ISSN 2835-4138 (digital)
https://doi.org/10.5565/rev/isogloss.

Isogloss 2023, ISSUE/NR
PAGES

Referencially Dependent DPs: Ellipsis versus Italian Pro-forms

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Received: 15-02-2023
Accepted: 15-03-2023
Published: 15-04-2023

How to cite Leave blank

Abstract

The paper studies the conditions that determine the Discourse-Linked or non-Discourse-Linked status of of noun-less Determiner Phrases introduced by different determiners, in Italian and in English. For instance, given the sentence "Ten bombs exploded yesterday.", the continuation "[Five] were cluster bombs" tends to have a meaning equivalent to 'Five of the bombs that exploded' (D-Linked), while "[Five] will explode today." is understood as 'five (different) bombs' (non D-Linked). Beside world-knowledge, the syntax of the determiner and its position w.r.t. the verb is shown to affect the availability of DL/non-DL readings. This and other facts undermine an analysis cast purely in terms of semantic domain restrictions, and suggests that DL readings are really due to *covert partitive structures*. While perhaps intuitive, this idea faces various issues in Italian, due to its interactions with the syntax of the pro-form *ne*. We show that an NP-based structure

for numeral and proportion-based partitives (”3/half of the boys”) is actually compatible with the facts, and offers a cue on the nature of sub-DP pro-forms and their uses.

Keywords: partitives; proportions; quantifiers; ellipsis; pronouns

1. Introduction

This paper explores the structure and meaning of phrases like those among square brackets in (1a) and (1b), consisting in a determiner-like element with no visible nominal restrictor, referentially dependent on a context that makes a restrictor available (here, *bombs*). We refer to these elements as *Noun-less-DPs*, NDPs for short.

(1) Ten bombs$_j$ exploded yesterday over the town.
   a. [Three]$_{i \subset j}$ were cluster bombs. D-Linked
   b. [Three] exploded today. Non D-Linked: other bombs

(1a) and (1b) illustrate the two different referential relations NDPs can have with their linguistic context: referring to a subset of the entities introduced with it — the ten bombs that exploded mentioned in the premise — or simply referring to entities of the same type, which may or may not overlap with those mentioned before. The former is the so-called *D(iscourse)-Linked* (DL) *reading* (Pesetsky 1987); the latter, the *non-D-Linked reading*, nDL), forced here by the choice of predicate (*exploded*) and by the presence of incompatible time adverbials (*yesterday* and *today*). (1b) gives rise to two separate explosion events, hence to different sets of bombs.

As (1) shows, it is possible to systematically tease apart DL from nDL interpretations by manipulating the linguistic form and the lexical entries of the examples. The nDL reading is preferred when the DPs are parallel topics, as in list environments (2), and even forced when the predicates of the Noun-less DPs are inconsistent when applied to the same objects (2a).

(2) a. Ten participants are from the US, two from the UK, four from China.
   b. I bought three books and borrowed two.

Inconsistent numerals also block DL. This is illustrated in (3), where the cardinality of the NDP is greater than that of the antecedent DP, thus too high for the DL reading which would otherwise be favored by the predicate in the continuation. Interestingly, this situation leads to a clash, not to a nDL reading.

(3) [Ten bombs]$_i$ exploded. #Twenty$_{*j \subset i}$ were cluster bombs. *inconsistent num*

Hereafter, when required, we force the nDL reading through inconsistent predicates like those in (1b) or (2a), never inconsistent numbers like (3).

In this paper we consider three variables that affect the availability of the two readings:

the type of 'determiner'[1] in the NDP, the language, and the argumental role of the NDP. Regarding the first variable, we contrast numerals like *three*, proportional expressions like *half* and quantifiers like *someone*. As for the language, we contrast English with Italian. Finally, we contrast preverbal and postverbal argumental positions: in English, this corresponds to subject vs. object, in Italian, to pre-V subject vs. post-V subject vs. object.

In a nutshell, our proposal is that the DL and nDL readings correspond to two different invisible structures selected by the visible 'determiner': a simple nominal (4a) for the nDL and a partitive structure (4b) for the DL.

(4) a. Ten bombs .... Three ~~bombs~~ nDL
b. Ten bombs .... Three ~~of the bombs~~ DL

Italian was chosen to contrast English because in this language the presence of a post-V nDP argument must be accompanied by a clitic pro-form, *ne* which (following Belletti and Rizzi 1981; Cordin 1988; Falco and Zamparelli 2019) we take to be a pro-NP (i.e. a DP subpart), roughly corresponding to English inflected *one(s)* in *three tall ones*, and glosses as such hereafter.[2] We will take a deeper look at *ne* in Section 4.1. What matters here is that the absence of *ne* leads to ungrammaticality (5a), unless the NDP is understood as referring to non-specific human beings (a [+HUMAN] feature) (5b):

(5) a. Carlo aveva tre auto. Suo fratello *(ne) ha venduto due.
Carlo had three cars. His brother (ONES) has sold two.
b. Ho visto due per strada.
I_have seen two in_the street.
'I saw two guys in the street'.

Despite the superficial differences between the two cross-out elements in (4), we will argue that *ne* can easily corresponds to both. This will require the proper analysis of the structures underling (4), but also more complex cases like *three quarters of the bombs*.

The proposal makes predictions on the readings available to the determiners found in the NDPs: those that can take either nouns or partitives, like numerals or *some*, will allow both DL and nDL readings; determiners that do not select partitives, like *somebody*, will not allow DL, and 'determiners' that do not select simple nominals will not allow nDL readings. The facts support these predictions, but the situation is more complex in post-V positions, due to the existence of two forms of *ne*: pro-NP and pro-PP. Overall, the proposal provides new insights on the structure of proportional phrases, on the nature of the *ne*, on the properties of quantifier domain restrictions and on the relation between syntactic structures and their context.

The rest of this paper is organized as follows. After a brief methodological introduction, Sec. 2 contains the fundamental contrast between numerals and proportions and between Italian and English. In Sec. 3 we spell out the proposal sketched in (4), and give two argument against an approach that solely relies on semantic domain restrictions — one based on NDPs with conjoined antecedents (Sec. 3.1), the other on the Definitness

[1] Proportional elements like *half* or *a quarter*, which belong in this class, are not determiners *strictu sensu*, hence the scare quotes.

[2] On the differences and similarities between *one(s)* and *ne*, see Falco and Zamparelli (2016)

Effect (Sec. 3.2). Next, in Sec. 4 we detail the structure we adopt for overt numeral-based partitives, and how its mold fits the DL interpretation of NDP with numerals. Subsection 4.1 reevaluates Italian *ne*, spelling out the different syntactic properties of its two main forms. Section 5 describes the variant of the partitive structure used with proportion nouns, and gives a proposal for the optionality of the definite article with the word *metà* 'half' in Italian. Left by itself, the structure proposed makes the prediction that *ne* should be impossible with post-V proportions, or at least that their meaning should always be D-Linked. This is consistent with the English data, but not with the Italian one, a difference which is resolved in Section 5.1.

Section 6 shows that the proposal correctly predicts that quantifiers yield DL readings if and only if they can take overt partitives. Quantifiers (or numerals) that have implicit nominal restrictions can of course use semantic/pragmatic contextual restriction, but not real discourse-linking; a subsection, 6.1, looks at the DL reading in those post-V positions where *ne* is syntactically blocked. The observation is that when *ne* is structurally possible, not using it blocks the DL reading, but if *ne* is impossible, the DL is available even without it (with some caveats). Section 7 closes the paper.

2. Data: Numerals versus Proportions

2.1 *A note on methodology*

To substantiate the paradigm presented in the introduction, we carried out a systematic data collection and analysis. Since these interpretive judgements are sometimes graded, we collected them for the core contrasts reported in the paper from at least 20 native speakers, both for English and for Italian. The surveys used a Likert scale to express judgements ranging from 1 to 5, with 1 = '100% incoherent' with the premise and 5 = '100% coherent' with the premise. We implemented and presented the surveys online using Google Forms and the PsyToolkit platform (Stoet, 2010, 2017), The participants were selected and recruited through Prolific[3]. We performed statistical analysis on the collected data with the Wilcox two-sided test. The raw data and the R script used for the analysis are available on GitHub.[4] For simplicity's sake in what follows we present examples with informal judgments (?, ??, *), supporting the distinction with graphs of the experimental data.

2.2 *Numeral NDPs: English and Italian*

Numeral NDPs show similar referential properties in English and in Italian. In pre-V subject position the nDL reading is somewhat degraded for Italian speakers, compared to English (see Fig. 1). Since we tested with an unaccusative verb (*esplodere* 'explode'), our hunch is that the drop is due to the competition with post-V subjects, which are fully acceptable with this reading. D-Linked nominals, on the other hand, are topics, which in this language are normally realized in the left periphery of the clause (Rizzi, 1997)

(6) Ten bombs exploded yesterday in this town. *English Pre-V (= (1))*

a. [Three] were cluster bombs. DL

[3]https://www.prolific.co/

[4]Github URL to be provied at publication time

b. [Three] exploded today. *nDL, other bombs*

(7) [Dieci bombe]$_j$ sono esplose ieri in questa città. *Italian Pre V*
Ten bombs are exploded$_{Pl.Fem.}$ yesterday in this town.
'Ten bombs exploded yesterday in this town'

a. Tre$_{i\subset j}$ erano a grappolo. DL
[Three] were at cluster.
'Three were cluster bombs.'

b. ?Tre sono esplose oggi. *nDL, other bombs*
[Three] are exploded$_{Pl.Fem.}$ today.
'Three exploded today.'

The DL and nDL readings are both fully acceptable in the post-V positions of English and Italian. The latter, a *pro* drop language, has post-V objects but also post-V subjects, a configuration unattested in English. As mentioned above, Italian post-V NDPs require the clitic pro-form *ne* on the verb, accompanied by number and gender agreement with the *ne*-antecedent on the past-participle. We illustrate these cases with English objects (8), Italian objects (9) and Italian post-V subjects (10).

(8) Yesterday ten bombs exploded. *English post-V*

a. We shot down three. DL

b. Today, I heard three. *nDL, other bombs*

(9) [Dieci bombe]$_j$ sono esplose ieri in città. *Italian post-V Obj.*
Ten bombs are exploded$_{Pl.Fem.}$ yesterday in town.
'Ten bombs exploded yesterday in this town'

a. Ne$_i$ ho sentite [tre t_i]. DL
ONES I have heard$_{Pl.Fem.}$ [three t_i].
'I heard three.'

b. Oggi ne$_i$ ho sentite [tre t_i] *nDL, other bombs*
Today ONES I have heard$_{Pl.Fem.}$ [three t_i].
'Today I heard three.'

(10) Ieri sono esplose dieci bombe in città. *Italian post-V Subj.*
yesterday are exploded$_{Pl.Fem.}$ ten bombs in town.
'Ten bombs exploded yesterday in town'

a. Ne ho sentite [tre t_i]. DL
Ne I have heard$_{Pl.Fem.}$ [three t_i].
'I heard three.'

b. Oggi ne sono esplose [tre t_i]. *nDL, other bombs*
Today ne I have heard$_{Pl.Fem.}$ [three t_i].
'Today I heard three.'

Table 1 sums up the data on numerals in English and in Italian.

2.3 *Proportions: English vs. Italian*

We exemplify proportions with the case of *half*, which plays the role of the denominator in a fraction (i.e. ½). The Italian corresponding noun can optionally appear with or without

Numerals	English	Italian
Pre-V	DL / nDL	DL / ?nDL
Post-V object	DL / nDL	DL / nDL, presence of *ne*
Post-V subject	absent	DL / nDL, presence of *ne*

Table 1: Numerals in English and in Italian.

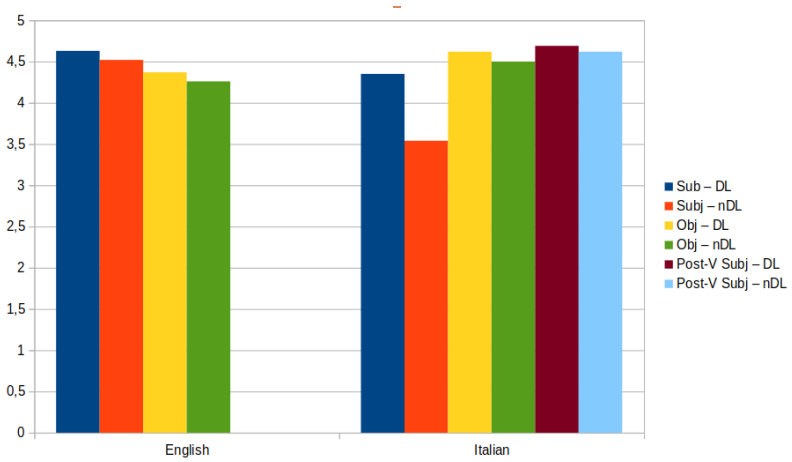


Figure 1: Acceptability of NDPs with numerals in English and Italian. p.≤0.05="*".

a definite determiner: *la metà*$_{F.Sng}$ or *metà*; we use the former (see Section 5 for our take on this curious optionality).

Unlike numerals, NDPs containing proportions strongly prefer DL readings in subject position, both in English and in Italian. When this reading is blocked by the impossibility of ri-explosions, as in (11b), the acceptability of the sentence drops (see the difference across the blue bars in Fig. 2 and Fig. 3). We mark these cases with a diacritic (#).

(11) Yesterday ten bombs exploded in this city. *English pre-V*
   a. Half exploded on military targets. DL
   b. #Half exploded today. *DL: 'ri-explosion' reading*

(12) [Dieci bombe]$_j$ sono esplose ieri in questa città. *Italian pre-V*
   Ten bombs are exploded$_{Pl.Fem.}$ yesterday in this town.
   'Ten bombs exploded yesterday in this town'
   a. [La metà]$_{i\subset j}$ erano a grappolo.
      [The half] were at cluster.
      'Half were cluster bombs.'
   b. #[La metà] sono esplose oggi. *DL: 'ri-explosion' reading*
      [The half] are exploded$_{Pl.Fem.}$ today.
      'Half exploded today.'

Once again, in post-V position the pro-form *ne* is obligatory inserted in Italian (14). This time, however, Italian differs from English (11b): both in object position (14) and in post-V position (15) either reading (DL/nDL) is possible.

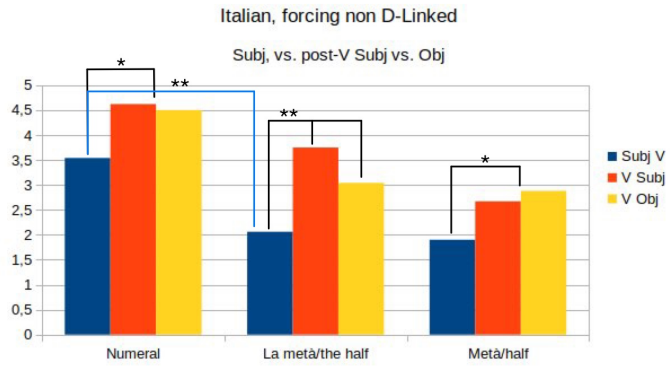


Figure 2: Acceptability of nDL NDP in Italian, with numerals and two forms of the proportion ½. p.≤0.05="*"; p.≤0.005= "**"

(13) Yesterday ten bombs exploded in this city. *English post-V*

a. We shot down half. DL

b. #Today, I heard half. *DL: 'ri-explosion' reading*

(14) [Dieci bombe]$_j$ sono esplose ieri. *Italian post-V Obj.*
Ten bombs are exploded$_{Pl.Fem.}$ yesterday.
'Ten bombs exploded yesterday'

a. Ne ho sentite la metà. DL
ONES I have heard$_{Pl.Fem.}$ the half.
'I hear half'

b. Oggi ne ho sentite la metà. nDL with "today"
Today ONES I have heard$_{Pl.Fem.}$ the half.
'Today I hear half.'

(15) [Dieci bombe]$_j$ sono cadute ieri. *Italian post-V Subj.*
Ten bombs are fallen yesterday.
'Ten bombs fell yesterday'

a. Ne sono esplose la metà. DL
ONES are exploded$_{Pl.Fem.}$ the half.
'Half exploded'

b. Oggi ne sono cadute la metà. nDL with "today"
Today ONES are dropped$_{Pl.Fem.}$ the half.
'Half the number of those that fell yesterday fell today.'

Table 2 sums up the data on proportions in English and in Italian and highlighs the asymmetry between the two languages.

Proportions	English	Italian
Pre-V	DL	DL
Post-V object	DL	**DL / nDL, presence of *ne***
Post-V subject	absent	**DL / nDL, presence of *ne***

Table 2: Proportions in English versus in Italian

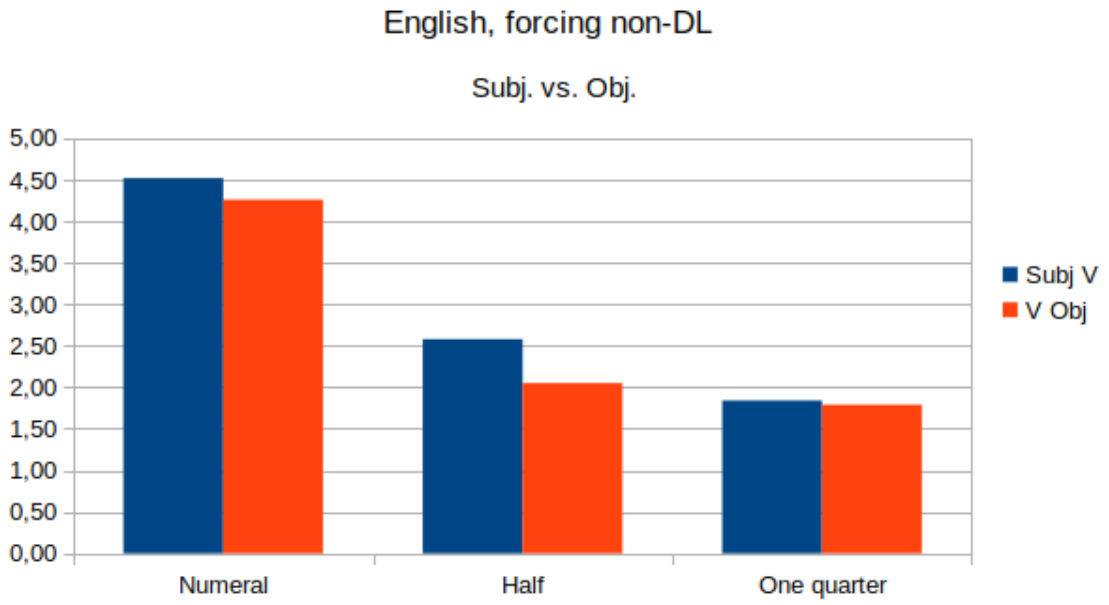


Figure 3: Acceptability of English numerals vs. proportions

3. Proposal: structures of DL and nDL readings with numerals

Our proposal is that Non-DL DPs with numerals contain a simple NP restriction (16):

(16) [$_{DP}$ three [$_{NP}$ ~~bombs~~]] *nDL reading*

In pre-V position, this restriction is elided; in post-V position in Italian, it is replaced by the pro-form *ne*, which moves to the verb as any clitic pronoun in Italian (18).

(17) [Dieci bombe]$_j$ sono esplose ieri in questa città.
[Ten bombs] are exploded yesterday in this town.
'Ten bombs exploded yesterday in this town'

a. [Tre [$_{NP}$ ~~bombe~~]] sono esplose oggi.
[Three [$_{NP}$ ~~bombs~~]] are exploded today.
'Three (bombs) exploded today.'

(18) [Dieci bombe]$_j$ sono esplose ieri in questa città.
[Ten bombs] are exploded yesterday in this town.
'Ten bombs exploded yesterday in this town'

a. Oggi ne$_i$ ho sentite [tre t_i].
Today ONES$_i$ I have heard [three t_i].
'Today I heard three (bombs).'

Since DL-interpreted NDP are also picked up by the same Italian pro-form, *ne*, it is tempting to conclude that the their structure is also (16), and that the difference between the two readings can simply be reduced to the absence or presence of *additional contextual restrictions*. According to this approach, the DL NDP *two* in (19a) would be restricted by the intersection of $[\![bombs]\!]$ (elided) and subsets of contextually salient pluralities (i.e.,

given three bombs that exploded, a, b and c, the set {abc, bc, ac, ab, a, b, c}), *Two* would thus filter not all bomb-pluralities in the domain, but only bomb-pluralities implicitly made salient by the antecedent *three bombs.*

(19) a. Three bombs exploded. Two hit the target.
b. Two [bombs in **C**] = {abc, bc, ac, ab, a, b, c} ∩ {X : Card(X) = 2}
= {bc, ac, ab}

Contextual domain restriction is a pervasive, well-established phenomenon (see Fintel 1994; Stanley and Gendler-Szabo 2000, a.o.): when I say *everybody came to my party*, what is understood is 'everybody relevant', 'everybody who could be expected to come'. Using it to cover D-Linking would thus require no new tool (unlike, say, the double-index system proposed in Enç 1991 for similar purposes),

And yet, despite the appeal of this approach, we believe that in this case a purely semantic solution is on the wrong track. Our proposal, instead, is that Noun-less DPs with D-Linked readings are *covert partitives*, similar to over partitives like (20) but with a missing PP.

(20) [$_{DP}$ three of the bombs] *the DL reading*

Evidence in favor of this solution comes from that fact that DL NDPs have restrictions similar to those of the corresponding *overt* partitives, discussed in the next two subsections. Additional evidence will be presented in Section 6, where we consider the behavior of those quantifiers that disallow partitives.

3.1 *Coordinated antecedents*

As well known, the object of an partitive *of* PP of a regular partitives can be a plural definite DP or a plural pronoun referring to a plurality (21a), but not a conjunction of definites (21b) — an observation originally made in Hoeksema (1996) and discussed in Hoop (1997), and Falco and Zamparelli (2019, Sec.7) (see also (22), from ibid.; similar results obtain for Italian and German). Acceptability ratings for (21) given by 25 native speakers confirm this piece of data (see the numbers on the right, with "5"=perfecty natural; all differences significant)

(21) The picture showed [a truck, a mechanic and a dog]$_i$
a. Two of them$_i$ were in the lower left corner. *Avg. 4.1*
b. *Two of [the truck, the mechanic and the dog] were ... *Avg. 1.8*

(22) a. Some of {the boys / *Jack, Marc, Luis and Tom} will not come.
b. I am looking for one of {my friends / *the boy and the girl}.

Testing now NDPs with analogous antecedents, we find that the judgments of NDPs with conjoined antecedents like (23) and (24) are degraded and significantly worse than those of cases where the antecedent is a simple plural (e.g. *Four trucks came in yesterday evening. Three left this morning.*)

(23) The picture showed [a truck, a mechanic and a dog].
?Two were in the lower left corner. *Avg. 3.2*

(24) John wanted two blue shirts and three grey sweaters.
?Mary bought four. *Avg. 2.8*

The fact that the D-linked NDPs are not as bad as the conjoined cases in (21b)/(22) can be explained by the possibility that the elided part is understood as ... *of them*, rather than *of the truck, the mechanic and the dog*. On the other hand, if elision requires at least partial identity of lexical content, *two ~~of the truck, the mechanic and the dog~~* should win out over *two ~~of them~~*. This uncertain results in the mixed ratings we obtained.

3.2 *Definiteness effects*

As well know since Milsark (1979) definites trigger deviance in *there*-sentences in English (see also Zucchi 1995,McNally 1998, a.o.) (25).

(25) *There is the guest at the door.

Partitives contain definites, and trigger the same effect, though possibly in a weaker form (26). [5] Interestingly, the same applies to the D-Linked NDPs in (27).

(26) a. There weren't many (*of the) girls in the garden. *Moro 1997, Ch.3, (66b)*
b. *There aren't two of the four guests tonight.

(27) a. Marc expected four guests. *There aren't two. *i.e. 2 of the 4 are missing*
b. Marc thought that this problem could have at most four solutions.
??I can prove there aren't two. *in DL reading*

Note that (27) would be fine with the nDL reading (... *There aren't even two (guests/solutions)*), but not if (27) is reporting the absence of some of the previously mentioned items. If the DL in (27) reduce to partitives like those in (26), this pattern is accounted for.

4. The structure of overt partitive phrases

In this paper we adopt the analysis of overt, canonical[6] partitives proposed in Falco and Zamparelli (2019) (henceforth FZ). FZ's analysis belongs to a family of treatment (from Jackendoff, 1977 to Cardinaletti and Giusti, 2007) which posit the existence of an invisible noun between the numeral and the PP proper:

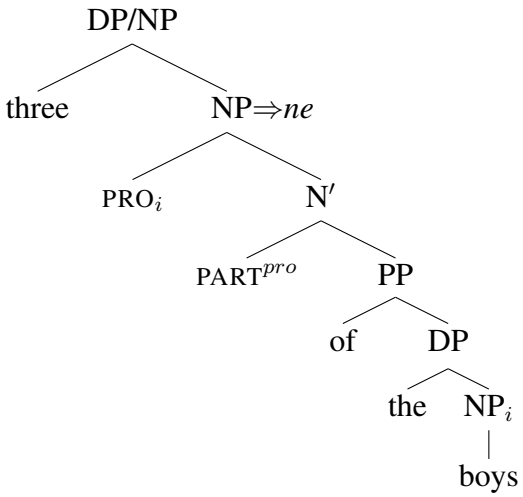
(28) $[_{\text{DP/NumP}}$ 3 $[_{\text{NP}}$ N^e $[_{\text{PP}}$ of the boys]]]

It differs from other accounts in this family in seeing N^e not as a syntactic placeholder, but as an active relational noun, which selects for an (invisible) pro-NP in its specifier and a (normally visible) definite DP in its complement (modulo *of*, a semantically null case marker), yielding the structure in (29). Crucially, the pro-NP is coindexed with the NP inside the definite (in (28), *boys*), so that it ends up denoting the restrictive property of the plural definite (here, the *set of pluralities of boys*).

[5] Thank to Andrea Moro and to the audience of IGG 2023 for pointing out this argument to us.

[6] By canonical, we refer to partitives introduced by numerals followed by a PP contains a plural definite, as in (28). See Falco and Zamparelli, 2019, Sec.2 for a list of other types of partitive-like constructions. The case of partitives headed by proportions will be discussed below.

(29)



PART^{pro} has a subtractive semantics: it removes from the set of pluralities found in its spec the denotation of the plural definite (the *supremum*, Sharvy, 1980), and returns the rest (30). This yields the effect of *proper partitivity* (**one of the boy/*two of my two ears)*, see Barker 1998). The effect is derived at a semantic level, unlike the analysis in Marty (2017), which derives it as a purely pragmatic effect.

(30) $[\![$of the boys$]\!] = $ Pl($[\![$boy+s$]\!]$)–MAX(Pl($[\![$boy+s$]\!]$))
'the plural denotation of boys, minus its maximal element'

At a syntactic level, FZ's analysis derives cases where the pro-NP has been replaced by the NP raised overtly from inside the definite (as proposed in Kayne, 1994; Zamparelli, 1998). These case is illustrated by English 'inverted' possessives (31), and by the Italian split-superlative construction (32).

(31) a. Two friends of John's
b. [$_{\text{DP/NumP}}$ Two [$_{\text{NP}}$ [$_{\text{NP}}$ friends]$_i$ PART^{pro} [$_{\text{PP}}$ of [$_{\text{DP}}$ John's t_i]]]]

(32) a. Due ragazzi dei più piccoli
two boys of_the most young
'two of the youngest boys'
b. [$_{\text{DP}}$ due [$_{\text{NP}}$ [$_{\text{NP}}$ ragazzi]$_i$ [$_{\text{PP}}$ de [$_{\text{DP}}$ i più piccoli t_i]]]]

In addition, (29) naturally covers the impossibility of conjoined definites seen in Section 3.1: conjoined definite are out simply because the pro-NP in [Spec,PART^{pro}] cannot find a single NP to link to.[7] This is laid out in (33):

(33) *[$_{\text{DP}}$ One [$_{\text{NP}}$ PRO$_{i/j}$ [$_{\text{N}'}$ PART^{pro} [$_{\text{PP}}$ of [$_{\text{DP1}}$ the boy$_i$] and [$_{\text{DP2}}$ the girl$_j$]]]]]

Unlike personal pronouns, which are capable of having split antecedents (e.g. *John picked up Mary and they had lunch*), elements anaphoric to properties do not seem to have this ability, as shown with the English pro-NP *ones*.

(34) Mary has a cat$_1$, a dog$_2$ and a parrot$_3$. *John has three nice ones$_{1/2/3}$, too.

[7] As far as we know none of the other partitive theories is capable of capturing the ban on conjunction. In all other constructions we are aware of, a conjunction of definites is fully equivalent to a plural definite.

4.1 ne*: pro-NP or pro-PP*

The two structures proposed in the previous sections for the readings at issue both contain an NP selected by the visible determiner: a simple restrictor for the non-D-linked reading, and the NP headed by PART^{pro} for the D-Linked one. If *ne* is a pro-NP, as we assumed in the introduction, this explains why post verbal NDP in Italian can be picked up by *ne* regardless of their readings. This picture also corresponds to the acceptability of both (35a) and (b), where the *ne* antecedent are the bracketed phrases in topic position.

(35) a. [Automobili]$_i$, ne$_i$ ho viste poche.
[cars]$_i$, ONES$_i$ I_have seen few.
b. [Di queste automobili]$_i$ ne$_i$ ho viste poche
[of these cars]$_i$ ONES$_i$ I_have seen few.

(35) helps answering the question: what is the relation between *ne* and the elision? In NDPs with *ne*, what is *ne* anaphoric to? We hypothesize that the elision is carried out at the level of a complex NP topic (*automobile* in (35)) which is picked up by *ne*. Schematically:

(36) [$_{\text{Four}}$ automobiles]... [$_{\text{NP}}$ ~~pro of the 4 automobiles~~]$_i$, [$_{\text{TP}}$ ... ne$_i$+V ... [$_{\text{DP}}$ two t_i]]
DL

If this suggestion is correct, *ne* is just a way to move the elision site from its *in situ* position to a left-periphery position, where it is closer to the element that licenses the elision itself.

Putting this aspect aside, the situation with *ne* is actually more complex it appears. As pointed out by Cordin, *ne* can also pick up *di* 'of' PPs introduced by a verb (e.g. *parlare di* 'speaking of') or by a relational noun (e.g. *autore* 'author'). We gloss this *ne* 'of_it/them'.

(37) a. Carlo ne parla bene.
Carlo of_it speaks well.
'Carlo speaks well of it/them.'
b. La qualità del disco ne definisce il valore.
the quality of_the record of_it dictates the value.
'the quality of the record dictates its value.'

The two *ne*s have different properties: pro-NP *ne* cannot be moved across strong DETs (*ogni* 'every', demonstratives like *questo* 'this', etc.; see (38a)) and cannot be extracted from inside a predicate nominal (38b). Pro-PP *ne* has none of these restrictions, see (39).

(38) a. *Di ospiti, ne conosco {ogni / ognuno / questi}
Of guests, ONES I_know {every / these}
b. *Ospiti, loro ne sono due.
guests, they ONES are two

(39) Quel quadro? Ugo non ne ...
That painting? Ugo not of_it ...
a. è l' autore. *extr. from predicate*
is the author
'Ugo isn't the author of it'

b. conosce ogni dettaglio. *extr. from universal Q*
knows every detail
'Ugo doesn't know every detail of it'

c. apprezza questa versione. *extr. from demonstr.*
appreciate this version
'Ugo doesn't appreciate this version of it'

It is possible that this difference stems from the fact that only pro-PP *ne* seen in (37) is licensed by a lexical category (verb or noun). What matters here is that pro-PP *ne* is **not** licensed by the determiners that license pro-NP, in the absence of any verb or noun; if this wasn't the case, it would be hard to explain the diverging behavior of *ne* in (38) and (39). While this makes pro-PP *ne* irrelevant for most covert partitives, it will give it a crucial role in explaining proportions like *half*, presented in Sec. 2.3 and discussed in the next section.

5. The structure of proportions

Unlike numerals, the proportions we saw in Sec. 2.3 force DL readings in all positions except Italian post-V NDPs, where nDL became possible. Following once again the discussion in Falco and Zamparelli (2019, Sec. 4.1), we take words like *half* or *quarter* to be relational nouns that *replace* the invisible noun PART^{pro} in numerical partitives. The number that appears before these words is merged as an argument of *half/quarter* in [Spec,NP]. FZ suggest that it (or its features) raise to [Spec,D^0], licensing the DP (40).

(40) $[_{DP}\ [_{MeasP}\ \text{three}]_i\ D^0\ [_{NP}\ t_i\ [_{N'}\ \text{quarters}\ [_{PP}\ \text{of}\ [_{DP}\ \text{the people}]]]]]$

(41) gives FZ's semantics for the expression in (40), assuming that ⟦of the people⟧ = ⟦the people⟧ = a. The choice of $\leq$ means that proper partitivity is not required with proportions, making *three thirds of the people* semantically well-formed.

(41) a. $[\![\text{quarter}]\!] = \lambda n \lambda e \lambda x \exists u[x \leq e \wedge \text{AMOUNT}(x,u) = \text{AMOUNT}(e,u) \times n/4]$

b. $[\![\text{three quarters}]\!] = \lambda e \lambda x \exists u[x \leq e \wedge \text{AMOUNT}(x,u) = \text{AMOUNT}(e,u) \times 3/4]$

c. $[\![\text{three quarters of the people}]\!] = \lambda x \exists u[x \leq a \wedge \text{AMOUNT}(x,u) = \text{AMOUNT}(a,u) \times 3/4]$
"the set of pluralities that are subparts of *the people* and whose amount, measured in *u*-units, is three quarters the amount of *the people* "

Half is similar, with one twist: since *2 halves* is rarely used, its default measure is *one* (i.e. ½) . We propose that *half* and its Italian counterpart *metà* allow a phonetically null *1* (+), which remains capable of licensing the DP by moving to [Spec,D+0] (and reconstructing), or by transmitting its number features.

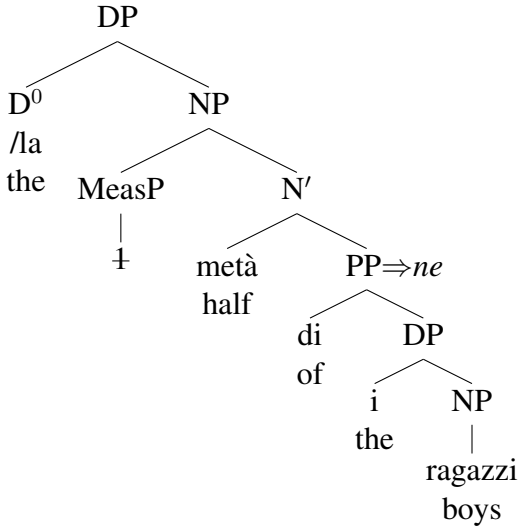
(42) $[_{DP}\ [_{MeasP}\ +]_i\ D^0\ [_{NP}\ t_i\ [_{N'}\ \text{half}\ [_{PP}\ \text{of}\ [_{DP}\ \text{the people}]]]]]$

The Italian word for the noun *half*, i.e. *metà*, has the option of being introduced by a definite determiner (as discussed in Sec. 2.3 and illustrated in Fig. 2). The presence of *the* is by itself not surprising: overt singular definites are found with many Italian abstract nouns that would be bare singulars in English (see (43), and a discussion in Longobardi 1996); the pattern even extends to *percentages* (Italian *il 10% di* 'the 10% of' contrasts

with the English *10% of*). The twist here is the *optionality* of the definite. This is due, we propose, to the presence of the silent *1* licensed by *half/metà*. This element can replace the definite article in the DP layer, yielding the appearance of optionality. The structure we propose in therefore (44).

(43) {La democrazia / La libertà / La qualità} è in pericolo.
{the democracy / the freedom / the quality} is in danger.
'{democracy / freedom / quality} is in peril.'

(44)



Turning to the complement of Italian *metà*, we see that this noun only introduce partitives (45a) or mereological subparts (45b). Other possibilities are ungrammatical.[8]

(45) a. (La) metà delle bombe$_{Pl}$ 'the half of the bombs'
b. La$_{Sng}$ metà bomba$_{Sng}$ 'the$_{Sng}$ half bomb' *mereological half*
c. *La$_{Sng}$ metà bombe$_{Pl}$ 'the$_{Sng}$ half bombs'
d. *Le$_{Pl}$ metà bombe$_{Pl}$ 'the$_{Pl}$ half bombs' *cf. 'the half-bombs'*

Now the fact that (45c,d) are either ungrammatical or with the wrong meaning (in English (45d) doesn't mean 'half the number of bombs', but 'pluralities of half-bombs') immediately predicts that the nDL reading should not be available with these 'denominator nouns', since the covert version should be based on (45c) plus ellipsis of the noun.

This derives the difference between numerals and proportions we saw in Fig. 2, but does not immediately explain why Italian can still use *ne* in post-V cases (15): a pro-NP *ne* should *replace* the [1 *metà*], not leave it stranded. Remember, however, that *ne* has a pro-PP version used with relational nouns, and that *metà* is a relational noun. (46a) shows the same effects we saw in (39): *ne* can be extracted from predicate nominals with *metà* and from demonstrative DP. We conclude that the *ne* we see with *metà* in the DL reading is the pro-PP 'of it/them' meaning, not the pro-NP 'ones' meaning.

[8](45d) is grammatical in English: *the half bombs*. Italian resorts to the cognate adjective *mezzo* for these cases, and also for (45b). Interestingly, *mezza città* 'half$_{Adj_Sng}$ city' behaves as a DP with a determiner, not as a bare singular (e.g. it can be subject), while *mezze città* 'half$_{Adj_Plr}$ cities' has the distribution of a bare plural. This suggests that, just like *metà*, singular *mezzo/a* comes with the default 1 measure, while plural *mezzi/e* does not.

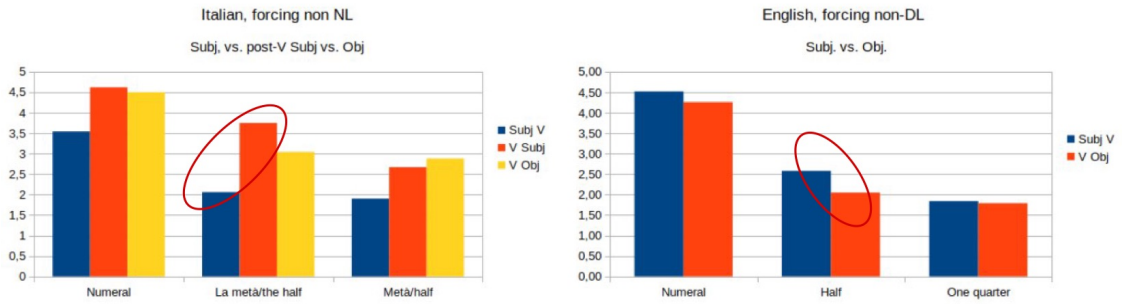


Figure 4: Acceptability of pre-V and post-V cases in English and Italian

(46) a. Vedi quello spago? Questo pezzo ne è la metà esatta.
See that string? This piece of it is the half exact
'See that string$_i$? This piece is the exact half of it$_i$'

b. Ne ho preso questa metà, tu prendi l' altra.
of_ I_have taken this half, you take the other.
'I have taken this half of it/them, you take the other.'

There is thus no obstacle to assuming that Italian object D-Linked proportions with *ne* are also covert partitives, where *ne* play the role of the PP object of *metà/half*.

In the next two sections we turn to two final issues with post-V proportions: the nDL reading in Italian and the agreement variability we see on the verbs.

5.1 *Non D-Linked readings with proportions*

If proportions like *metà* 'half' or *quarto* 'quarter' can only select partitives, the straightforward prediction is that they should always trigger D-Linked readings. This seems correct enough for English: as Fig 3 illustrates, forcing a nDL reading causes a significant drop compared to numerals. In Italian, however, a nDL reading is quite acceptable in *post-V* position, with *ne* (see (15b), and the differences highlighted in Fig. 4).

How is nDL possible in post-V, and why only in Italian? Pro-PP *ne* does not help, here, as it would predict the wrong reading (DL), and pro-NP *ne* has nothing to pick up inside a structure like (44), except possibly the lowest NP. But *la metà* may well be followed by a demonstrative (47); pro-NP *ne* cannot be extracted from under a demonstrative (see (38) above), yet *ne* remains very much obligatory. (47) clearly shows is that *ne* cannot come from anywhere inside the bracketed proportion. So, it must come from outside.

(47) Ieri, dieci bombe$_i$ ... (Bombe), oggi ne sono esplose [la metà di
Yesterday, 10 bombs$_i$ ... (Bombs), today NE are exploded [the half of
quelle$_i$].
those$_i$].
'Yesterday, 10 bombs... Today, a number of bombs that was half that of yesterday'

The key to an answer is that in Italian proportions may be used within relative clauses as *measure phrases* (MPs). When these MPs modify a nominal that comes with its one numeral, as in (48), they can only apply their meaning to the noun, in a distributive fashion:

what is halved in (48) is the size of each individual bomb.

(48) Ho visto tre bombe (che erano) la metà di quelle.
I have seen three bombs (that were) the half of those.
'I have seen three bombs, each of which was half the size of those (other) bombs.'

We propose that when no numeral is present (or when the NP outside is replaced by *ne*) the proportion acts as a type of (reduced) *amount relative* (like (49)), where *la metà* sets the dimension of the plural NP. This is indeed the meaning we get with (50).

(49) They will never put together [the troopers they had in WW2.] *amount RC*

(50) Oggi ho sentito bombe, la metà di quelle di ieri.
today I heard bombs, the half of those of yesterday

When the NP is replace by *ne*, the situation becomes (52), where it *appears* that *ne* comes from *metà*'s complement position, whereas *ne* is actually just modified by *metà*.
.[9]

(51) … (bombe,) ne ho viste [[$_{NumP}$ t$_i$ [$_{RC}$ la metà [$_{PP}$ ~~di quelle bombe$_i$~~]]]
… (bombs), ONES I have seen [[$_{NumP}$ t$_i$ [$_{RC}$ the half [$_{PP}$ ~~of those bombs$_i$~~]]]

If this idea in on the right track, we could explain the absence of the nDL reading in the English case with the observation that English does not even have the structure corresponding to (50). i.e. (52).

(52) *I have heard bombs, (that were) half of those.

It would also account for the fact that this reading is not available in pre-V position: in Italian, argumental bare plurals are limited to object positions (see Contreras 1986 for the original observation in Spanish, and Longobardi, 1994).

5.2 *Agreement variability in Italian*

In testing the acceptability of post-V subjects with proportions we observed an effect of number (on the auxiliary, and on the participle), and an interaction with the presence/absence of the definite article before *metà* (53).

(53) a. ne è esplosa la metà 'NE is exploded$_{Sng,Fem}$ the half'
b. ne sono esplose la metà. 'NE are exploded$_{Pl,Fem}$ the half'
c. ne è esplosa metà. 'NE is exploded$_{Sng,Fem}$ half'
d. ne sono esplose metà. 'NE are exploded$_{Pl,Fem}$ half'

As a subject, *la metà* allows both singular or plural agreement (the same applies in English: *half of the boys was/were tired.*). In Italian, this fact holds across pre- and post-V positions, as shown in Fig. 5; in Sec. 2.3 we showed that the post-V position is much better to get the nDL reading, but the verb number discrepancy we see in (53a,b) is not

[9] In (48) there is a prosodic break before *la metà*, pointing to the fact that the RC is not restricting the lower NP level but it is applying higher (NumP?), as it has been proposed for non-restrictive RCs. These break is not present with (51). This could be due to fact that the NP has been extracted, but we do not have a precise account.

significant. Removing the determiner, however, causes a significant drop in acceptability with *singular* verbs (1.88 in the DL reading, 1.19 in the nDL). Why is this the case?

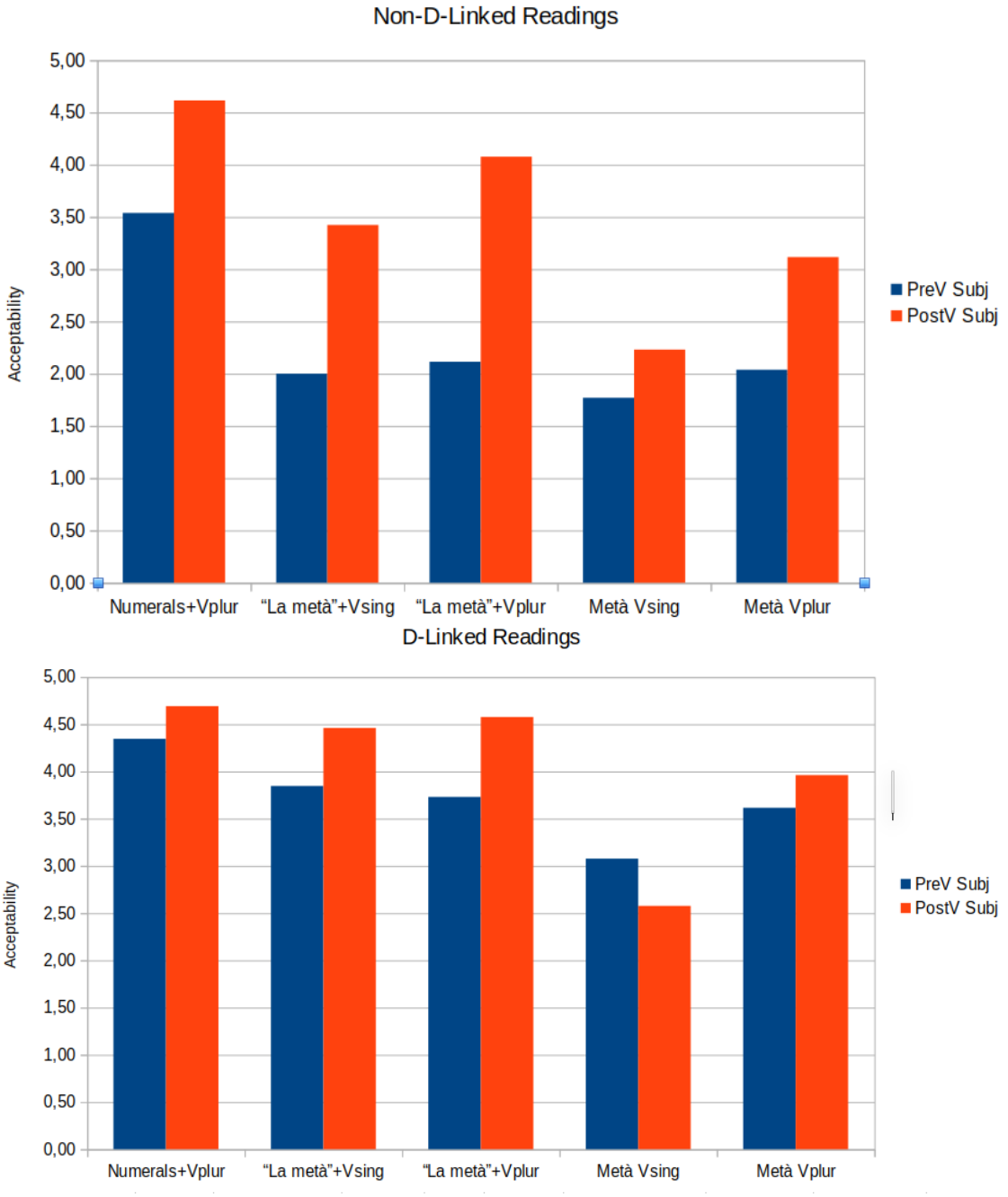


Figure 5: Effect of verb number on Italian numerals and proportions, by position and by reading. Higher = better.

In the analysis of proportions we are pursuing, the plural features (along with the gender features that appear on the past participle) must be carried by the pro-form *ne* (corresponding to a bare plural in the nDL and to the PP in the DL reading[10]). The singular form is then likely to appear as an agreement attraction from the DP containing

[10]Note that we have to assume that the P *di/of* is transparent to gender/number feature trasmission (see

metà. When this DP is headed by *il/the*, as in (53a,b), the singular number is transmitted to the verb via a *pro* in the canonical subject position.

(54) $[_{TP}\ pro_i$ is $[_{VP}\ [_{VP}$ ne+exploded] $[_{DP_i}$ la $[_{NP}$ metà ...]]]]

But when this DP does not contains any visible article (the 'bare *metà*' cases), we have proposed that D^0 is licensed by a covert form of the numeral *1*, which is in turn licensed by *half*. We suggest that this invisible D is *feature-defective*, thus hardly capable of transmitting the singular via *pro* in a configuration like (54). Cases where an invisible pronoun is unable to connect to a feature defective antecedent are well-documented in other domain (sentential antecedents) in Greek (Iatridou and Embick, 1997) and Italian (Delfitto, 2003). Cases closer to the present topics can be found by looking at the pre- vs. post-verbal position of distributive conjunctions like *both John and Mary*.

(55) a. Sia Marco che Luigi {sono / ??è} arrivati/o.
Both Marco and Luigi {are / ??is} arrived.
b. {È / Sono} arrivato/i sia Marco che Luigi.
{is / are} arrived both Marco and Luigi.

While pre-V conjoined subjects strongly require plural verb agreement, the same conjunctions quite freely allow singular and plural agreement when a post-V subject. The same subject object asymmetry is well visible in Fig 5, regardless of readings; in post-V position singular NUMBER from *metà* has an harder time reaching the verb.

6. Quantifiers: partitives and non-partitives

We have so far focused our discussion on numerals (which may or may not have partitive continuations) and proportions (which require partitives, modulo the amount readings addressed in Sec. 5.1). We now turn to the third logical possibility: those quantifiers that do not take partitive complements. Examples in English are *everyone, everybody, someone, somebody, no-one* (restricted to people) *everything,something,nothing* (restricted by and large to 'things'); in Italian, *nulla* 'nothing' *niente* 'nothing', *qualcosa* 'something' *ogni cosa* 'every thing'. The situation is summarized in Table 3.[11]

Qs that do not take partitives have a nominal morpheme (evidenced in **bold** in English) more or less tightly combined with the quantificational morpheme. In our analysis this is not a coincidence: the [±HUMAN] restriction carried by *-one, -thing* and *-body* originates in the N head, preempting the PART^{pro} which is needed to make the partitive work.

Our prediction is that if a Q does not license a partitive but just an implicit N restriction, it should not be able to have a DL reading. Before testing with the quantifiers in Table 3, we observe that Italian numerals have the same effect. Recall that with Italian numerals, the post-V argumental position must be associated with *ne*, *unless* the numeral

Manzini 2019). Supporting evidence comes from the fact in Italian the definite article routinely combines with prepositons, forming *preposizione articolata* (e.g. *di*+*i* 'of+the'= *dei*); the *di*+DEF-ART complex can even function as an indefinite determiner (see Zamparelli 2008), triggering verb agreement.

[11] A note of clarification. Many Italian quantifiers seem to contain the morpheme *-uno* 'one', much as English *someone, no-one*, yet they allow partitives. We assume that the Italian form is the number 1 (visible also in English in *every one of the boys*), while the English incorporated case is the pro-NP *one(s)*, which does block partitives.

Quantifiers	**part-DET**	**non part-DET**
English	some (of the people/things) each (of the people/things) none (of the people/things) most (of the people/things) which (of the people) how many (of the people)	some**body** (*of the people) every**body** (*of the people) no**body** (*of the people) no**thing** (*of the cars) every**thing** (*of the cars) some**thing** (*of the cars) **what** (*of the cars)
Italian	nessuno 'no/no-one'(✓+part) qualcuno 'some/someone' (✓+part) ognuno 'every one' (✓+part) quale 'which one' (✓+part) quante 'how many' (✓+part)	nulla 'nothing' (*+part) niente 'nothing' (*+part) entrambi 'both' (*+part) cosa 'what'

Table 3: Quantifiers that do or do not allow partitive restrictors

takes a [+HUMAN] restriction ((5b) above). (56) (note the absence of *ne*) is grammatical, but not D-Linked to the tourist who arrived.

(56) Sono arrivati [quattro turisti cinesi]$_i$. Io ho visto due$_{*j\subset i}$ per strada.
Are arrived [4 turists Chinese]$_i$. I have seen two$_{*j\subset i}$ in street.
'Four Chinese turists arrived. I saw two people in the street (not some of the turists who arrived)]

(56) reflects our own judgment. To rest on safer grounds we collected the judgments of 50 native speakers (25 British English, 25 Italian) on the behavior of a subset of the partitive and non-partitives quantifiers in Table 3. Given a context like (57), we asked our English speakers to judge if the sentences with part-DETs (57a) and non part-DETs (57b) meant "DET person in the courtyard PRED" or "DET girl PRED". In Italian we tested a similar context using *nulla* 'nothing' vs. *nessuno* 'no-one'.

(57) Three boys were waiting in the courtyard when five girls arrived.
a. [Some / None] {had a colorful hat / spoke for a while}. **part DET**
b. [Someone / Everybody / Nobody] {had a colorful hat / spoke for a while}. **non-part DET**

The results, in Fig. 6, overwhelmingly show that the non-partitive determiners in (57b) span the whole group (all the persons, not just the girls), while the partitive quantifiers can easily target just the girls.

Quantifiers come with domain restrictions, which are especially visible in universal cases. Indeed, *everybody* in (57b) can hardly be interpreted as ranging on more than the people in the context set up by the previous sentence. However, at the end of the sentence the context contains both boys and girls, and that's where the reach of the contextual restriction stops: only a syntactic analysis, one that posits an implicit partitive form, can manage to pick out only the just-introduced nominals: the girls that entered in (57), or the tourists that arrived in (56).

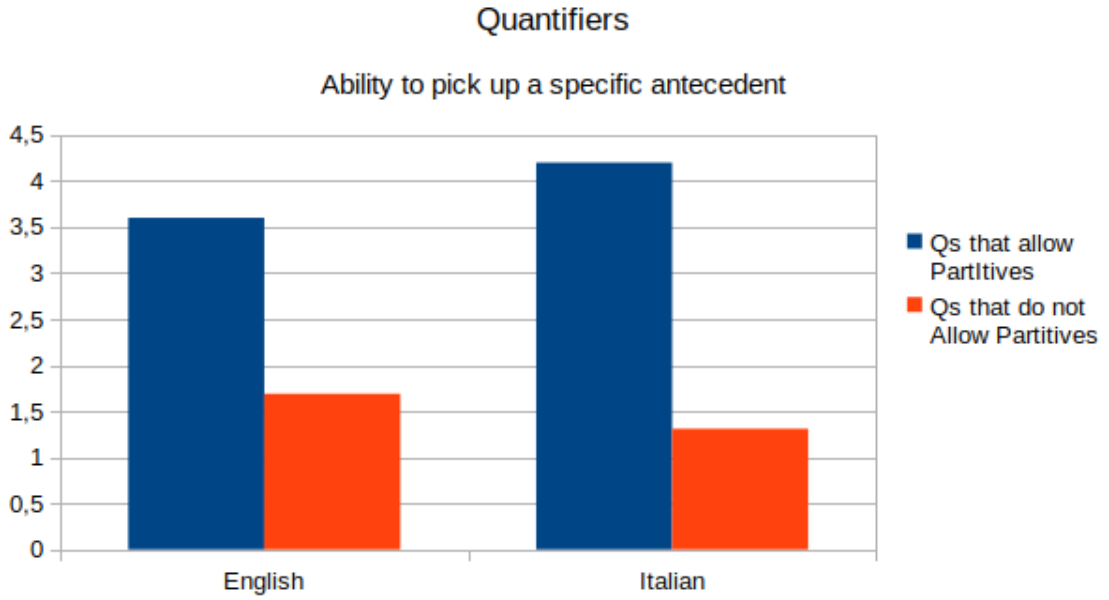


Figure 6: Possibility to D-Link only to the most recent plurality introduced

6.1 *The role of* ne

We have seen that in post-V argument position Italian uses *ne* with any NDP, unless the NDP receives a non-specific [+HUMAN] interpretation, as in (5b) above or (56). All our examples, however, used unaccusative verbs (with auxiliary *essere* 'be'). Post-V subjects of unergative verbs like *telefonare* 'to telephone' are said not to allow post-V subjects (Belletti, 1988). We find them less than completely degraded, and mark them as *??* in (58a). We follow Longobardi, 2000 in assuming that the post-verbal subjects of these verbs may be too high to allow for a well-formed chain between *ne* and its trace or unpronounced copy. Turning to transitives, *ne* can be extracted from direct objects, but not from inside PPs ((58b) and (58c)). Finally, strong distributive quantifiers block pro-NP *ne* even when all other conditions are satisfied (see (58d), and (38) above).

(58) a. ??Clienti, ne$_i$ hanno telefonato tre t_i
Customers, ONES$_i$ have phoned three t_i.
'speaking of customers, three called'

b. *Clienti, ne$_i$ ho parlato con tre t_i.
Customers, ONES$_i$ I_have spoken with three t_i.
'speaking of customers, I spoke with three'

c. *Pacchi, ne$_i$ ho applicato l' etichetta a tre t_i.
Packages, ONES$_i$ I_have applied the tag to three t_i.
'speaking of packages, I applied their tag to three.'

d. *Neonati, ne$_i$ ho consegnato ciascuno t_i ai suoi genitori.
newborns, ONES$_i$ I_have delivered each t_i to his parents.
'speaking of children, I brought each one to his parents.'

What happens when *ne* is dropped? While we did not gather data from a pool of naive speaker, our intuitions are that the *ne*-blocking PP cases (58b, c) (i) are all perfectly gram-

matical without *ne*; (ii) the NDL is not forced to a [+HUMAN] interpretation ((58d) is a clear counterexample) and (iii) the DL reading is perfectly possible. Thus, (59a) directly contrasts with (56).

(59) a. Sono arrivati [quattro turisti cinesi]$_i$. Ho già parlato con
Are arrived [4 turists Chinese]$_i$. I_have already spoken with
[due$_{j\subset i}$].
two$_{j\subset i}$.
'[Four Chinese turists]$_i$ arrived. I already spoke with two$_{j\subset i}$'

b. Ci sono [dieci pacchi]$_i$ da confezionare. Ho già applicato l'
There are [10 packeges]$_i$ to assemble. I_have already applied the
etichetta a sei$_{j\subset i}$.
tag to six.

The judgments for the distributive case in (58d) are less sharp. DL seems possible removing *ne*, but the sentence is not perfect. The post-V NDLs with unergatives seen in (58a) remain non D-Linked (and [+HUMAN]) without *ne*. Interesting, Italian has a trick up its sleeves to get this meaning, modeled after (59): it uses a special preposition *in*, which embeds the post-V subjects of an unergative verb and makes DL readings available again (60).

(60) Ieri sono arrivati [quattro turisti]$_i$. Oggi hanno chiamato *(in) due$_{j\subset i}$.
yesterday are arrived [4 turists]$_i$. Today have called (in) two$_{j\subset i}$.
'Four turists arrived yesterday. Today two called.' (lit. 'they called in two')

The DL reading of those quantifier that have nominal restrictions (right columns in Table 3 above) remain impossible at all time. Unsurprisingly, these quantifiers all disallow *ne*.

What can be conclude from this complex data? A compact way to express the situation is (61).

(61) To have a DL reading in Italian, the Q in the NDP
a. must allow overt partitives.
b. if its restriction is phonetically null, it must be licensed.

Ne is a way to avoid a completely null restriction (NP is replaced by a copy/trace, but this is linked to an overt element).

Merging [+HUMAN] features is another way of avoiding completely empty restrictions, as is merging morphemes like *-thing* or *-body* in English *everything, everybody*. These are not anaphoric elements, however, so they block the partitive reading and with it the DL interpretation. Finally, there are cases when the *ne* strategy is structurally unavailable (NDL in pre-V subject position, or embedded under a PP) and the [+HUMAN] features yields an unwanted semantics. In these case, NP elision is carried out *in situ*. We understand this to be a more expensive option and, in some sense, a last resort. This does not mean that adopting it gives raise to partial or total deviance: subject NDP are perfectly fine, and so are the examples in (59). This seems a situation suitable to be modeled in an optimality-theoretic framework (Legendre, Grimshaw, and Vikner, 2001; Steddy and Samek-Lodovici, 2011), where less important constraints (licensing elision) become important when the more prominent constrains (insert a *ne*-NP) become unsatifi-

able. However, time and space are insufficient to attempt an analysis along these lines.

The situation of unergatives remains at this point rather unsatisfactory: if they truly block *ne* they should allow DL readings in the absence of *ne* just as well as (59). It should be noted, however, that the ungrammaticality of *ne* with unergatives (illustrated in (58a)) is much more nuanced than other cases. In this case, the acquisition of reliable graded judgments from a pool of speakers could be the key to understand the real nature of this difference.

7. Conclusions

In this paper we have explored the conditions for a distinction (the presence/absence of so-called *Discourse Linking* — the reference to an antecedent superset), a phenomenon which has been addressed by means of a more elaborate system of indexes (see (e.g. Enç, 1991)), or used as a tool to classify the behavior of different types of Wh-elements (from the D-Linked *which* to the 'aggressively non-D-Linked' *who the hell!*, see Pesetsky 1987). Our take was a bit different. We did not focus of Wh-elements or on examples like (62), though we believe that our analysis is fully compatible with them.

(62) Four people have just arrived. {Which one / How many / Who / Who the hell} speaks Italian?

We looked instead at the ingredients that shape the presence or absence of the DL reading across a range of 'determiners', some of which (in particular, proportions) have not received a lot of attention. The results show a complex picture, especially in post-V position. When the two languages under consideration diverged (as with the nDL reading of post-V *half*), we tried to confirm the discrepancy with statistical tests and to find an account in terms of independently motivated features or constructions in the two languages. One limits of the present study is of course the number of languages under consideration. Some languages, e.g. Hungarian, seem to mark different readings of NDPs with specific suffixes (A. Tamm, p.c.). A study of the range of determiners that can bear such suffixes could be a way to probe the generality of the analysis we have adopted for (overt) partitives. A comparison with French, which has an NP-proform similar to the Italian *ne*, would also be relevant. We leave these topics for future investigations.

Acknowledgements

The authors wish to thank the audiences of Going Romance 2022 and IGG 2023 for comments and discussion.

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