# LICENSING AND INTERPRETATION OF *N*-WORDS IN COMPARATIVE CLAUSES

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## Abstract

The available analysis of comparative constructions that intend to explain the possibility of NPIs to occur in *than*-clauses do not give a satisfactory account of the licensing and interpretation of *N*-words in such clauses. In this paper, I propose a different analysis of comparative constructions, which, contrary to previous analysis, does not assume any stipulation particular to such structures, such as some rule that reverses the scope relations between different elements. This is achieved by considering that the semantics of comparative constructions involves the consideration of three degrees. The proposed analysis explains naturally the presence and interpretation of *N*-words in *than*-clauses.

## 1    Introduction

In this paper I will be concerned with the licensing and interpretation of *N*-words, as *ninguém* – 'nobody' –, or *nunca* – 'never' –, in *than*-clauses, as in the examples (1)-(3):

(1)    O   Paulo  trabalhou mais  do que       ninguém.
       *the  Paulo  worked    more than_what nobody*
       'Paulo has worked harder than anybody (else).'

(2)    O   Paulo  não trabalhou mais  do que       ninguém.
       *the  Paulo  not worked    more than_what nobody*
       'Paulo has not worked harder than anybody (else).'

(3)    Desta  vez,  o   Paulo  correu menos do que       nunca.
       *on_thistime, the Paulo  ran    less    than_what never*
       'This time, Paulo ran less than ever.'

The examples are from Portuguese, a Negative Concord language. Similar examples are to be found in other Romance languages, which are also Negative Concord languages. In this environment, *N*-words are not interpreted as negative quantifiers, but as NPI's. That is, *ninguém* is interpreted as equivalent to *anybody,* not as equivalent to *nobody,* and *nunca* is interpreted as equivalent to *ever,* not as equivalent to *never.*

As for languages like English, as is well known, NPI's may also occur in comparative clauses, as shown by examples as (4) and (5):

(4)    John is taller than any student.
(5)    John is taller than his brother will ever be.

I will first consider some previous analyses of comparative constructions that intend to explain the possibility of NPI's to occur in *than*-clauses and I will try to show that none of these analyses gives a satisfactory account of the licensing and interpretation of *N*-words in Romance languages. I will then present a different analysis of comparative constructions, from which the possibility of *N*-words and NPIs to occur in such clauses follows naturally.

## 2  Previous analyses
## 2.1  The universal quantification over degrees and the maximality operator approaches

The first proposal to be considered is the idea, advocated in Cresswell (1976), Pinkal (1989) and Lerner and Pinkal (1992, 1995), that *than*-clauses involve universal quantification over degrees. According to such proposal, the meaning of (6) would be captured by a formula like (7), where *d, d'* and *d''* are degree variables, *j* stands for John and *m* for Mary:

(6)      John is taller than Mary.
(7)      $\exists d' [[\text{tall'} (j,d')] \wedge \forall d [\text{tall'} (m,d) \rightarrow [d' > d]]]$

According to this analysis, (6) means that John is taller than every degree *d* such that Mary is *d* tall. Since the universal quantifier is downward monotonic, *than*-clauses would be a context of downward monotonicity, a fact that would explain the possibility of NPI's to occur in such clauses. The meaning of comparative constructions where NPI's occurs in the *than*-clause is easily captured by this analysis. Sentence (8) would mean that John is taller than every degree *d* such that there is a student who is *d* tall, as expressed in (9):

(8)      John is taller than any student.
(9)      $\exists d' [\text{tall'} (j,d') \wedge \forall d \exists x [[\text{student} (x) \wedge \text{tall'} (x,d)] \rightarrow [d' > d]]]$

The second proposal to be considered is advocated by von Stechow (1984), who follows the idea of Russell that *than*-clauses are definite descriptions. However, von Stechow argues, they are not simple definite descriptions, but involve the computation of a (hidden) maximality operator, defined in (10):

(10)      Max (P) is true of d *iff* P(d) and ~ ($\exists d'$) [P(d') & d' > d]

<div align="right">(cf. von Stechow (1984), 37)</div>

According to this proposal, the meaning of (6) – *John is taller than Mary* – would be as described in (11). Sentence (8) – *John is taller than any student* – would correspond to a formula like (12), that is, it would mean that John is taller than the maximal degree *d* such that some student is *d*-tall:

(11)      $\exists d' [\text{tall'} (j,d') \wedge [d' > \text{MAX } \lambda d ([\text{tall'} (m,d)])]]$
(12)      $\exists d' [\text{tall'} (j,d') \wedge [d' > \text{MAX } \lambda d ([\exists x [\text{student'} (x) \wedge \text{tall'} (x,d)])]]]$

Since the maximality operator creates a downward monotonic context, it would licence the presence of NPI's in *than*-clauses.

Turning now to *than*-clauses with *N*-words in Romance languages, it can be shown that neither the hypothesis of universal quantification over degrees nor the hypothesis of the maximality operator give a satisfactory account of the facts. In what concerns the first hypothesis, it fails to explain why *N*-words in *than*-clauses are assigned an interpretation different from the one they receive in other constructions where they also occur under the scope of a universal quantifier. This can be shown by comparing the interpretation of the *N*-word *ninguém,* – 'nobody' – in (1) and in (13):

(1)      O  Paulo  trabalhou  mais  do que       ninguém.
          *the  Paulo  worked     more  than_what   nobody*
          'Paulo has worked harder than anybody.'

(13)      Todos  os   lugares  onde   ninguémesteve  foram  ignorados.
          *all      the  places   where  nobody was     were   ignored*
          'All the places where nobody was were ignored.'

According to the proposal of universal quantification, (1) would be translated to (14), where the *N*-word is interpreted as an existential quantifier over individuals under the scope of a universal quantifier (over degrees):

(14)      $\exists d'$ [works_hard' (p,d') $\wedge$ $\forall d$ [$\exists x$ [person' (x) $\wedge$ works_hard' (x,d) $\rightarrow$ [d' > d]]

However, in what respects (13), *ninguém* – 'nobody' – which also occurs under the scope of a universal quantifier, would have to be translated as an existential quantifier under the scope of negation, as indicated in (15):

(15)      $\forall y$ [[place' (y) $\wedge$ $\neg \exists x$ [person' (x) $\wedge$ was-in' (x, y)]] $\rightarrow$ was_ignored (y)]

That is, in (1), the *N*-word *ninguém* is interpreted as *anybody,* while in (13) the same word is interpreted as *nobody*.

The same kind of problem exists with the proposal that *than*-clauses involve the computation of the maximality operator. Such operator is also to be found in superlative constructions. In such constructions *N*-words, if allowed at all, are interpreted as existential quantifiers under the scope of negation, as show by (16), which might be paraphrased by (17):

(16)      A    montanha mais alta    que o   Paulo nunca escalou é  o   Monte Everest.
          t*he  mountain more high  that the Paulo never  climbed is the Mount Everest*
          'The highest mountain that Paulo never climbed is Mount Everest.'

(17)      Of those mountains *x* such that there is not an interval of time when Paulo
          climbed *x,* the one that is higher than all the others is Mount Everest.

In *than*-clauses, on the other side, according to the maximality operator hypothesis, *N*-words are interpreted as existential quantifiers, but they are not under the scope of negation. This is shown by (18), the formula that, according to the maximality operator analysis, captures the meaning of (1) – 'O Paulo trabalhou mais do que ninguém':

(18)      $\exists d'$ [works_hard' (p,d') $\wedge$ [d'>MAX ($\lambda d$ [$\exists x$ [person' (x) $\wedge$ works-hard' (x,d)]])]]

Another problem common to the considered proposals is the following one. According to both approaches, *N*-words may appear in *than*-clauses because this is a downward monotonic context. However, Schwarzschild and Wilkinson (2002) argue that *than*-clauses do not constitute a downward monotonic context, contrary to what is generally assumed, but an upward monotonic one. I will come to this point later.

Finally, there is another difficulty common to both the universal quantification and the maximality operator proposals. In fact, according to such proposals, the scope assigned to quantifiers in comparatives with *N*-words is not the same as in other comparatives. This point can be illustrated by comparing sentence (1) and (19), which have the same meaning:

(1)       O Paulo trabalhou mais do que ninguém.
          'Paulo has worked harder than anybody.'

(19)      O Paulo trabalhou mais do que toda a gente.
          'Paulo worked harder than everyone (else).'

As is well known from the literature, according to the universal quantification over degrees or to the maximality operator proposals, the subject of the *than*-clause needs to have scope over the degree introduced by such clause. Thus, (19) is translated to (20a) or (20b). In either formula, the universal quantifier over individuals has scope over the universal quantifier over degrees or the maximality operator.

(20)  a. $\exists d'$ [worked' (p, d') $\wedge$ $\forall x$, $\forall d$ [[person' (x) $\wedge$ worked' (x, d)] $\rightarrow$ [d' > d]]]
      b. $\exists d'$ [worked' (p, d') $\wedge$ $\forall x$ [person' (x) $\rightarrow$ [d' > MAX ($\lambda d$ [worked' (x, d)])]]]

If the scope relation is the reversal one, as shown in (21), the formulas would mean that Paulo worked harder than the higher degree common to everyone else. That is, it would mean that Paulo worked harder than the person who worked the least.

(21)  a. $\exists d'$ [worked' (p, d') $\wedge$ $\forall d$, $\forall x$ [[person' (x) $\wedge$ worked' (x, d)] $\rightarrow$ [d' > d]]]
    b. $\exists d'$ [worked' (p, d') $\wedge$ [d' > MAX ($\lambda d$ ($\forall x$ [person' (x) $\rightarrow$ [worked' (x, d)]]))]

However, in what respects comparatives with *N*-words, the subject of the *than*-clause needs to have lower scope, as indicated in (14) and (18), the formulas that would capture the meaning of (1) – *O Paulo trabalhou mais do que ninguém*.

(14)      $\exists d'$ [works_hard' (p,d') $\wedge$ $\forall d$ [$\exists x$ [person' (x) $\wedge$ works_hard' (x,d) $\rightarrow$ [d' > d]]
(18)      $\exists d'$ [works_hard' (p,d') $\wedge$ [d'>MAX ($\lambda d$ [$\exists x$ [person' (x) $\wedge$ works-hard' (x,d)]])]]

If the scope relation is the reversal one, as shown in (22), the formulas would mean that Paulo has work harder than someone, which is not the meaning of (1).

(22)  a. $\exists d'$ [works_hard' (p,d') $\wedge$ $\exists x$ [person' (x) $\wedge$ $\forall d$ [works_hard' (x,d) $\rightarrow$ [d' > d]]]]
    b. $\exists d'$ [works_hard' (p,d') $\wedge$ $\exists x$ [person' (x) $\wedge$ [d'>MAX ($\lambda d$ [works-hard' (x,d)]])]]

Thus, according to the proposals of universal quantification over degrees or the maximality operator, some mechanism of raising the subject of the *than*-clause has to be assumed, but such mechanism does not operate in comparatives with *N*-words.

## 2.2  The indirect licensing hypothesis

A different proposal concerning the licensing of NPIs in *than*-clauses is considered by Giannakidou (1998), who claims an indirect licensing of such expressions. According to this proposal, a sentence like (23) asserts that Roxanne run *g* fast and implies that people did not expect Roxanne to run *g* fast. It would be by virtue of this implicature that *N*-words are legitimated in comparative clauses.

(23)      Roxanne ran faster than anyone expected.

Adopting this analysis to *N*-words, sentences (24) and (25) would be associated with different implicatures. (24) would have the implicature that Paulo never before had run **at least** *g,* while (25) would have the implicature that never before Paulo had run **at most** *g*.

(24)      O  Paulo  correu  mais do que      nunca.
          *the Paulo ran      more than_what never*
          'Paulo has run faster than ever.'

(25)      O  Paulo  correu  menos do que      nunca.
          *the Paulo ran      less   than_what never*
          'Paulo has run less than ever.'

However, it is rather inelegant that so similar constructions are associated with different implicatures. It seems more fit to assume that both kinds of comparatives share the same analysis, with the only difference that *less* and *more* express opposite orders of degrees.

Thus, none of the considered proposals gives a satisfactory account of the licensing and interpretation of *N*-words in comparative clauses. I will now present an alternative analysis of comparative constructions, from which the possibility of *N*-words to occur in *than*-clauses follows naturally.

## 3    An alternative analysis of comparative constructions

In what concerns the syntactic analysis of comparative constructions, I will not assume the traditional division between 'clausal comparatives', as (26), and 'phrasal comparatives', as (27):

(26)    O   Paulo  é  (muito)  mais  alto do que        é  a    Ana.
        *the Paulo is (much)  more tall than_what is the Ana*
        'Paulo is (much) taller than Ana is'

(27)    O   Paulo  é  (muito)  mais  alto  do que       a    Ana.
        *the Paulo is (much)  more tall   than_what the Ana*
        'Paulo is (much) taller than Ana'

Instead, I will assume that all comparatives are clausal, the difference between (26) and (27) being that in (27), but not in (26), the VP is elliptical. One immediate problem respects the interpretation of this ellipsis. In fact, the resolution of ellipses requires identity between the elliptical VP and its antecedent. The problem is that, as observed by several authors (e.g., Moltmann (1992), Hendriks (1995) or Kennedy and Merchant (2000)), according to this requisite of identity, the comparative operator, such as *more* or *less,* has to occur both in the main and in the *than*-clause. That is, after the resolution of ellipsis, (27) would correspond to the sequence *Paulo is taller than Ana is taller than.*

   To avoid this problem, it may be assumed that the resolution of ellipsis is done after the comparative operator has been stripped out of its position. Such assumption is considered by Moltmann (1992), Lerner and Pinkal (1995) or Heim (2000), among others. Moltmann (1992), for instance, proposes that the comparative operator suffers Quantifier Raising, leaving in its place a trace, which would be a degree variable. Thus, in (28a), for instance, the operator *-er* suffers Quantifier Raising, as shown in (28b), and the VP that is copied to the *than*-clause is [*is* d-*tall].*

(28)  a. John is taller than Mary.
      b. [-er] [John [is *d*-tall]]

Lerner and Pinkal (1995) considers only comparatives as (29a) and propose that Quantifier Raising applies to the NP *a faster car than Bill.* (29b)-(29d) are the steps involved in the syntactic interpretation of the structure, which will be translated to the formula (29e).

(29)  a.  George owns a faster car than Bill.
      b. [$_{NP}$ [$_{NP}$ a faster car than Bill *e*]$_i$ George owns t$_i$]
      c. [$_{NP}$ [$_{NP}$ a faster car than Bill *e*]$_i$ [George$_1$ [$_{IP}$ t$_1$ owns t$_i$]
      d. [$_{IP}$[$_{NP}$[$_{NP}$a faster car] than [$_{CP}$WH$_j$ C [$_{IP}$Bill$_2$ [$_{IP}$t$_2$ owns t$_j$]]]]$_i$ [George$_1$[$_{IP}$t$_1$ owns t$_i$]
      e. $\exists x \exists d'$ [$\forall d$ [$\exists y$ [fast'(car')(y,d) $\wedge$ own'(b*,y)] $\rightarrow$ d'>d] $\wedge$ fast'(car') (x,d')
$$\wedge \text{ own' (g*,x)}]$$

As for Heim (2000), she assumes that *more than* p is a constituent, which is raised to a position higher than the one where it is generated. Thus, (30a) would correspond to (30b) in Logical Form.

(30)  a. John is more than 4 feet tall.
      b. [$_{DegP}$ –er than 4 ft]$_1$ John is [$_{AP}$ t$_1$ tall]

Considering that there are counter-arguments to the idea that *more than* p is a quantifier, as Kennedy (1997) shows, this constituent may not be raised by Quantifier Raising. Instead, another mechanism of raising would have to be assumed.

Another hypothesis, considered by Kennedy and Merchant (2000), is that the comparative operator is copied, but suffers 'vehicle change'. Thus, in a sentence like (28) – *John is taller*

*than Mary –*, the VP [*is taller]* would be copied as [*is* d–*tall]* and the sentence would be interpreted as saying that John is taller than the degree *d* such that Mary is *d*-tall.

If the subject of the *than*-clause is not a proper noun or a definite description, as in (31), there has to be assumed some mechanism that raises the subject NP out of the *than*-clause. Otherwise, (31) would be interpreted as indicated in (32):

(31)     John is taller than many of his colleagues.
(32)     John is taller than the degree *d* such that many of his colleagues are *d*-tall.

In a model where, for instance, John is six feet tall, one of his colleagues is five feet tall and all the others are seven feet tall, (31) would be true, but (32) would be false. The meaning of (31) would only be captured if the NP [*many of his colleagues]* has scope over the degree *d.* However, there are well known counter-arguments to the idea that the subject of the *than*-clause may be raised, as observed by Beil (1997) or Schwarzschild and Wilkinson (2002).

Thus, the considered analyses of comparative constructions have to make two problematic assumptions. First, the resolution of ellipsis in this kind of constructions is preceded by some mechanism that strips out the comparative operator, a mechanism that may be particular to comparative constructions; and, second, there is another process of raising, which allows the subject of the *than*-clause to have scope over the degree variable introduced by the *than*-clause.

I will propose a different analysis of comparative constructions, which does not assume any operation of raising or any other mechanism that reverses scope relations. The basic assumptions in what regards the syntactic analysis of comparative constructions are the following: (i) the comparative operators (such as *more* or *less)* take as their complement a degree constituent, which is not lexically realised; (ii) the comparative clause is a nonrestrictive relative clause, which is generated in or is raised to a position of adjunction to the main clause (or the main VP), and which is coindexed with the argument of the comparative operator. The intuitive idea, in the line of Russell (1905) and others, is that a sentence like *John is taller than Mary m*eans that John is taller than a degree *d,* and that the *than*-clause is a definition of this degree. In what regards the resolution of ellipsis, I will make the assumption that there is indeed identity between the elliptical VP and its antecedent. That is, if the resolution of ellipsis involves copy of the main VP, then the comparative operator is also copied into the *than*-clause. This idea seems counter-intuitive, but it allows the resolution of ellipses in comparative clauses to follow the general mechanisms of ellipsis resolution. I will also assume that there is a hidden negative operator in the comparative clause. Thus, (33) will be the syntactic configuration of (26) – *O Paulo é (muito) mais alto do que a Ana –*, once the VP ellipsis is solved:

(33)

```
                                    CP
                        _____/  _____
                      CP                        [PREDICATION]
                     […]                      _____/   _____
              _____/  _____              [e]ᵢ             NP
            NP              VP                          ____/   \____
            _           ___/  \___                    [∅]       REL-Clause
        [o Paulo]      V        AP                             ____/   \____
        the Paulo      |      __/  \__                  (de o) queᵢ        […]IP
                       é    XP       A                  (of) what        __/   \__
                       is  _/ \_     |                                  NP       NEGP
                   (muito)  X'  alto                                    _      __/  |  \__
                   (much)  _/ \_  tall                              [a Ana]  não        VP
                        mais  [e]ᵢ                                  the Ana  not      __/  \__
                        more                                                        V        AP
                                                                                    |      __/  \__
                                                                                    é     XP       A
                                                                                    is   _/  \_     |
                                                                                  mais  [e]ᵢ  alta
                                                                                  more        tall
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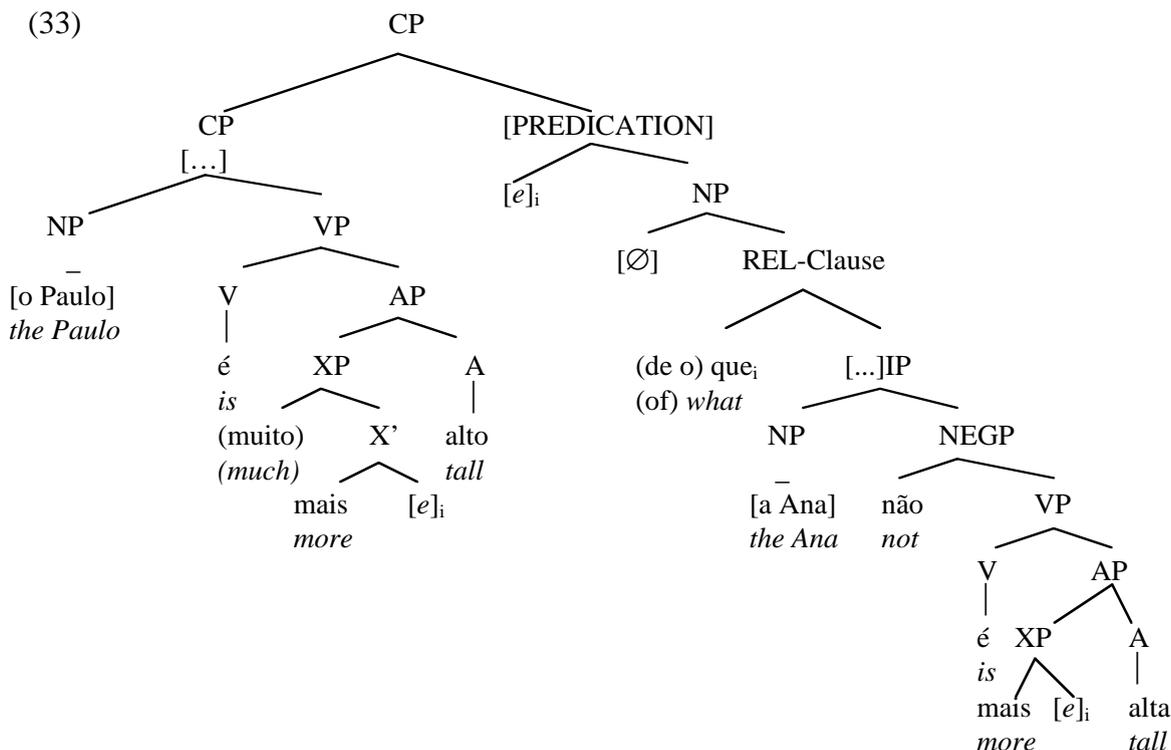
This syntactic configuration is translated to the DRS (34):

(34)

$$
\begin{array}{|l|}
\hline
x, y, d, d' \\
\text{Paulo }(x) \\
\text{Ana }(y) \\
x \text{ is } d'\text{-tall} \\
d' > d \\
\hline
\neg \begin{array}{|l|}
\hline
d'' \\
y \text{ is } d''\text{-tall} \\
d'' > d \\
\hline
\end{array} \\
\hline
\end{array}
$$
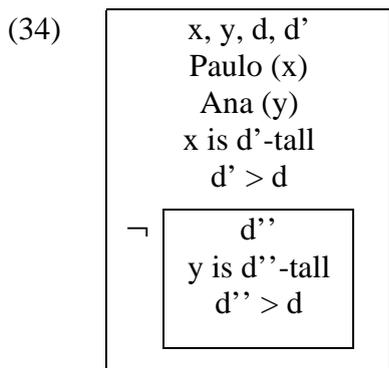
According to this analysis, (26) may be paraphrased as (35a) or (35b), which are equivalent to (35c):

(35) a.  Paulo is taller than a degree *d,* such that Ana is not taller than *d*.
    b.  Paulo is tall in a degree higher than the (minimal) degree which Ana is not taller than.
    c.  Paulo is taller than the (degree of) tallness of Ana.

This being so, the computation of comparative constructions will involve the consideration of three degrees. (26) indicates that the tallness of Paulo is superior to a degree *d* and that the tallness of Ana is not superior to this degree. If there were no negation in the comparative clause, (26) would correspond to the DRS (36), which just indicates that both Paulo and Ana have tallness:

(36)

$$\begin{array}{|c|}\hline \text{x, y, d, d', d''} \\ \text{Paulo (x)} \\ \text{Ana (y)} \\ \text{x is d'-tall} \\ \text{d'} > \text{d} \\ \text{y is d''-tall} \\ \text{d''} > \text{d} \\ \hline \end{array}$$

Thus, according to the proposed analysis, simple comparatives, like (26), lead to the prediction that there is negation in *than*-clauses. Once this is assumed, the possibility of *N*-words to occur in *than*-clauses is not surprising. They are legitimated by this negative operator.

Considering now comparatives of equality, as (37), assuming that such constructions are syntactically similar to comparatives of superiority or inferiority, the proposal leads to the prediction that there is no negation in the comparative clause.

(37)   O   Paulo é   tão  alto como  a    Ana.
       *the Paulo is  as   tall as     the Ana.*
       'Paulo is as tall as Ana.'

The syntactic analysis of (37) will be (38), which corresponds to the DRS (39):

(38)



(39)
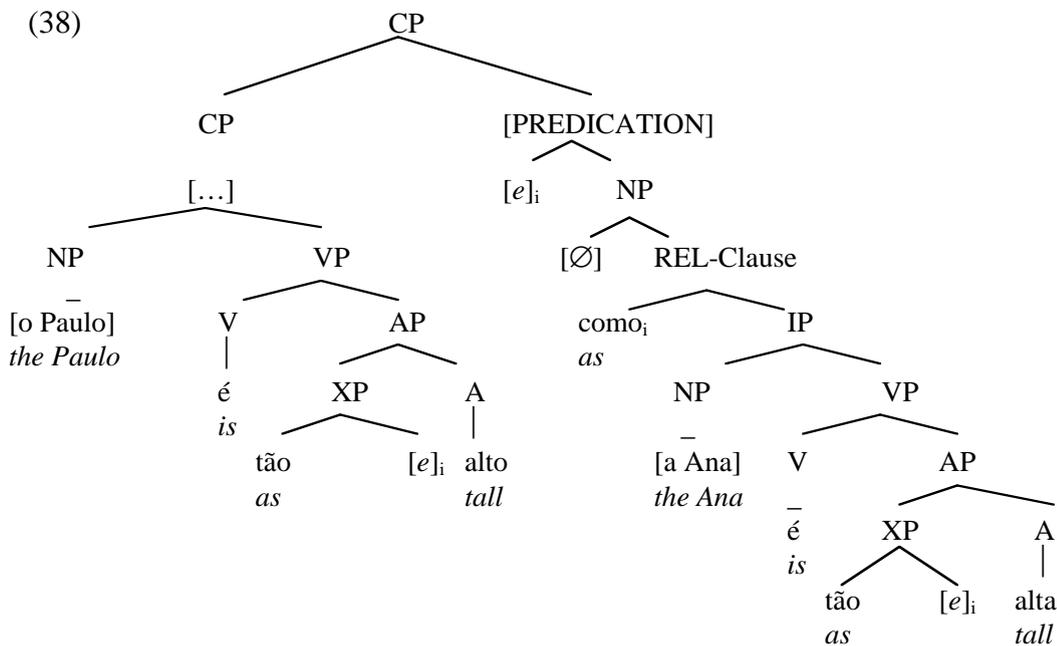
$$\begin{array}{|c|}\hline \text{x, y, d, d', d''} \\ \text{Paulo (x)} \\ \text{Ana (y)} \\ \text{x is d'-tall} \\ \text{d'} = \text{d} \\ \text{y is d''-tall} \\ \text{d''} = \text{d} \\ \hline \end{array}$$

If there were negation in comparatives of equality, the DRS corresponding to (37) would be (40). The sentence would mean that Paulo and Ana have different degrees of tallness.

(40)

$$
\begin{array}{|c|}
\hline
\text{x, y, d, d'} \\
\text{Paulo (x)} \\
\text{Ana (y)} \\
\text{x is d'-tall} \\
\text{d' = d} \\
\neg\ \boxed{\begin{array}{c} \text{d''} \\ \text{y is d''-tall} \\ \text{d'' = d} \end{array}} \\
\hline
\end{array}
$$
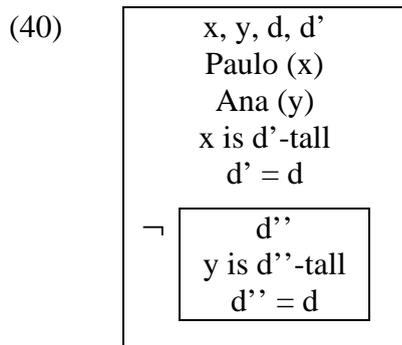
Thus, the proposed analysis predicts that there is negation in comparative clauses with the operators *more* or *less,* but not in comparatives of equality. The fact that *N*-words may occur in the first kind of comparatives, but not in comparatives of equality, as shown by (41)-(43) is coherent with such prediction:

(41)  O   Paulo  trabalhou  mais  do que        ninguém.
       *the  Paulo  worked     more  than_what  nobody*
       'Paulo has worked harder than anybody.'

(42)  O   Paulo  correu   menos  do que        nunca.
       *the  Paulo  ran       less     than_what  never*
       'This time, Paulo ran less than ever.'

(43)  *O  Paulo  correu  tanto       como   nunca.
       *the  Paulo  ran      as-much   as         never*
       'Paulo ran as fast as ever.'

A positive consequence of the proposed analysis of comparative constructions is that no mechanism that reverses the scope relations between different operators has to be assumed. In particular, previous analyses of comparative constructions have to assume an obligatory rule that gives wide scope to the subject of the *than*-clause, though there are several arguments against the existence of such rule, as observed by Larson (1988), Schwarzschild and Wilkinson (2002), among others. According to the analysis that I propose, the different constituents of the *than*-clause are interpreted *in situ.* This point might be illustrated by considering (44), which corresponds to the syntactic configuration (45), where the relativised degree constituent has scope over the subject of the *than*-clause, which, in its turn, has scope over the negation operator. The same scope relations are obtained in the semantic representation, as shown by (46):

(44)  O   Paulo  é  mais  alto  do que        a    maioria   dos seus  colegas.
       *the  Paulo  is  more  tall    than_what  the  majority  of_his     colleagues*
       'Paulo is taller that most of his colleagues.'

(45)

```
                                        CP
                        _____|_____
                      CP                            [PREDICATION]
                    […]                          _____|_____
             _____|_____             [e]_i            NP
           NP                  VP                      _____|_____
           _              _____|_____                [∅]            REL-Clause
       [o Paulo]        V          AP                          _____|_____
       the Paulo        |       ___|___                   (de o) que_i          IP
                        é      XP      A                   (of) what       _____|_____
                       is    _|_       |                              NP           NEGP
                           mais [e]_i alto                            _         _____|_____
                           more       tall                    [a maioria dos  não        VP
                                                              seus colegas]   not     ____|____
                                                              most of his            V        AP
                                                              colleagues             |     ___|___
                                                                                    são   XP      A
                                                                                    are  _|_       |
                                                                                      mais [e]_i altos
                                                                                      more       tall
```

(46)

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┌─────────────────────────────────────────────────────────────┐
│                          x, d, d'                            │
│                          Paulo (x)                           │
│                         x is d'-tall                         │
│                           d' > d                             │
│  ┌──────────────┐      ◇        ┌─────────────────────────┐  │
│  │      y       │    ╱   ╲      │          ┌───────────┐  │  │
│  │ y is friend  │   ╱ most ╲  ¬ │          │    d''    │  │  │
│  │   of x       │   ╲  y  ╱     │          │ y is d''- │  │  │
│  │              │    ╲   ╱      │          │   tall    │  │  │
│  └──────────────┘      ◇        │          │  d'' > d  │  │  │
│                                 │          └───────────┘  │  │
│                                 └─────────────────────────┘  │
└─────────────────────────────────────────────────────────────┘
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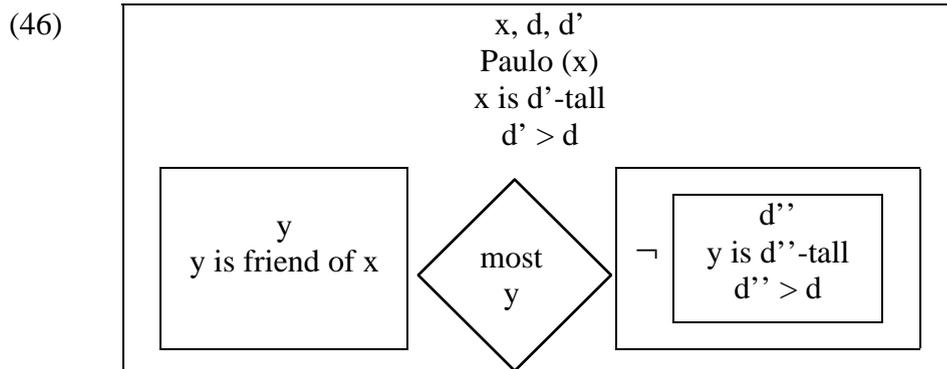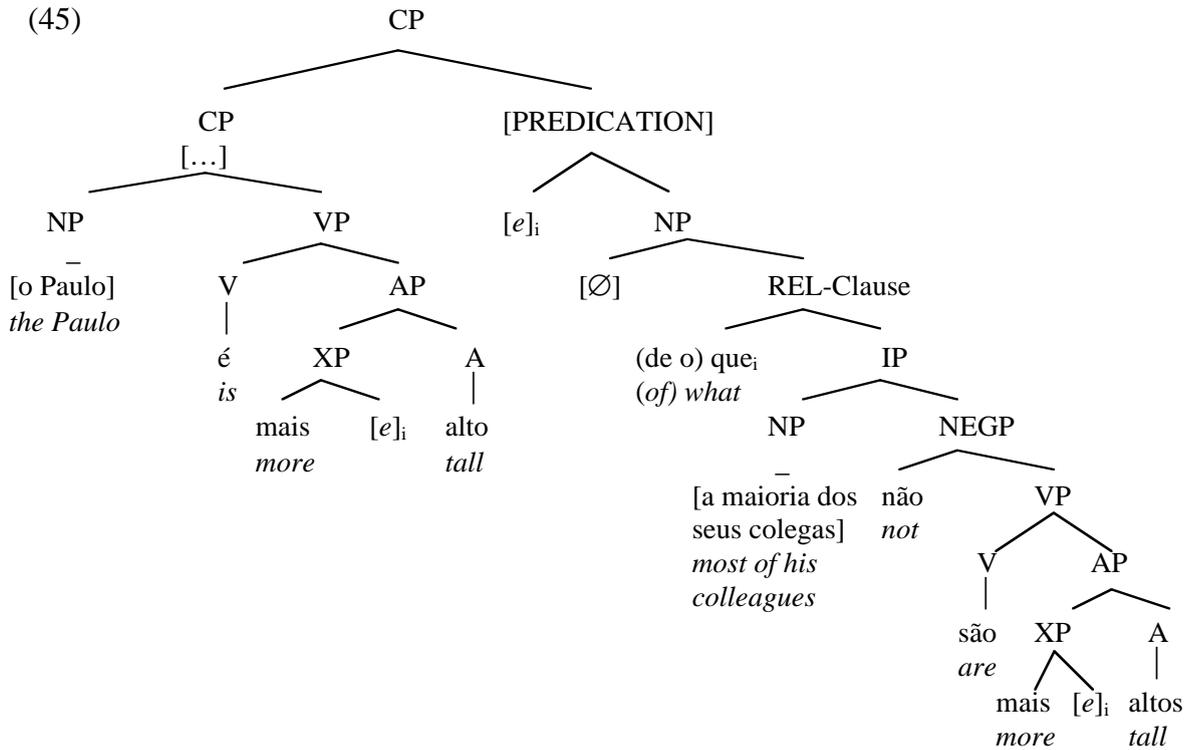
## 4  A reply to some counter-arguments

Having presented an analysis of comparative constructions that gives a natural account of the licensing and interpretation of *N*-words in *than*-clauses, I will now consider three possible counter-arguments to the advocated hypothesis. The first one has to do with undesirable inferences that would follow from the claim that there is negation in *than*-clauses; the second one is related to monotonicity properties of such clauses, and the third one with the interference of the polarity of the main clause in the interpretation of *N*-words occurring in *than*-clauses.

In what concerns the first issue, the hypothesis that there is negation in *than*-clauses was already considered by Seuren (1973), who proposes (48) as the logical form of (47):

    (47)       John is taller than Bill.

    (48)       $\exists d$ [John is $\geq$ d-tall $\wedge \neg$ [Bill is $\geq$ d-tall]]

von Stechow (1984) observes that this analysis has the undesirable consequence of predicting that (47) implies (49), since (48) implies (50):

    (49)       John is taller than everyone.

    (50)       $\exists d$ [John is $\geq$ d-tall $\wedge \neg$ [everyone is $\geq$ d-tall]]

This argument is valid on the assumption that the negation operator has scope over the entire proposition. However, in the analysis that I propose, in which the scope relations that are observed in the semantic representation are the same as those that are observed in the syntactic structure, the subject of the *than*-clause has scope over the negation operator. Thus, the sentence *John is taller than Bill* is interpreted as shown in (51):

(51)    $\exists$g [[John is taller than g] $\wedge$ [Bill is not taller than *g*]].

This proposition implies (52), but does not imply (53), which is the interpretation obtained for the sentence *John is taller than everyone,* according to the analysis that I propose.

(52)    $\exists$g [John is taller than g] $\wedge \neg$ [everyone is taller than g]
(53)    $\exists g$ [John is taller than g] $\wedge$ [Everyone is not taller than g]

Another possible counter-argument to the idea that there is negation in *than*-clauses comes from the observation of Schwarzschild and Wilkinson (2002) that such clauses are monotone increasing. Since sentential negation creates a downward monotonic context, this is a problem to the hypothesis that there is negation in *than*-clauses. The claim of the authors is based on the observation that the following inferences are invalid:

(54)   a. #John is richer than at least 4 of my relatives were.
           $\rightarrow$ John is richer than exactly 7 of my relatives were.

       b. #My car is heavier than some elephant in this room is.
           $\rightarrow$ My car is heavier than almost every elephant in this room is.

       c. #Nissan is currently more overvalued than at least 2% of the high tech stocks were.
           $\rightarrow$ Nissan is currently more overvalued than most of the high tech stocks were.

If the direction of the arrow is reversed, the entailments are intuitively correct. Thus, the examples show that *than*-clauses are a context of increasing monotonicity, not one of decreasing monotonicity. That is, it is possible to replace the subject of the *than*-clause by a less restrictive NP, but not by a more restrictive one.

The considered data involves the manipulation of the subject of the *than*-clause. However, the following examples show that the VP of the *than*-clause occurs in a downward monotonic context:

(55)    John has published more books than Bill.
           $\rightarrow$ John has published more books than Bill has published novels.

(56)    John trusts in European cars more than he trusts in Asian cars.
           $\rightarrow$ John trusts in European cars more than he trusts in Japanese cars.

This data means that the downward monotonic context of the *than*-clause includes the VP, but not the subject NP, a fact that is coherent with the hypothesis that there is a negative operator in *than*-clauses, which is under the scope of the subject NP, but has scope over the VP.
Finally, I will consider another potential problem for the analysis of comparatives that I consider. It respects the interpretation of sentences like (57) and (58):

(57)    O   Paulo  trabalhou mais  do que      ninguém.
        *the Paulo  worked    more than_what nobody*
        'Paulo has worked harder than anybody.'

(58)    O   Paulo  não trabalhou mais  do que      ninguém.
        *the Paulo  not worked    more than_what nobody*
        'Paulo has not worked harder than anybody.'

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It seems natural to assume that the only syntactic difference between these two sentences respects the presence or absence of negation in the main clause. Thus, taking for granted that *N*-words are existential quantifiers, as is generally assumed, in both sentences the *than*-clause would have the representation (59):

(59)

```
                                         CP
               _____|_____
              /                                    [PREDICATION]
             /                                      ___|____
            /\                                    [e]ᵢ      NP
           /  \                                            _|_____
          /    \                                         [∅]    REL-Clause
 o Paulo (não) trabalhou mais [e]ᵢ                               __|_____
 the Paulo (not) worked more [e]ᵢ                          (de o) queᵢ    IP
                                                           (of) what    __|____
                                                                      NP      NEGP
                                                                       _      __|___
                                                                   [alguém]  não   VP
                                                                   anyone    not   _|___
                                                                                  V     XP
                                                                                  |    _|____
                                                                              trabalhou mais  [e]ᵢ
                                                                               worked    more
```
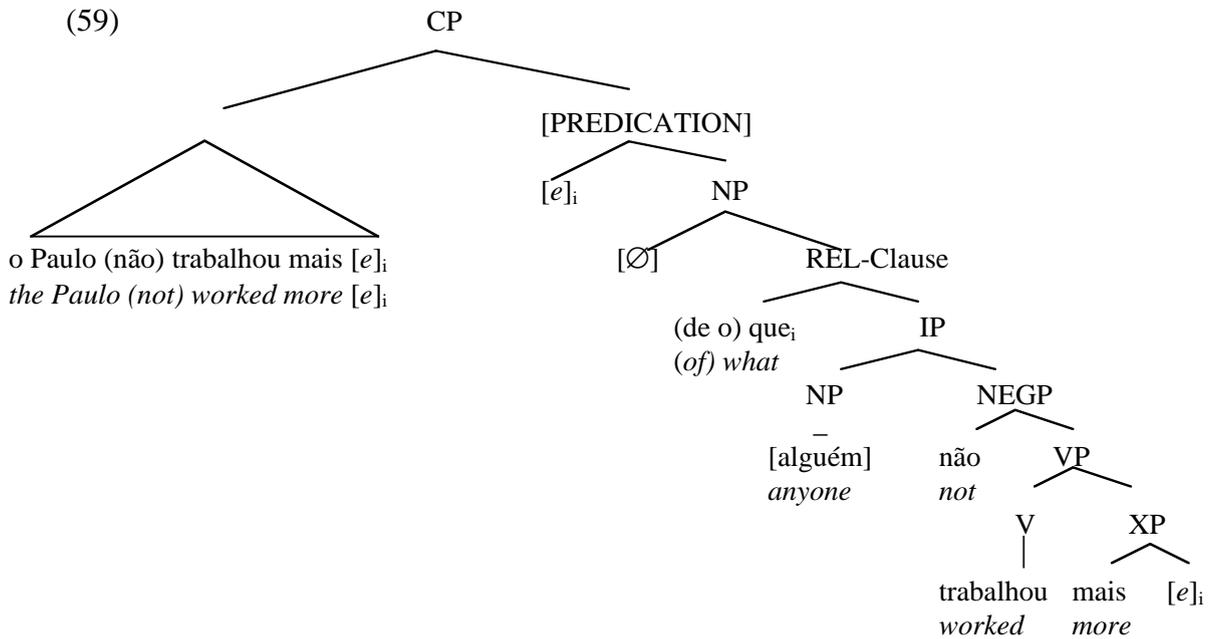
In this syntactic representation, the negation operator of the *than*-clause does not have scope over the subject NP, which will be realised as an *N*-word. However, the meaning of (57) is captured by the DRS (60), where the negation operator of the *than*-clause has scope over the *N*-word, while the meaning of (58) is captured by (61), where the scope relation between the negative operator of the *than*-phrase and the *N*-word is the reversal one:

(60)

$$
\boxed{
\begin{array}{c}
p, d, d' \\
\text{Paulo } (x) \\
\neg \boxed{
\begin{array}{c}
y, d'' \\
\text{person } (y) \\
y \text{ worked } d''\text{-hard} \\
d'' > d
\end{array}
} \\
x \text{ worked } d'\text{-hard} \\
d' > d
\end{array}
}
$$

(61)

$$
\boxed{
\begin{array}{c}
x, d \\
\text{Paulo } (x) \\
\neg \boxed{
\begin{array}{c}
d', y \\
\text{person } (y) \\
\neg \boxed{
\begin{array}{c}
d'' \\
d'' > d \\
y \text{ worked } d''\text{-} \\
\text{hard}
\end{array}
} \\
d' > d \\
x \text{ worked } d'\text{-hard}
\end{array}
}
\end{array}
}
$$
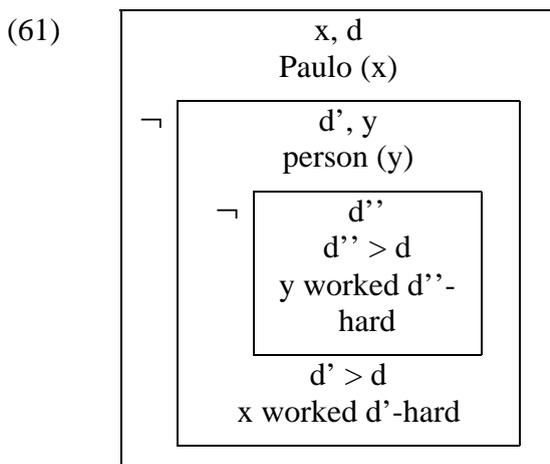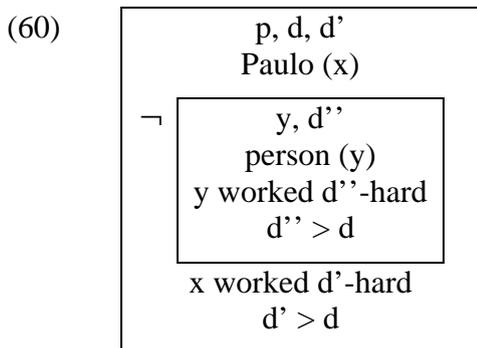
Thus, the proposed analysis has to assume different scope relations between the negation operator of the *than*-clause and the *N*-word depending on the polarity of the main clause. When the main clause is negative, the *N*-word has scope over the negation operator of the *than*-clause, while if the main word is affirmative, the existential quantifier corresponding to the *N*-word is under the scope of the negation operator of the *than*-clause. Nevertheless, this fact is not a problem for the proposed analysis of comparative constructions, being explained by the general analysis of *N*-words. In what respects sentence (58) – *O Paulo não trabalhou mais do que ninguém* –, the *N*-word is legitimated by the negation of the main clause, and the structure is interpreted as any other comparative construction, the subject NP having scope over the negation operator. The *N*-word *ninguém* is an existential quantifier, which has this morphological form by virtue of entering in a process of negative concord with the negation of the main clause. As for sentence (57) – *O Paulo trabalhou mais do que ninguém* –, the *N*-word is an existential quantifier that is incorporated with the negation operator, in the sense of Klima (1964). These two processes – 'negative concord' and 'incorporation of negation' – are operative in simple sentences, like (62), as shown by Peres (1995), among others.

(62)      Ninguém  viu  nada.
          *nobody    saw nothing*
          'Nobody saw anything.'

The first *N*-word that occurs in (62) results from the incorporation of an existential quantifier with the negative operator, which takes scope over it, while the second *N*-word enters in a process of negative concord.

## 5   Conclusion

In this paper, I have presented an analysis of comparative constructions which does not have to assume any particular mechanism concerning the syntax or the semantics of this kind of structure. The licensing of *N*-words in *than*-clauses follows naturally from the proposed analysis and their interpretation involves the same processes that are operative in other constructions where *N*-words may appear.

The hypothesis assumes that *than*-clauses have a negation operator and a comparative operator. This hypothesis allows the resolution of ellipsis in *than*-clauses to follow from general principles of grammar and does not have to assume any rule of scope reversal. However, there is a lack of empirical evidence in favour of the proposed analysis. In particular, as far as I know, no language exhibits a comparative operator lexically realised in the *than*-clause. Nevertheless, the presence of this second comparative operator is predicted by the hypothesis that there is negation in *than*-clauses. Otherwise, a sentence like *John wrote more books than Mary* would mean that there is a number of books *d,* such that John wrote more than *d* books and Mary did not write *d* books. This way, the sentence would be predicted to be false if John wrote just one more book than Mary, a situation in which the sentence is true. According to the analysis that I propose, the sentence means that there is a number of books *d,* such that John wrote more than *d* books and Mary did not write more than *d* books. As was seen before, the presence of negation in the *than*-clause is obligatory, since if there were no negation, the sentence would just mean that there is a number of books *d,* such that John wrote more than *d* books and Mary also wrote more than *d* books. This being so, the sentence would be true in any model where both Mary and John have write books, regardless of the fact that John wrote more, less or the same number of books than Mary. Thus, according to the proposed analysis, the presence of negation and the presence of a second comparative operator in the *than*-clause are both predicted. If *than*-clauses do not have negation neither a comparative operator, as empirical evidence suggests and most analyses of comparative constructions assume, then, as has been noticed in the literature, a mechanism that reverses scope relations has to be assumed

in some comparative constructions. However, such mechanism would not be operative in comparatives involving *N*-words, as I hope to have showed. The hypothesis that *than*-clauses have negation and a comparative operator, though counter-intuitive, gives an account of the semantics of comparative constructions without any particular assumption concerning this kind of structures and allows comparatives with *N*-phrases to have the same analysis as any other comparative.

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