

# Natural Negation and Quantification: explorations into negative concord

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## 1. Introduction<sup>1</sup>

In some languages, when co-occurring in a suitable construction, as in (1)b., multiple occurrences of negative items, as *ninguém* (nobody), semantically express together only one negation. This phenomenon is usually known as negative concord (NC) and, when considered in full detail, brings to light non trivial challenges concerning the interface between Syntax and Semantics of natural languages.

- (1) a. *Ninguém viu o Rui.*  
nobody saw the Rui  
Nobody saw Rui.
- b. *Ninguém viu ninguém.*  
nobody saw nobody  
Nobody saw anybody.

As part of this complexity, it has been observed in the literature that NC in some Romance languages exhibits an asymmetry between preverbal and postverbal N-words<sup>2</sup> (e.g. the relevant translational counterparts of the English *nobody*, *no*, *nothing*, *never*, etc.): whilst postverbal N-words require the presence of some negative element preceding the verb — vd. the contrast in (2)a. —, preverbal N-words cannot co-occur with a marker of sentential negation — vd. the contrast in (2)b.. Portuguese patterns with Italian and Spanish in this respect, giving rise to the basic distribution illustrated below:

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<sup>1</sup> We are grateful to Berthold Crysmann for his discussion of the results presented in this paper.

<sup>2</sup> See, among many others, van der Wouden and Zwarts, 1993; Dowty, 1994 for Italian; Suñer, 1995 for Spanish.

- (2) a. O Rui \*(nã) viuinguém.  
 the Rui not saw nobody  
 Rui didn't see anybody.
- b. Ninguém (\*nã) viuo Rui.  
 nobody not saw the Rui

Within the recent literature, there have been different contributions to resolve this puzzle. These contributions may be seen as falling into one of the following three types of approaches:

- An N-word unambiguously expresses negation, and during syntactic derivation, there happens the merging of multiple "negations" into one (cf. Zanuttini, 1991, Haegeman, 1995, a.o.);
- N-words do not directly express negation, and negative force is conveyed by some non overt operator, without phonetic realization (cf. Ladusaw, 1996, Suñer, 1995, a.o.);
- N-words are lexically ambiguous between a positive existential and a universal negative reading, with syntactic structure restricting the distribution of these two different readings (van der Wouden and Zwarts, 1993, Dowty, 1994, a.o.).

The first two approaches have to assume a certain amount of formal machinery to cancel out or to introduce negative force. This typically involves special purpose constructs to ensure the correct prediction of facts, thus being of limited conceptual insight and weakening the explicative appeal of this sort of approaches. Ambiguity approaches, in turn, in order to perform the task of disambiguation, tend to make use of arbitrary syntactic diacritics in the grammatical geometry in order to anchor the right reading at the right place in the grammatical structure, thus lending this other type of approaches also a limited explanatory appeal.

In this paper, we will try to enhance the interest in the ambiguity-driven approach to NC by uncovering a constraint, independently motivated from the NC facts, which avoids resorting to stipulative disambiguation via arbitrary diacritics.

Using NC in Portuguese as a case-study and adhering to the ambiguity approach rationale, we assume that N-words in this language are lexically ambiguous between, on the one hand, universal negative quantifiers, and on the other hand, positive existentials, in this case with the specific property of being also strong negative polarity items (NPIs).

In what follows, we will argue that the different distribution of the two different readings of N-words, and the concomitant emergence of so-called NC constructions, do not result from the effect of stipulated diacritics: rather, they can be derived from the interplay of independently motivated syntacto-semantic constraints.

One of these constraints has been widely discussed in the literature for several languages and receives thus empirical justification from outside the realm of facts concerning the NC phenomenon: the occurrence of a strong NPI is subject to the usual licensing condition of it being preceded by an anti-additive expression (cf. Zwarts, 1996).<sup>3</sup>

The other constraint we are introducing is also independently justified, as we will argue in the following sections: there is a restriction on a certain formally well defined class of semantic operators which bans these operators to appear in a position linearly preceding negative expressions.

Our goal in this paper is thus twofold. First, we aim at lending empirical justification to the linear precedence constraint between negative expressions and a group of operators, which includes a subclass of quantifiers. Second, we discuss how this constraint together with the usual constraint on strong NPIs and the assumption that N-words are ambiguous in the way referred to above can provide for a wide range of correct empirical predictions with respect to NC, without resorting to stipulative assumptions or constructs.

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<sup>3</sup> Evidence that N-words qua NPIs are strong polarity items can be observed in examples like the ones below (see footnote 6 for the definition of anti-additivity). In (i), a monotone decreasing but not anti-additive item, the quantifier *poucos dos estudantes* (few of the students), is unable to act as licenser of N-words, in (i)a., although it acts as licenser of a weak NPI such as *o que quer que fosse* (anything; lit: the what ever that was), in (i)b.:

- (i) a. \* Poucos dos estudantes viram *nada*.  
 few of\_the students saw nothing
- b. Poucos dos estudantes viram *o que quer que fosse*.  
 few of\_the students saw the what ever that was  
 Few students saw anything.

In (ii), an anti-additive and monotone item, *nenhum estudante* (no student) is able to act as licenser both of a strong NPI, in (ii)a., and a weak NPI, in (ii)b.:

- (ii) a. Nenhum estudante viu *nada*.  
 no student saw nothing
- b. Nenhum estudante viu *o que quer que fosse*.  
 no student saw the what ever that was  
 No student saw anything.

## 2. Quantifiers preceding negation

A first set of empirical observations to be considered concerns the co-occurrence interaction between quantifiers and negation.

Hoeksema (1986:38) reports that not all English determiners can be preceded by not: not every, not many, etc. are grammatical sequences, but \*not several, \*not most, etc. are ungrammatical ones. Interestingly, a similar interaction holds with respect to Portuguese determiners and negation but in a linearly reversed relationship.

In a first rough characterization, contrasts as the ones below can be seen as showing that not all determiners can be part of an NP that precedes the negation adverb não (not) — for ease of reference the determiners in (3) and (4) are grouped in sets we term respectively Sy and Sn.

- (3) {Muitos, alguns, vários, a maioria dos, os, n} estudantes não viram o Rui.  
 {Many, some, several, the most of\_the, the, n} students not saw the Rui.  
 {Many, some, several, most, the, n} students didn't see Rui.
- (4) a. \* {Todos os, nem todos, poucos dos, cada} estudante(s) não viram/viu o Rui.  
 {all the, not every, few of\_the, each} student(s) not saw the Rui
- b. ?? {Menos de n, no máximo n} estudantes não viram o Rui.  
 {less than n, at most n} students not saw the Rui
- c. ? Poucos estudantes não viram o Rui.  
 few students not saw the Rui

The hypothesis that this incompatibility between a subgroup of determiners and negation have its root in some semantic universal should be discarded, as in some languages — e.g. German — such co-occurrence constraint is not observed:

- (5) {Alle, Wenige} Studenten haben Rui nicht gesehen.  
 {every, few} students have Rui not seen  
 {All, Few} students have not seen Rui.

This, however, should not be taken as implying that no semantic generalization exists that sets the determiners in Sy apart from those in Sn. The claim we will argue for below is that such a generalization can be brought to light and that it is based in general semantic properties. Data such as (5) should then be considered as

showing that this distributional asymmetry of determiners is language specific, possibly being the effect of language parameterization.<sup>4</sup>

### 3. Downward monotonicity

In order to make apparent the semantic properties possibly underlying the contrasts above, it is worth noticing first that the distinction between sets  $S_y$  and  $S_n$  does not replicate the distinction between strong and weak determiners. Elements from both  $S_y$  and  $S_n$  behave as weak determiners, such as *alguns* (some) and *menos de n* (less than  $n$ ) in (6), or as strong determiners, such as *a maioria dos* (most) and *todos os* (every) in (7):

- (6)        *Havia*    {*alguns, menos de n*} *estudantes na sala.*  
               there was {some, less than  $n$ } students in\_the room.
- (7)        \* *Havia*    {*a maioria dos, todos os*} *estudantes na sala.*  
               there was {the most of\_the, all the} student(s) in\_the room

The distinction between  $S_y$  and  $S_n$  does not align either with the distinction between cardinal and proportional determiners. The contrast below shows that not all proportional determiners fit into one of our sets  $S_y$  or  $S_n$ :

- (8) a.        {*Muitos dos, alguns dos, n dos*} *estudantes não viram o Rui.*  
               {many of\_the, some of\_the,  $n$  of\_the} students not saw the Rui
- b. \* *Poucos dos* *estudantes não viram o Rui.*  
               few of\_the students not saw the Rui

If we look at the property of monotonicity, however, a natural grouping seems to emerge. Quantifiers from  $S_y$  are either non-monotone or monotone increasing; quantifiers from  $S_n$ , i.e. those corresponding to determiners that cannot precede the negation adverb *não*, are (left or right) monotone decreasing:<sup>5</sup>

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<sup>4</sup> We are extending our research to other languages. Preliminary results seem to indicate that this distributional constraint may be active also in Dutch.

<sup>5</sup> Definition of right monotone decreasing determiners:

$$\text{MON} \downarrow: (D(A)(B) \wedge B^* \subseteq B) \rightarrow D(A)(B^*)$$

Example of a test to check out this property with respect to the nominal determiner *nem todos* (not all), where the denotation of *portugueses* (Portuguese) is a subset of the denotation of *européus* (European) — for a full discussion of the testing of natural expressions with respect to generalized

|             |             | ↓MON | MON↓ |    |
|-------------|-------------|------|------|----|
| a maioria   | most        | -    | -    | Sy |
| muitos      | many        | -    | -    | Sy |
| alguns      | some        | -    | -    | Sy |
| n           | n           | -    | -    | Sy |
| o           | the         | -    | -    | Sy |
| todos       | all         | +    | -    | Sn |
| cada        | each        | +    | -    | Sn |
| nem todos   | not all     | -    | +    | Sn |
| poucos      | few         | -    | +    | Sn |
| menos de n  | less than n | +    | +    | Sn |
| no máximo n | at most n   | +    | +    | Sn |

The hypothesis that downward monotonicity is the property at stake receives further empirical support from constructions where the occurrence of the negation adverb is also ruled out by monotone decreasing expressions other than determiners. Importantly, that is what can be observed in the context of examples with the prepositional expression *sem* (without) or the adverbial *nem* (not even):

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quantifiers properties see Zwarts (1996):

- (i) **Nem todos os estudantes são europeus.** → **Nem todos os estudantes são portugueses.**  
 not all students are European → not all students are Portuguese

Definition of left monotone decreasing determiners:

$$\downarrow\text{MON} : (D(A)(B) \wedge A^* \subseteq A) \rightarrow D(A^*)(B)$$

Example of a test to check out this property with respect to the nominal determiner *todos* (all):

- (ii) **Todos os europeus são simpáticos.** → **Todos os portugueses são simpáticos.**  
 all European are kind → all Portuguese are kind

- (9) a. O Rui saiu sem (\*não) ter visto o Pedro.  
 the Rui left without (not) have seen the Pedro  
 Rui left without having seen Pedro.
- b. Nem o Pedro (\*não) viu o Rui.  
 not even the Pedro (not) saw the Rui  
 Not even Pedro saw Rui.

## 4. Determiners, negation and proclisis

In order to strengthen the empirical justification of the above generalization, it is worth noting that the determiners in  $S_n$  form a natural class also with respect to other linguistic phenomena unrelated to NC or to negation.

Verbal pronominal clitics in Portuguese occur typically in an enclitic position, after the verb. In the European variant of this language, however, some specific syntactic environments exist where clitics occur before the verb, in a proclitic position. These contexts have been seen as showing that the distribution of clitics is sensitive to the occurrence of a broad range of constructions and expressions, considered as proclisis triggers, among which one finds a subset of determiners (vd. Madeira, 1992, Martins, 1994, a.o.). For the sake of our study, it is thus of note that, in previous work, Crysmann (1998, 1999) showed that the determiners triggering proclisis can be characterized as  $\downarrow\text{MON} \cup \text{MON}\downarrow$ , the set of left or right monotone decreasing determiners, i.e. those appearing in  $S_n$ :

- (10) a. \* {Todos os, nem todos, poucos, menos de  $n$ , no máximo  $n$ } estudantes  
 viram-no.  
 {all the, not all, few, less than  $n$ , at most  $n$ } students  
 saw-CLITIC:him
- b. {Todos os, nem todos, poucos, menos de  $n$ , no máximo  $n$ } estudantes  
 o viram.  
 {all the, not all, few, less than  $n$ , at most  $n$ } students  
 CLITIC:him saw  
 {Every, not every, few, less than  $n$ , at most  $n$ } students saw him.

Like what happens with the interaction with negation, and in opposition to the determiners of  $S_n$ , the non-downward monotone determiners, in  $S_y$ , are those that occur in the unmarked configuration, as they go along with enclisis:

- (11) a. {Muitos, alguns, vários, a maioria dos, os, n} estudantes  
viram-no.  
{many, some, several, the most of\_the, the, n} students  
saw -CLITIC:him  
{Many, some, several, most, the, n} students saw him.
- b. \* {Muitos, alguns, vários, a maioria dos, os, n} estudantes o  
viram.  
{many, some, several, the most of the, the, n} students CLITIC:him  
saw

Interestingly, the interaction of quantifiers with negation and quantifiers with clitics have yet further similarities, as it will be discussed in the next section.

## 5. A-Quantifiers

The partitioning of determiners between Sy and Sn regarding proclisis generalizes from nominal determiners to adverbial determiners, or in another terminology, from D- to A-quantifiers: while non-downward monotone A-quantifiers like *muitas vezes* (many times) or *várias vezes* (several times) do not trigger proclisis, the opposite is true for downward monotone A-quantifiers like *sempre* (always) or *poucas vezes* (seldom):

- (12) a. {Muitas vezes, várias vezes} elas viram-no.  
{often, sometimes} they saw-CLITIC:him
- b. \* {Muitas vezes, várias vezes} elas o viram.  
{often, sometimes} they CLITIC:him saw
- (13) a. \* {Sempre, poucas vezes} elas viram-no.  
{always, few times} they saw-clitic:him
- b. {Sempre, poucas vezes} elas o viram.  
{always, few times} they CLITIC:him saw

Likewise, an analogous constraint can be observed for the interaction with negation. The contrast above is replicated below, where downward monotone A-quantifiers cannot precede negation:

- (14) O Rui {muitas, algumas, a maioria das, n} vezes não viu o  
Pedro.  
the Rui {many, some, the most of\_the, n} times not saw the  
Pedro  
Rui didn't see Pedro {many, some, most, n} times.



- (15) a. \* O Rui {sempre, nem sempre, poucas das vezes} não viu o Pedro.  
 the Rui {always, not always, few of\_the times} not saw the Pedro
- b. ?? O Rui menos de *n* vezes não viu o Pedro.  
 the Rui less than *n* times not saw the Pedro
- c. ? O Rui {poucas, no máximo *n*} vezes não viu o Pedro.  
 the Rui {few, at most *n*} times not saw the Pedro

## 6. Linear precedence and scope

The data on clitic distribution show that proclisis triggering is operative under linear precedence, irrespective of the scope relationship between quantifiers and the clitic. Constructions with subject extraposition, as in (16), or D-quantifier float, as in (17), lend empirical support to this fact. When a monotone decreasing D-quantifier from Sn occurs after the clitic, it loses its ability to trigger proclisis:

- (16) a. Cumprimentaram-no todos os estudantes.  
 greeted-CLITIC:him all the students  
 All students greeted him.
- b. \* O cumprimentaram todos os estudantes.  
 CLITIC:him greeted all the students
- (17) a. Os estudantes telefonaram-lhe todos.  
 the students phoned-CLITIC:to\_him all  
 All students phoned him.
- b. \* Os estudantes lhe telefonaram todos.  
 the students CLITIC:to.him called all

Constructions with A-quantifiers exhibit the same pattern as above, thus reinforcing the empirical argument for the critical importance of linear precedence in the interaction of quantifiers with proclisis:

- (18) a. Eles telefonaram-lhe sempre.  
 they phoned-CLITIC:to\_him always  
 They always phoned him.
- b. \* Eles lhe telefonaram sempre.  
 they CLITIC:to\_him phoned always

Likewise, linear precedence appears as a critical factor for the interaction between quantifiers and negation. In subject extraposition constructions, as in (19), or sentences with quantifier float, as in (20), the incompatibility between monotone decreasing D-quantifiers and negation is not operative if the former occur after the negation adverb:

- (19) a. Não viram o Rui todos os estudantes.  
 not saw the Rui all the students  
 No student saw Rui./Not every student saw Rui.
- b. \* Todos os estudantes não viram o Rui.  
 all the students not saw the Rui
- (20) Os estudantes não viram todos o Rui.  
 the students not saw all the Rui  
 No student saw Rui./Not every student saw Rui.

Again, the parallelism between proclisis and negation can be observed with respect to A-quantifiers. Only when the adverb *sempre* (always) — with the temporal reading — occurs before the negation adverb, the co-occurrence restriction applies:

- (21) a. \* Sempre os estudantes não viram o Rui.  
 always the students not saw the Rui  
 %The students didn't always see Rui./%The students never saw Rui.
- b. Os estudantes não viram o Rui sempre.  
 the students not saw the Rui always  
 The students didn't always see Rui./The students never saw Rui.

Note that both the postverbal subject NP in (19)a., as well as the postverbal floating quantifier in (20), may take either wide or narrow scope with respect to negation. The same appears to hold for the postverbal adverbial in (21)a.. We can therefore discard differences in scope properties as a potential source of explanation for the constraint between downward monotone operators and negation. Instead, the data below show that such constraint is operative on the basis of a linear precedence relationship between the operator and the negation adverb.

## 7. Anti-additive operators

In the previous sections, the incompatibility of D-quantifiers with negation was shown to generalize to other sort of expressions that exhibit the same kind of incompatibility, namely prepositions such as *sem* (without), adverbs such as *nem*

(not even) or A-quantifiers such as *sempre* (always). These expressions have in common that they are all monotone decreasing and cannot precede negation.

We will focus now on the other side of this linear precedence constraint. In order to uncover their formal properties, we will examine expressions that cannot follow monotone decreasing operators.

The contrasts below illustrate that the constraint at stake is not restricted to the negation adverb *não* (not). It extends to other negative expressions, such as *ninguém* (no one), *nenhum* (no), or *nunca* (never):

- (22) a. \* {*Sempre, Poucas vezes*} *ninguém viu o Rui.*  
           {always, few times} nobody saw the Rui
- b. *Ninguém viu {sempre, poucas vezes} o Rui.*  
           nobody saw {always, few times} the Rui  
           Nobody saw Rui {always, seldom}.
- (23) a. \* {*Todos os, Poucos dos*} *estudantes nunca tinham visto o Rui.*  
           {all the, few of the} students never had seen the Rui
- b. *Nunca {todos os, [?]poucos dos} estudantes tinham visto o Rui.*  
           never {all the, few of the} students had seen the Rui  
           Never {all, few} students had seen Rui.

Like in the contrasts of the previous sections with respect to *não* (not), these other negative expressions can precede monotone decreasing items but cannot be preceded by them. Accordingly, this restriction cannot be assigned to the fact that these negative items are monotone decreasing expression, as in such case the examples b. above would have to be also ungrammatical.

What seem thus to be common to the expressions not, no, nobody, never is the fact that they are negative. Looking at the hierarchy of negative expressions studied in Zwarts, 1996, it turns out that the formal property common to all of them and yet distinctive with regards to other items is their being (right) anti-additive.<sup>6</sup>

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<sup>6</sup> Definition of right anti-additivity:

$$\text{ANTI-ADD} \downarrow: D(A)(B \vee B') \leftrightarrow D(A)(B')$$

## 8. Negative concord and more

Taking into account the generalization above, motivated independently of NC constructions in the previous sections, it is possible to provide now a principled explanation for a broad range of data, including NC facts, under the approach that N-words are ambiguous.

In (1) and (2)b., repeated below, the NPI reading lexically associated with the N-word *ninguém* (nobody) occurring in pre-verbal position is not licensed by any preceding licenser. Hence, in these constructions, this occurrence of this N-word is restricted to express negation, as unequivocally shown by (1)a.. Accordingly, despite their lexical ambiguity, only the negative quantifier reading can be contributed by them in these occurrences.

- (1) a. *Ninguém viu o Rui.*  
nobody saw the Rui  
Nobody saw Rui.
- b. *Ninguém viu ninguém.*  
nobody saw nobody  
Nobody saw anybody.
- (2) a. *O Rui \*(não) viu ninguém.*  
the Rui (not) saw nobody  
Rui didn't see anybody (anytime).
- b. *Ninguém (\*não) viu o Rui.*  
nobody (not) saw the Rui

Given the first occurring, preverbal N-word is a universal negative quantifier, it is then a monotone decreasing expression. Accordingly, the ungrammaticality in (2)b. can simply be traced to the general linear constraint banning monotone decreasing operators linearly preceding an anti-additive operator, such as the negation adverb.

Turning to the case of multiple concordant terms, as in (1)b. and (2)a., we see that this linear constraint precludes the postverbal N-word to express negative force: Its negative reading is not allowed by the linear constraint given it is preceded by a downward monotone operator, namely the pre-verbal *ninguém* (nobody) in (1)b., and the adverb *não* (not) in (2)a.. Still, the other reading of these post-verbal N-words, as (positive existential) NPIs, is licensed. Given that the first occurring N-word in (1)b. can only be a negative quantifier there, either this first N-word in (1)b. or the negation adverb in (2)a. act as licensers of strong NPIs.

Examples (1)b. and (2)a. exemplifies thus why in this type of constructions with multiple concordant terms negation is expressed only once: (i) in the absence of

suitable NPI licensors, N-words occurring first can enter the construction only under the negative quantifier reading; (ii) for N-words occurring after the first N-word or after the negation adverb, the inverse situation holds: the preceding N-words or the negation adverb act as licensors of their NPI reading while at same time blocking their negative quantifier reading.

Identical explanation follows directly for other constructions where more than two concordant terms occur, as in the following example:

- (24) Nem nunca ninguém nada viu que pudesse incriminar o Rui.  
 not never nobody nothing saw that might incriminate the Rui  
 It is not the case that anyone has ever seen anything that might incriminate Rui.

Finally, the approach we sketched in this paper helps to explain other facts not restricted to the realm of negative concord. In (23)a., repeated below, we see a case where both the negative quantifier reading of an N-word is banned and its NPI reading is not licensed. Given todos (all) and poucos (few) are (left) downward monotone, they preclude the negative quantifier reading of nunca (never) of entering the grammatical construction; however, given they are not anti-additive, their failure to qualify as strong NPI licensors also preclude an NPI reading for nunca (never). Consequently the construction is ungrammatical:

- (23) a. \* {Todos os, Poucos dos} estudantes nunca tinham visto o Rui.  
 {all the, few of the} students never had seen the Rui  
 (22) a. \* {Sempre, Poucas vezes} ninguém viu o Rui.  
 {always, few times} nobody saw the Rui

The data in (22)a. shows a similar effect with the only difference that the relative linear order of the D- and A-quantifiers is reversed.

## 9. Conclusions and future research

In this paper we analyzed a set of data we interpret as supporting the generalization that there is a constraint banning downward monotone operators from linearly preceding anti-additive operators. When this constraint is taken into account concomitantly with the assumption that Portuguese N-words are ambiguous between a universal negative and a positive existential reading, a neat and straightforward explanation can be provided for a wide range of puzzling data,

including many cases of what has been termed in the literature as negative concord constructions.

The results presented here are a first step in exploring other details and the importance of the constraint now uncovered. We are now working on providing a formal account of the data discussed above in the grammatical framework of Head-driven Phrase Structure Grammar, extended with a Minimal Recursion Semantics setup for semantic representation. In the future we are interested in examining a larger set of data, and in particular to use textual databases to check the data used in this paper. We plan also to address a specific case of negative concord construction, namely the impossibility of having postverbal non concordant N-words, and how the explanation found for the other cases of negative concord in this paper can be extended in order to cover also this requirement. Examining other languages with some variant of NC, and check if the constraint now uncovered also holds in those languages will also be another major focus of inquiry in future research.

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