he himself noted, to account for generic-like *a/an*, given the absence of a comparable generic prenominal *one* that would be its source:⁶

(14) A spider has eight legs and many eyes.

(15) One spider has eight legs and many eyes.

The generic-like reading of (14) does not carry over in any exact way to (15).

The rule that Perlmutter suggested was meant to treat pairs like:

²Cf. Chomsky and Halle (1968, 69, 184n).

³In addition, the non-pronunciation of the *w* in *two* is arguably a consequence of English never allowing word initial /*twu...*/ (and similarly for other stop consonants).

The coexistence of *to* and *too* might be linked to their different spelling; alternatively the difference in spelling does not reflect any abstract phonological difference in this case and they are in fact the same element, as may be suggested by a link between *too* and (*in addition*) *to* (cf. German *dazu* ‘there-to’).

⁴For evidence supporting this conclusion, see Kayne (to appear).

⁵Left open by this reference to stress is the fact that English sometimes allows a stressed indefinite article, as in:

i) I can’t give you the book (you want), but I can give you a book.

in which *a* rhymes with *say*. This stressed *a* does not license NP-ellipsis:

ii) *...but I can give you a.

suggesting that Borer’s (2005, 111n) primarily phonological account of the impossibility of (ii) with unstressed *a* is not general enough.

⁶I am setting aside the reading in which *one spider* can correspond to *one type of spider*, arguably as ‘one TYPE OF spider’.

Perlmutter suggests that generic *a/an* might perhaps derive from *any one*, but note:

i) Any/*A spider whatsoever would be able to eat that insect.

ii) Hardly any/*a spider would eat that insect

iii) Not just any/*a spider could have done that.

(16) That was a hell of a paper.

(17) That was one hell of a paper.

as involving, respectively, an unstressed and a (somewhat) stressed variant of the same element *a/one*, with the same interpretation. As just noted, the kind of pairing that holds for (16) and (17) does not hold for (14) and (15). In part similarly, the intended pairing breaks down for:

(18) too long a book

which has no counterpart with *one*:⁷

(19) *too long one book

A third such problem for Perlmutter's conversion rule lies in:

(20) a few books

(21) *one few books

where, again, the indefinite article has no *one* counterpart to serve as a plausible source.

A fourth problem for the pairing of *a* and *one* can be seen in:

(22) They're selling one-drawer desks in the back of the store.

(23) *They're selling a-drawer desks in the back of the store.

in which, this time, prenominal *one* is possible, but cannot be replaced by *a/an*.

Despite these several discrepancies between *one* and *a/an*, I will, in partial agreement with both Perlmutter and Barbiers, take there to be a significant relation between *a/an* and *one*, to be broached in the next section.

4. *One* is a determiner associated with a classifier

Let me try to execute the idea that *a/an* is a reduced form of *one* in a different way from Perlmutter (and Barbiers). Let me start from the generic-like (14) and in particular from the fact that the contrast between (14) and (15) is reminiscent of a fact from Chinese. According to Cheng and Sybesma (1999, 533-534; 2012, 640), a singular classifier in Chinese cannot occur within a generic DP (whether or not *yi* ('a/an/one') is present).⁸

This leads me to think that *one* cannot occur in (15) with the generic-like reading of (14) for the same reason that singular classifiers are excluded from Chinese generic DPs. This leads in turn to the following proposal:

(24) An English DP with *one* contains a singular classifier.

(Conversely, an English DP with *a/an* can (perhaps must) lack a classifier.)

The idea that *one* is always associated with a singular classifier has something in common with Perlmutter's idea that *a/an* is a phonologically 'reduced form' of *one*, though by reinterpreting the notion of 'reduction' as the more specific notion of the absence of a classifier, we are able to formulate an account of (14) vs. (15) that Perlmutter's less specific proposal was unable to do. More specifically put, the phrase *one spider* in (15) must, by (24), be associated with a singular classifier. But, judging from Chinese, singular classifiers are

⁷Possibly related to this is:

i) a half a day

ii) *a half one day

On (i), see Wood (2002).

⁸Cf. Simpson et al. (2011, 188) on Vietnamese; also Simpson and Biswas (2015, 7) on Bangla.

incompatible with generic readings. Therefore, (15) cannot be a generic type of sentence in the way that (14) can be.

5. Back to *one* and its classifier.

In Cardinaletti and Starke's (1999) terms, we might try to relate the fact that *one* is associated with extra syntactic material (the singular classifier) to the fact that *one* is morphophonologically 'bigger' than *a/an*. We could do this as follows. *One* is to be understood as bimorphemic and in particular as 'wλ + n', where wλ- is the classifier and -n an indefinite article.⁹ The necessary pronunciation of the *n* of *one* even before a consonant, as opposed to the necessary dropping of the *n* of *an* before a consonant, might just be phonology. Or it might also be related to syntax, especially if the order 'classifier - indefinite article' ('wλ + n')¹⁰ is produced by leftward movement from a structure in which the indefinite article precedes the classifier.¹¹

From this perspective, the additional contrasts (beyond the generic one) mentioned earlier between *one* and *a/an* look as follows. The contrast in:

- (25)a. We have a few days left.
- b. *We have one few days left

could be attributed to a clash between the classifier wλ- that is part of *one* and the silent noun NUMBER (capitalization will indicate silence) that accompanies *few*.¹² That NUMBER is important here is supported by the existence of similar effects with overt *number*, as seen in:

- (26)a. We have (only) a small number of days left.
- b. *We have (only) one small number of days left.

as well as in:

- (27)a. Mary has written (quite) a number of papers this year.¹³
- b. *Mary has written (quite) one number of papers this year.

In all of (25)-(27), *number*/NUMBER is not allowed to cooccur with the classifier associated with *one*. In the variants of (25)-(27) with *a*, there is no comparable classifier, just the indefinite article, and so no clash.¹⁴

As for:

- (28) too long (of) a book
- (29) *too long (of) one book

it may be that the classifier in question blocks the preposing of the degree phrase.

⁹Consideration of ?*a whole nother N* might support taking -*n* itself to be an indefinite article, as suggested to me a while back by Thomas Leu (p.c.), with subsequent question about the status of *a*.

An alternative that I will not pursue here would be to take *one* to be monomorphemic and to cooccur with a silent classifier.

¹⁰Cf. Ghosh (2001, chap.3) on some Tibeto-Burman having 'CLF Numeral Noun' order.

¹¹Cf. Leu (2015, 116) on German *ein* being moved across.

¹² Cf. Kayne (2002; 2005a); sometimes *few* can be accompanied by overt *number*, as in:

- i) Of all the students, it's John who's written the fewest number of papers this year.

¹³In a rather different interpretation, one can to some extent have:

- i) ?Mary has written one number of papers, John another.

¹⁴The clash in question may in turn be related to the classifier-like status of *number*/NUMBER itself in these sentences - cf. Liao (2015).

Finally, the reverse type of restriction seen in:

(30) They're selling one-drawer desks in the back of the store.

(31) *They're selling a-drawer desks in the back of the store.

may be linked to:

(32) They're real Brooklyn-lovers.

(33) They're real (*the) Bronx-lovers.

via a prohibition against bare articles appearing within compound-like structures, with *one*'s classifier protecting it, in a way that remains to be spelled out, from this prohibition.¹⁵

In conclusion, then, *one*, always the same element, is associated with a (singular) classifier in all of its occurrences.

6. Numeral *one*

By (11), what we think of as numeral *one* must, since it is spelled the same and has the same (abstract) phonology, be the same element as the non-numeral prenominal *one* of (2)-(5) and the same element as the non-prenominal *one* of (12)-(13). Examples of numeral *one* are:

(34) John has written three papers. Two are on phonology and one is on syntax.

(35) There are three books on the table. Only one is worth reading.

In allowing its associated noun to remain silent, as in (34) and (35), numeral *one* behaves like other numerals. This may at first seem unsurprising, but Barbiers (2007) has emphasized that *one* is quite different from other numerals in some ways, in particular in not lending itself (in a great many languages) to regular ordinal formation:

(36) The first/*oneth chapter is the most interesting.

Similarly, in many Romance languages *one* is the only numeral that shows agreement in gender. In addition, in French complex numerals that are multiples of 100 (or 1000), *one* is the only numeral that cannot appear, as seen, for example, in:

(37) deux cents ('two hundred'), trois cents ('three hundred')...

(38) cent

(39) *un cent ('one hundred')¹⁶

French also displays a striking asymmetry between *one* and other numerals in that in the additive compound numerals 21, 31, 41, 51, 61, 71, an overt coordinating element *et* ('and') is necessary, e.g.:

(40) vingt-et-un livres ('twenty-and-one books')

whereas with 22, 23,...32, 33... no coordinating element appears, e.g.:¹⁷

¹⁵Why *one* acts differently here from demonstratives remains to be understood. Relevant to the formulation of the prohibition in question is:

i) two (beautiful) (*the) seventh inning home runs

vs.

ii) ?two (beautiful) top of the seventh inning home runs.

¹⁶With 1000, French has:

i) (*un) mille linguistes ('a thousand linguists')

Possible, with a complex numeral containing *one* as a subpart, is:

ii) trente-et-un mille linguistes ('thirty and one thousand linguists')

¹⁷Though there may be a silent *et* present, to judge by the obligatory pronunciation of the final consonant of *vingt* in 22, 23...

(41) vingt-deux livres ('twenty-two books')

7. The analysis of numeral *one*

It may appear paradoxical that numeral *one* should be the same element as the non-numeral *one* of (2)-(5), repeated here as (42)-(45), insofar as numeral *one* and non-numeral *one* are felt to be distinct:

(42) Mary has just written one hell of a paper.

(43) There's one John Smithfield here to see you.

(44) One day, he'll realize that we were right.

(45) At one time, they were friends.

A proposal that comes to mind that dissolves this paradox is that sentences with numeral *one* such as:

(46) John has two brothers and one sister.

have the analysis:

(47) ...and one SINGLE sister.

with a silent adjective corresponding to *single*.¹⁸ Whereas examples (42)-(45) do not contain SINGLE.

The term 'numeral *one*' picks out those instances of *one* that occur in a syntactic context whose overall interpretation lends itself to contrast with other numerals. If (47) is correct, then that context will necessarily include an adjective like *single*/SINGLE. In some cases, *only* is very natural:

(48) John has two brothers but only one sister.

Silent ONLY might be present in other cases. Whatever the correct details, it seems extremely likely that the language faculty consistently treats numeral 1 as not being a primitive, and that something like (47) will hold for numeral 1 in all languages.

One is in fact in all its guises a complex determiner. It is always associated with a singular classifier. As a numeral, it is in addition accompanied by SINGLE or *single* (and/or by ONLY or *only*).

8. A note on ordinals

The idea that numeral *one* is to be understood as in (47) is in partial agreement with Barbiers's (2005; 2007) claim that *one* is very different from *two* and numerals higher than *two*. He took numeral *one* to be a stressed, focussed version of the indefinite article.¹⁹ The present proposal doesn't rely directly on the notion of 'focus', using instead the presence of SINGLE.²⁰

¹⁸There is a point of similarity here with Borer's (2005, 196) proposal that Hebrew *'exád* ('one') is an adjective interpreted as 'single'.

In some cases, *one* is natural with a following overt *single*:

(i) You haven't written one single paper this year.

¹⁹As mentioned in an earlier footnote, this view of *one* faces a challenge dealing with stressed *a*, as in:

i) We don't need some chocolates, we need a chocolate.

with *a* pronounced to rhyme with *say*.

²⁰Presumably, the numerals from *two* on up (perhaps apart from complex numerals having 1 as a subpart) do not (necessarily) involve SINGLE.

As mentioned earlier, Barbiers emphasized the relative systematicity of the cross-linguistic absence of a regularly formed ordinal based on *one*:

(49) Mary was the first/*oneth linguist to have proposed that.

From the present perspective, the impossibility of **oneth* must reflect the inability of ordinal *-th* to combine with 'one SINGLE' (and similarly for other languages), as suggested by:

(50) *the (one) single-th linguist

Why ordinal *-th* differs in this way from the suffixal *-ce* of *once*,²¹ which can combine with numeral *one*, as in:

(51) We've been there only once.

remains to be elucidated.

9 *Two*: Introduction and proposal

If what we think of as numeral *one* is complex in the way outlined above and is not a syntactic (or a semantic) primitive, what about *two* (and *three* and *four* and *five*)?

In some varieties of English, *two* is paralleled by *both*, in cases like:

(52) the two of us

(53) the both of us

Although not as ordinary as (52), (53) seems to be fairly common. Quite a bit less common than (53), though attested, is:

(54) the both boys

in what appears to be the sense of:

(55) the two boys

The point of bringing in *both* here is that *both* also occurs in English with coordination:

(56) both this book and that book

A comparable use of *two* is not possible:

(57) *two this book and that book

Consider, however, the following proposal. Although impossible in (57), *two* can occur in coordinate structures in a way that partially tracks *both*, but only with coordinated bare indefinites, as in:

(58) *two book and book

which is itself ill-formed, but becomes, in this proposal, well-formed if part of the coordinate structure is silent:²²

(59) two book AND BOOK

Now (59) gives the impression that English should allow *two book* rather than *two books*. In fact, English allows both types, depending on the syntactic environment:

(60) This file cabinet has two drawers.

(61) This is a two-drawer file cabinet.

In addition some speakers (myself not included) allow:

²¹On *once*, see Kayne (2014).

²²Or perhaps 'two BOOK AND book'; in addition, classifiers will need to be integrated, as will the appearance of the preposition *de* in French in dislocation examples like (cf. Kayne (1975, sect. 2.7):

i) Elle en a trois, de frères. ('she thereof has three, of brothers')

Something like this *de* appears in Moroccan Arabic even without dislocation - cf. Harrell (1962, 206); see also the discussion of Romanian in Kayne (2006).

(62) You owe us two pound.

The proposal indicated in (59) should be interpreted as saying that (59) represents the only way in which *two* can combine with a noun. What we think of as simple phrases like *two book(s)* are actually instances of (minimal) coordination.

10 *Three and four*

There is no word in English that is to *three* as *both* is to *two*:

(63) both books; both Mary and John

(64) *t(h)roth books; *t(h)roth Mary and John and Susan

Therefore, the preceding discussion of *two* cannot be transposed mechanically to *three*. Let me instead try to get at *three* using *both* itself, in combination with *either*, which in some cases is, like *both*, clearly linked to *two*:²³

(65) either of those two/*three books

Let me begin by constructing a three-argument coordinate counterpart to (56), using *both* and *either*:

(66) We should hire either Mary or both John and Bill.

This example is reasonably acceptable, and suggests the following picture for *three (books)*, modeled on (59) (and abstracting away from constituent structure):²⁴

(67) three book AND BOOK AND BOOK

Let me assume now that the well-formedness of (67) tracks the acceptability of (66) (even though (67) does not contain an overt *both* or an overt *either*), at least to the extent that the well-formedness of (67), and hence of *three book(s)*, depends on (66) not being strongly unacceptable.

In the spirit of (67), *four book(s)* can be thought of as:

(68) four book AND BOOK AND BOOK AND BOOK

whose well-formedness will depend on the (partial) acceptability of:²⁵

(69) ??We should hire both Jim and either Mary or both John and Bill.

Similarly, *five book(s)* would potentially be:

(70) five book AND BOOK AND BOOK AND BOOK AND BOOK

with the well-formedness of (70) depending, however, on whether or not the following is acceptable at all:

(71) *We should hire either Ann or both Jim and either Mary or both John and Bill.

It seems to me that there is a sharp dropoff in acceptability from (69) to (71).²⁶ I conclude,

²³As are suffixes indicating dual number, which at least in some languages seem clearly to be related to numeral 'two' itself - cf. Harlow (2006, 111) on Maori and Pearce (2015, 24) on Unua.

²⁴Following Kayne (1981; 1994), I take coordination to be built solely on binary branching structures.

²⁵Gertjan Postma (p.c.) notes that the following is more acceptable than the text example:

i) We should hire either both John & Bill or both Mary and Sue.

²⁶The deviance of the latter might perhaps, depending on its exact constituent structure, be linked to Chomsky and Miller's (1963) discussion of center embedding. For relevant discussion of the constituent structure of coordination, see den Dikken (2006). For a possible alternative to Chomsky and Miller (1963), see Kayne (2000a, chap. 15, Part III).

Sentences like *We should invite either J or M or S or A or P or...* may involve sentential, rather than DP, coordination.

needless to say, not that *five book(s)* is impossible, but rather that *five book(s)* does not and cannot have a coordinate-like derivation of the sort that is arguably available to *two book(s)*, *three book(s)* and (to some extent) *four book(s)*.

If so, then the smooth generation of the set of natural numbers via Merge that was suggested by Chomsky (2008) (and Watanabe (2016)) is not appropriate for the language faculty, at least not for the case in which numerals are associated with nouns or noun phrases. (Conceivably, the language faculty might have a distinct counting mechanism, though that would depend on the non-obvious assumption that in counting there is no silent noun or noun phrase present.)

11 *Five* and up

One might wonder if smooth generation via Merge could hold for *five* and above even if not appropriate for the entire set of numerals. Let me address this question by jumping to *ten* and to the notion of numerical base.

Surely one of the most striking things about numerals in languages like English is how few there are that are monomorphemic. If the first part of this paper is on the right track, then *one* may well not be monomorphemic. *Two* may not be, either, if *tw-* is one morpheme (as seems virtually certain, given *twelve*, *twenty*, *twin*) and if *-o* is another. That leaves the numerals from *four* to *ten* as very likely to be monomorphemic,²⁷ plus *hundred* and *thousand*. (*Twelve* is almost certainly not, given *tw-*; *eleven* is less clear, but the *-el(e)v-* that it shares with *twelve* suggests that it, too, may not be monomorphemic.) (*Million*, *billion*, *trillion* and the imprecise *zillion* suggest factoring out *-illion*, in which case none of them are monomorphemic, either.)

There are, then, approximately ten monomorphemic numerals. Why are there so few? A partial answer is that English has, starting at least with 13, composite numerals such as 423, based on addition and multiplication and powers of 10, instead of having a larger number of monomorphemic numerals. But why does English (and similarly for many other languages) have recourse to such composite numerals so soon? Why does it not wait until 100, say? Part of the answer to this question must be related to the discussion above, to the effect that the coordinate strategy is available only as far as (*three* or) *four*.

Another part has to do, I think, with the question of the linguistic instantiation of the notion 'numerical base'. In earlier work,²⁸ I suggested that in a language in which the base is 10 (and similarly for languages with a different base), any multiple or power of 10 must have 10 (or that power of 10) accompanied by a silent counterpart of the noun *set* (silence will again be indicated by capitalization). Thus 306 is:

(72) three hundred SET and six

to be understood as 'three hundred-sets and six' or as:

(73) three sets of a hundred, plus six

In, say, 76, we have:

(74) seven ty SET AND six

in which *ty* is a form of 10 and *and* is silent, in addition to *set* being silent. (74), that is, 76, is then to be understood as:

²⁷Guglielmo Cinque points out (p.c.) that the bimorphemic character of *three* may be supported by *thrice*, *thirteen*, *thirty*, all of which lack the *-ee* of *three*.

²⁸Cf. Kayne (2006).

(75) seven sets of ten, plus six

When there is no 'and'-component to the numeral, we have, say for 70:

(76) seven ty SET

understood as:

(77) seven sets of ten

and we call these 'round numbers'.²⁹

12 Semi-round numbers

Let me now jump to the hypothesis that there is a linguistically significant notion of semi-round number, based on half the numerical base. The semi-round numbers in English and in other languages with base 10 are, then:

(78) 5, 15, 25...

That semi-round numbers have a special status is supported by facts from French, which has a robust use of approximative expressions that correspond to some extent to English *hundreds of books*, which French readily allows in the singular.³⁰

(79) *une centaine de livres* ('a 100-aine of books' = 'a hundred or so books')

(80) *une soixantaine de livres* ('a 60-aine of books' = 'sixty or so books')

The French numerals from 11 through 16 are arguably additive:

(81) *onze, douze, treize, quatorze, quinze, seize*

with 10 expressed by the suffix *-ze*. If we abstract away from the special case of 12 (*douze*, special in English, too, given *dozen*), we can note a clear difference between semi-round 15 and its neighbors:

(82) *une quinzaine* ('a 15-aine')

(83) **une treizaine, *une quatorzaine, *une seizaine*

With 15, the *-aine* form is straightforwardly acceptable as an approximative, as opposed to 13, 14 and 16.

Semi-round numbers thus have a special status. In languages with 10 as a numerical base, 5 and odd multiples of 5 (as in (78)) will have this special status. Let me now generalize the relevance of silent SET discussed above, as follows.³¹

(84) All round and semi-round numbers (and only those) are associated with silent SET.

This formulation is intended to cover 10 and 5 themselves, as well as higher multiples of 10 and 5.

If (84) is correct, then we find ourselves with an abrupt transition between 4 and 5. The numeral 4 has an analysis involving coordination, along the lines of (68). The numeral 5 does

²⁹In English, this term extends to additive numerals whose last part is 'round', e.g. 350.

³⁰Though additive numerals in which the larger component comes first (e.g. in English *thirty-one* vs. *thirteen*) are subject to a restriction in French (brought to my attention by Michal Starke (p.c.)) that prohibits adding *-aine* to them (with the exact range of cases varying depending on the speaker):

(i) **une centdizaine de livres* ('a 110-aine of books')

(ii) **une vingtcinquaine de livres* ('a 25-aine of books')

³¹Silent SET is to be kept distinct from the silent NUMBER discussed in section 5 above. For discussion relevant to whether NUMBER cooccurs with (some) numerals, see Zweig (2006).

not have an analysis involving coordination. 5 is rather '5 SET'. (And 4 is not '*4 SET', since 4 is not round or semi-round.)

13 Semi-round vs. unround

In a language with numerical base 10, there will thus be a semi-round vs. unround distinction between 5 (semi-round) and 4 (unround). This brings to mind the well-known morphological case distinction found in Russian between 2,3,4 on the one hand, and 5,6,7... on the other.³² With 5 and above,³³ the associated noun shows genitive plural, whereas with 2, 3 and 4, there is different case morphology, often called genitive singular. From the present perspective, we can say as a first approximation that Russian has genitive plural if the numeral is associated with SET.

Many French speakers make a similar cut with *tous* ('all'), in cases like the following (as already noted by Grevisse and Goosse (2011, §660bis)):³⁴

(85) *Tous deux/trois/quatre/*cinq ont réussi.* ('all 2/3/4/*5 have succeeded')

For such speakers *tous* plus numeral is possible only in the absence of SET. (English readily allows *all five/seventeen of us*, in a way possibly related to *all five/seventeen books* vs. French **tous trois livres* ('all three books').)

English has something similar in:

(86) twosome, threesome, foursome, *fivesome

with 'numeral + *-some*' possible again only in the absence of SET. For many speakers, there is also the fact that the series:

(87) bilingual, trilingual, quadrilingual

stops with 4. In addition, the denominator of fractions has an irregular form (without *-th*) only with 2,3,4:

(88) one half, one third, one quarter

14 Cutoffs near 4 vs. 5

On the other hand, there are French speakers who make the cutoff in (85) between 3 and 4, i.e. who accept *tous trois* but not *tous quatre*. This recalls English:

(89) once, twice, thrice, *fice

A cutoff between 3 and 4 (in a language with base 10) cannot be due solely to the presence vs. absence of SET, but must presumably involve some further sensitivity to complexity-like distinctions of the sort illustrated by the full acceptability of (66) vs. the lesser acceptability of (69). The same holds for cutoffs between 2 and 3, as in colloquial English having only *once* and *twice*, but not *thrice*,³⁵ and similarly for:

(90) half the books; *third the books

as well as for the earlier mentioned:

³²For recent relevant discussion, see Pesetsky (2013).

³³6 will now be '5 SET AND ONE', with questions arising as to how the pieces are spelled out, and similarly for 7, 8, 9.

³⁴Cf. Postma (2015) on Dutch.

³⁵Though there is a clear difference between:

i) ?a thrice-held conference

and:

ii) *a conference that has been held thrice

(91) both books; *t(h)roth books

15 Languages with few numerals

Distinctions of the sort seen in (85)-(91), as well as the Russian one alluded to briefly, recall the fact that some languages, such as Mundurucu,³⁶ have few numerals. From the present perspective, such languages (for reasons that remain to be elucidated) lack numerals based on silent SET, and lack a corresponding numerical base, though they appear to have numerals based on the coordination-related syntax seen earlier with 2,3,4.³⁷

16 Other species

Hauser, Chomsky & Fitch (2002, 1577) mention the existence of a precise number sense in non-human animals that is limited to 1,2,3,4. This limitation recalls the distinctions discussed above, both for languages like Mundurucu and within English-type languages, between low numerals and the higher ones starting with 5. This point of similarity between non-human animals and human language suggests in turn that some non-human animals may have coordination-like derivations of low numerals, of the sort alluded to in the discussion of (56)-(71). If so, then those non-human animals must have access to Merge.

The fact that non-human animals seem to lack other aspects of human language might then be attributed to their lacking verbs and other categories that take arguments. They could still have (simple) nouns as objects of coordination, if Kayne (2008) is correct to take nouns never to have arguments of any sort.³⁸

17 Conclusion

Phrases of the form 'numeral + noun' never involve direct merger of numeral and noun. In every case, derivations are more complex than that. With *one*, there is, in addition to a classifier, the necessary presence of *single/only*, whether pronounced or silent. With 2-4, coordinate structures are involved. With 5 on up, silent SET is necessarily present (in addition to whatever structure is required to express addition and multiplication and powers of the numerical base).

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³⁶Cf. Pica et al. (2004). On the question whether Mundurucu has number words that are exact, see Izard, Pica, Spelke and Dehaene (2008) and Pica and Lecomte (2008).

³⁷Pica and Lecomte (2008) emphasize the relevance of coordination (and reduplication) for Mundurucu numeral expressions.

³⁸It would suffice for this point if some nouns lacked arguments. In addition, the status of *and* itself needs to be clarified.

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