A Note on *Zero* and Silent Negation

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1.

Déprez (1997) called attention to instances in French of *zero* (*zéro* in French) found in non-mathematical contexts. An example in English would be:

(1) You showed zero interest in what we were saying.

Déprez notes that such sentences are often judged to be somewhat unnatural in French. The same may well hold of English and Italian, though (1) itself seems quite acceptable, especially with stress on *zero*.[1] (There are many cases of sharp differential judgments in acceptability that Déprez cites for French; the same holds for English and Italian.)

Of particular interest is Déprez's (1997, 124) observation that French *zéro* can at least marginally license NPIs, as in:

(2) Aujourd'hui tout va mal. Zéro de nos clients ont fait quoique ce soit de positif.
'today everything goes badly. zero of our clients have done what-that it is of positive' =
'...have done anything positive'

in which *quoique ce soit* is an NPI fairly comparable to *anything*. Similar licensing in English and Italian is possible to a significant extent:

(3) I have zero interest in doing anything right now.

(4) Ho zero voglia di fare alcunché.
'I-have zero desire to do anything'

[1] It may be that *zero* is in general emphatic, and in general best with strong stress.

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Déprez's claim about *zéro* and NPIs in French has in effect been contested, for English, by Bylinina and Nouwen (2018), even for weak NPIs. Although they may be correct for the case of strong NPIs,[2] English *zero* does seem capable of licensing weak NPIs, as seen in (3). Bylinina and Nouwen cite, from Gajewski (2011, 139), the following example:

(5) ?Zero students said anything.

Although (5) deserves its '?', tweaking it a bit leads to the more acceptable:

(6) Zero students have ever said anything like that.

Bylinina and Nouwen also cite Zeijlstra (2007), who gives:

(7) *Zero students bought any car.

But again, a bit of tweaking improves things:

(8) ?Zero students have attended any of my lectures this year.

We conclude that NPI-licensing by *zero* is possible to a non-negligeable extent. The question is how best to account for it.

2.

Our proposal in this paper will differ in part from Déprez's proposal, which took *zéro* to itself be the licenser of the NPI in (2). We will instead pursue the idea that NPI- licensing is in all languages invariably due to the presence of a negative morpheme, which in (2)-(8) is (a counterpart of) silent NOT (using capitals to indicate silence).[3] Thus in (3), for example, we

[2] Though they themselves grant that occasional examples are found, e.g. the following (pointed out by Daniel Lassiter):

(i) Yes, you heard us right, zero payments until July 2016! (with heavy stress on *zero*)

[3] If the *n-* of *not* is a separate morpheme, then it (or its silent N- counterpart) will presumably be the licenser. On *not* as *n+o+t*, see Leu (2012; 2017).

have the following:[4]

(9) I have NOT zero interest in doing anything...

Déprez (1997, 124) notes further that *zéro* appears to act like negation with respect to an 'inner island' effect discussed by Rizzi (1990):

(10) *Combien zéro clients ont-ils acheté de livres aujourd'hui?
'how-many zero clients have they bought of books today'

Subextraction of *combien* ('how many') from within the phrase *combien de livres* cannot in this kind of sentence cross a negative subject *zéro clients*.

From the perspective of (9), this blocking effect will be due to the presence of NOT, as in:[5]

(11) *Combien NOT zero clients...de livres...

Déprez (2001, note 25) points out that to some extent *zéro* can even cooccur with negative *ne,* in a way that ordinary numerals cannot:

(12) ?Zéro francs n'ont / n'a été dépensé pour cette cause. ('zero francs neg have/has been spent for this cause')
(13) **Mille francs n'ont été dépensés pour cette cause. ('thousand francs...')

From the perspective of (9), the presence of *ne* in (12) is (marginally) licensed by the presence of NOT:

[4] We note in passing that (9) is compatible with the analysis developed in Collins and Postal (2014) to the effect that in NPI sentences like (3) *not* (and now, if we're right, NOT) starts out lower down, within a phrase of the form '[not anything]'.
[5] Having 'NOT zero' as part of a subject phrase is to be compared to what we find in:

(i) Not everybody likes chemistry.
(ii) Not many people liked that movie.

(14) NOT zéro francs ne...

Further on in that same footnote, Déprez, citing Rizzi (p.c.), raises the question of whether or not *zero* in English can induce inversion of the sort seen in:

(15) No interest have you shown in any of our work.

Contrary to the judgment given there, the English-speaking coauthor of this paper finds relatively little difference between this example and the following (especially if, as earlier, *zero* is stressed):[6]

(16) Zero interest have you shown in any of our work.

The (relative) acceptability of (16) will now be understood as dependent on NOT, as in:[7]

(17) NOT zero interest have you...

3.

The question now arises as to the status of *zero* itself, in the context of NOT. We might take it to be a (rather special) subtype of numeral. Or it might be closer to *some, any, several, a few,* or *a number of.* Both options would seem to be compatible with *zero* requiring a plural noun:

(18) Unbelievably enough, zero students/*zero student came to that talk.

[6] Cf. the fact that one of the coauthors of Collins and Postal (2014, 137-8) accepts the following(internet) examples:

(i) ...and zero times have they...
(ii) But on zero occasions have I...

[7] Having 'NOT zero' as part of the preposed object is to be compared to:

(i) Not a single paper have you written this year.

Evidence that *zero* is not exactly numeral-like can be found, however. First, there is the fact that in Italian there are verbs with the suffix *-plic(are)* (arguably related to Latin *plico* in the sense of "fold") added to (Latin-like) numerals (2, 3, 4, 5, 10, 100), as in:

(19) duplicare, triplicare, quadruplicare, quintuplicare, decuplicare, centuplicare

in the approximate sense of 'to increase two-fold, three-fold...' (cf. English *duplicate*).

Italian does have a verb based on *zero*, namely *azzerare*, but it has a different sort of meaning, akin to that of *reduce*, unlike the verbs of (19). Moreover, there is no Italian verb ending in *plic(are)* based on *zero*, i.e. there is no **zeruplicare.* Conversely, there is no **adduare*, which would be formed parallel to *azzerare*. The facts of this paragraph and the preceding one, then, reflect a discrepancy between *zero* and numerals. As arguably does the absence of a *zero*-based counterpart to *once, twice, ?thrice*:[8]

(20) They've been to Paris zero times this year.
(21) *They've been to Paris zeroce this year.

Furthermore, there is the obvious, yet surprising, fact that, despite the possibility of (18) (with plural N), *zero* cannot be part of a complex additive numeral, in any language that we know of, e.g.:[9]

(22) *Twenty-zero students came to the talk.

[8] How closely this fact is related to the absence of the following, in which *-ce* would combine with negation:

(i) *They've been to Paris noce this year.

remains to be determined.

[9] This was noted by Ionin and Matushansky (2018, 336) (whose interesting p.130 discussion of the changes in the form of 'one' might be rethought in the terms of Bernstein (1993)). Cf. also the following contrast, in the context of dates:

(i) ???July minus twenty-fourth
(ii) **July twenty-minus-fourth

In Moro and Kayne (in preparation), we explore the possibility of generalizing Duffield's (1995, 323-332) leftward movement cum classifier analysis of Irish numerals to all languages, in part by using movement to Spec,*and* for numerals of the *four and twenty* type, much in the manner of Moro (2000) on predicate inversion and Kayne (1993) on English possessives.

(23) *Three hundred and zero students came to the talk.

Less clear, on the other hand, is the status of what would be an ordinal counterpart to *zero*. In a mathematical context, one can say, in talking about fractions such as 4/5, either of the following:

(24) Four over five is a banal fraction.
(25) Four fifths is a banal fraction.

In speaking of 4/0, though, there is a contrast:

(26) Four over zero is not well-defined.
(27) *Four zeroths is not well-defined.

To our ears, though, the following are marginally acceptable:[10]

(28) ?ten to the zeroth power
(29) ?dieci alla zeresima potenza

In summary, the *zero* accompanied by NOT that is under discussion is clearly not straightforwardly a numeral.[11] On the other hand, it should be noted that the very question, Is X a numeral?, is itself not straightforward, in particular if Kayne (2019) was right to take *one* to be very different from *two* (which he analyzed as involving minimal coordination), and to take *five* (accompanied by silent SET) to be different again. (In effect, syntactically speaking, numerals

[10] Note, though:

(i) ten to the twenty-fourth/*zeroth (power)

[11] Possibly, *zero* is not accompanied by NOT in cases like:

(i) How many zeros are there in ten to the seventh/in 3,004,073?

Possibly, too, a language can have phrases such as *zero students* only if it allows (i). If so, then the emergence of *zero students* in (some) languages will have depended on the existence of 0 in non-linguistic numerical expressions in those languages.

Notice also that our analysis of *zero* also suggests that the emergence of the numerical notion of 0 does not depend on the existence of this word in a given language: this is compatible with the history of this notion which was not available in the Western culture until the adoption of the Arabic numerals by Fibonacci in the XIII century,

don't form a natural class.)

4.

The silent NOT that accompanies *zero* is almost certainly not specific to *zero*.[12] Take the proposal by Jackendoff (1977, 152) that in phrases like *enough money* there is a deleted *much*:[13]

(30) MUCH enough money

Jackendoff did not propose, and for good reason, any comparable deletion of *little*, in part because of:

(31) little/*much enough money

and in part because *enough money* cannot have the interpretation of *little enough money*. Let us now ask why English fails to allow deletion of *little*, i.e. why there is, parallel to (30), no:

(32) *LITTLE enough money.

A straightforward answer would be that no language allows a counterpart of (32), i.e. that (32) is in general language faculty inadmissible. As for why that might be, consider the possibility that *little* is accompanied by NOT,[14] so that *They have little money* is to be analyzed as:

(33) they have NOT little money

(In which case, *little* would, strictly speaking, have an interpretation akin to that of *much*.). It might then be the case that NOT would be incompatible with LITTLE:

[12] Cf. the deletion of French negative *pas* alluded to in Kayne (1975, 87n).
[13] On the position of MUCH, see Kayne (2006).
[14] Cf. Kayne (2005a, sect. 13); also Heim (2006) on "*little* as a kind of negation". Indirectly related is the fact that *numerous* has no counterpart such that '*num(b)er*+suffix' would be interpreted as *few*; with a possible account being that the NOT associated with such a suffix would produce a violation akin to **importantun* (vs. *unimportant*) - cf. Kayne (2017).

(34) *they have NOT LITTLE money

perhaps because they could not both be simultaneously licensed. (In this Note, we do not take up the licensing question for NOT.) In part similar is the following contrast between *most* and *least*:

(35) Take the leftmost/*leftleast door.

and similarly for:

(36) rightmost, topmost, uppermost, outermost, innermost, northernmost, utmost, foremost

none of which is possible with *-least* in place of *-most*. The preposing of *left* to *-most* seen in (35) (and similarly for (36)):[15]

(37) the left most door <left>

may be blocked, in a way recalling negative islands, by the NOT that arguably must accompany *least*, just as it must *little*:[16]

(38) *the left NOT least door <left>

With regard to negative islands, Rizzi (1990, 116) had noted that the deviance of the following (when *how* is extracted from within the embedded sentence):

(39) How did he deny that he fixed the car?

might reflect negative verbs like *deny* being "construed with a null negative operator". A minimal pair in Italian is (again with extraction from the lower sentence):

[15] Cf. *the door (the) most to the left*, which suggests that *leftmost* is accompanied by silent TO.
[16] Cf. perhaps:

(i) Nothing much/*little is happening around here these days.

(40) In che modo affermi che hanno dipinto la porta?
'in what way do-you-affirm that they-have painted the door'

(41) *In che modo neghi che hanno dipinto la porta? ('...deny...')

From the present perspective, the null negative operator in question can be taken to be NOT.[17]

5.

If we are on the right track, the language faculty has chosen to have *zero* accompanied by NOT. Why did it choose to do so? The most straightforward answer would seem to be that it had no choice. The only way to express what *zero* expresses involves negation.

That the expression of zero requires negation can be seen in another way, thinking of von Neumann's characterization of the natural numbers, in which zero is the empty set,[18] the definition of which itself involves negation.

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[17] Silent NOT differs from pronounced *n-* in Italian in not inducing the appearance of preverbal *non*:

(i) Sono arrivate zero ragazze. ('have arrived zero girls')
(ii) Non è arrivata nessuna ragazza. ('neg is arrived no girl')

It may be that in (i) NOT has moved to preverbal position.

[18] Cf. Chomsky (2019, note 27).

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