Double Negation in a Negative Concord Language: An Experimental Investigation

Abstract

This paper investigates the interpretation and processing of simple transitive Catalan sentences with multiple negative expressions experimentally. Our results provide empirical confirmation that Negative Concord (NC) is the preferred and faster interpretation for negative sentences that either omit or contain the overt negative marker *no* 'not'. However, they also reveal that, in contrast to traditional descriptions of Catalan and independently of particular favoring contexts, a non-negligible amount of Double Negation (DN) readings arises, mainly when the negative marker co-occurs with preverbal n-words, and when these n-words have a complex DP structure. Our results further suggest that two populations could be distinguished: one for whom the negative marker is optional and leaves the favoured NC reading essentially unaffected, and another where the co-presence of *no* significantly increases DN readings. We account for these findings within a micro-parametric approach that features a lexically ambiguous negative marker *no* (negative vs. expletive) and ambiguous n-words (non-negative vs. negative), variably available for Catalan speakers. The nuanced empirical NC landscape that our experimental work reveals serves to stress the importance of taking DN readings into consideration for a better understanding of the nature of negative constructions in Catalan and cross-linguistically.

Keywords: Negative Concord, Double Negation, experimental approach, micro-parametric account, ambiguous negative marker, ambiguous n-words

1. Introduction

Within the charted landscape of Negative Concord (NC) languages, Catalan is often cast as a misfit because it presents the peculiarity of optionally allowing the co-presence of a sentential negative marker *no* 'not' with preverbal n-words (Fabra 1912, 1918, 1956; Badia i Margarit 1962, 1994; Solà 1973; Quer 1993; Vallduví 1994; Espinal 2002). The central goal of the present paper is to report the results of an experimental research that sought to test when, and to what extent, native speakers of Catalan prefer to interpret negative sentences of various types with a single negation interpretation as a Negative Concord (NC) reading, and whether, in some circumstances, with specific syntactic combinations of n-words, with and without a sentential negative marker, a Double Negation (DN) reading could emerge in simple transitive clauses as it has been claimed to emerge in other NC languages like Romanian.

We report on two experiments that aimed at investigating the following four questions. First, we tested whether it is correct, as standardly assumed by Catalan grammarians, that NC is systematically and consistently the default interpretation for sequences of multiple negative terms; second, we asked whether the processing of negative sequences in Catalan could be overall faster, and hence presumably easier to parse under a NC reading than under a DN one. The latter is commonly assumed to be cross-linguistically marked (Corblin et al. 2006, de Swart 2010, Puskás 2012), but has recently been shown, in equivalent experimental settings, to be sometimes equally fast, and even sometimes faster in distinct languages; third we verified whether the co-presence of the sentential negative marker *no* with preverbal n-words could influence the

readings of negative sequences and increase DN readings and fourth, we investigated whether the morpho-syntactic composition of the n-words involved in a negative sequence could influence the readings preferred by native speakers, increasing or decreasing a putative preference for a NC vs. DN reading.

Regarding the first question, we aimed at investigating to what extent the default nature of NC readings in Catalan can be confirmed, and whether Catalan sequences of n-words in simple transitive clauses are essentially always unambiguous, radically favouring NC readings in neutral discourse and prosodic contexts across native speakers, as expected from the literature.[1]

Regarding the second question, we aimed to experimentally test whether speakers process NC readings more easily and faster than DN readings, and whether the common belief that DN readings have a higher degree of parsing complexity than NC / single negation readings can be correlated with a longer reaction time.

Finally, regarding the third and fourth questions, our experiments were designed to explore whether native speakers of Catalan have a preference for NC readings irrespectively of the co-presence or absence of a sentential negation marker with preverbal n-words. One of our goals in raising this precise question was to seek to establish an experimental base line for further investigation of the properties of Catalan NC, and in particular of the factors that can bring about the emergence of DN readings, if any. A second goal was to provide an experimental assessment of the strength of NC interpretations in Catalan, for the purpose of cross-linguistic comparison with other Romance languages, such as French, Italian, Portuguese and Spanish. A third goal was to investigate the effects, if any, of the morpho-syntactic complexity of DPs containing n-

[1] See references above.

words on the interpretation of negative sequences. In this respect we considered simple n-word pronominal forms vs. full DPs (with both partitive and non-partitive forms), and their parallel vs. non-parallel distribution in subject and object position.

The paper is organised as follows. Section 2 presents a summary of the relevant background facts about the interpretation of negative sequences in Catalan, centring on the properties of this language as a NC one, and on the contexts where the negative marker *no* seems to be optional. We then present some theoretical accounts of these known facts from the literature, focusing more specifically on the required ingredients of a micro-parametric approach to Catalan NC. In Section 3, we present our experimental design and methodology. Section 4 details the results of our experiments. Finally, Section 5 discusses these results and assesses their consequences within a general theory of NC.

2. Background

2.1. Catalan as an NC language

Negative doubling (den Besten 1986), in which multiple occurrences of morphologically negative constituents are interpreted as a single logical negation, is a common synchronic phenomenon in Catalan. Characteristic Catalan examples provided in (1) contain both negative expressions or *n-words* (Laka 1990) (*ningú* 'nobody', *res* 'nothing') and the negative marker (*no* 'not'):

(1) *Ningú* (*no*) pensa *res*.
nobody not thinks nothing
'Nobody is thinking anything.'

As is well known, *no* 'not' is optional with n-words in preverbal position but must be present with post-verbal ones, as the examples in (2), from Fabra (1956: 83), with an unaccusative predicate and a preverbal (2a) and postverbal subject (2b) illustrate here:

(2) a. *Cap* d'ells (*no*) ha vingut.
none of them not has come
'None of them has come.'

b. *(*No*) ha vingut *cap* d'ells.
not has come none of them
'None of them has come.'

This well-known asymmetry has long fuelled the on-going debate on the status of Catalan n-words as negative quantifiers (2a) or as polarity items (2b). In their ability to express a negative meaning alone when occurring in pre-verbal position (2a), or as answers to questions (3), Catalan n-words show clear similarities with English negative quantifiers.

(3) A: On vas?
where go.2SG?
'Where do you go?'

B: *Enlloc*.
nowhere
'Nowhere.'

In postverbal positions, however, Catalan n-words have a polar behaviour (Linebarger 1987; Progovac 1994; Giannakidou 1998, 2000; Martins 2000), as they are

sensitive to the non-veridical (Zwarts 1995) property of a c-commanding licenser or of the contexts in which they felicitously occur.

(4) a. *No* ha comprat *cap* dels llibres. (negation)
not has bought none of.the$_{PL}$ books
'(S)he has not bought any of the books.'

b. Ha comprat *cap* dels llibres? (question)
has bought any of.the$_{PL}$ books
'Has (s)he bought any of the books?'

c. *Si* ha comprat *cap* dels llibres, jo ho hauria de saber. (conditional)
if has bought any of.the$_{PL}$ books I it should of know
'If (s)he has bought any of the books, I should know it.'

According to traditional descriptive Catalan grammars, the combination of n-words with other n-words or minimizers (Vallduví 1994) –otherwise known as *negative spread*, (with or without *no*)– always leads to a single negation / NC reading and never to a cancellation of negations into a positive meaning (Horn 1989), in contrast to what is usually found with negative quantifiers for languages such as Standard English.

(5) a. *Ningú* pensa *res*. (=1b) NC
nobody thinks nothing
'Nobody is thinking anything.'

b. *Enlloc* es veu *ni una ànima*. NC
nowhere CL sees not a soul

(6) a. *Nobody* is thinking *nothing*. DN

b. *Not a soul* can be seen *nowhere*. DN

This contrastive interpretation of sequences of negative expressions in languages like Catalan (5) vs. languages like English (6) that embodies the difference between Negative Concord (NC) and Double Negation (DN) has been taken under some approaches (Zeijlstra 2004 among others) to be the core factor of a parametric divide between NC languages like Catalan, French, Italian, Portuguese and Spanish, on the one hand, and DN languages like Standard English, Dutch and German, on the other hand. On this view, the question arises whether DN interpretations of sequences of negative expressions are ever possible in NC languages, and particularly of what, if anything, can license them. In other approaches to NC (de Swart and Sag 2002), NC vs. DN readings are taken to be the two ambiguous faces of the same negative sentences and thus predicted to occur in all languages.

According to traditional descriptive Catalan grammars, DN readings are only possible and in fact required when two sentential negations occur in different clauses (cf. the Law of Double Negation, Horn 1989), as in (7):

(7) *No* vull que *no* vingui.
not want that not come$_{SUBJ}$
'I don't want him not to come.' (=I want him to come)

Yet DN is sometimes observed in single clauses under particular syntactic conditions, such as for instance (8a), where an adjunct PP ambiguously allows both DN and single negation/NC readings (Tubau and Espinal 2012)[2]. The ambiguity disappears when a second *no* precedes the n-word in the PP adjunct, as in (8b).

[2] For Tubau and Espinal (2012) this type of clause internal DN results from the presence of an abstract negative operator NEG, triggered by the n-word that checks its negative morpho-syntactic feature within this special PP construction, in combination with the overt negative marker *no*.

(8) a. *No* lluiten per *res*. (DN and NC in Catalan)

not fight for nothing

'They don't fight for nothing. / They don't fight for anything.'

b. *No* lluiten per *no res*. (DN in Catalan)

not fight for not nothing

'They don't fight for nothing.'

Otherwise, special conversational, prosodic and gestural conditions are generally claimed to be necessary for DN readings to emerge, be it for sequences of multiple negative terms in single clauses or with isolated n-words. Espinal and Prieto (2011), Prieto et al. (2013), and Espinal et al. (to appear) experimentally investigated some of the prosodic and gestural factors that favour DN in Catalan and Spanish. Regarding conversational conditions more particularly, Catalan DN readings were argued to emerge only in discourse contexts that allow an accessible negative proposition (or presupposition) –either explicitly contained in the previous discourse, or inferred from it– to be denied (Dryer 1996, Prince 1992, Dryer 1996, Geurts 1998, Espinal and Prieto 2011). In these respects, Catalan is not assumed to much differ from other NC languages, where the role of contextual and prosodic factors such as prosodic phrasing, stress, contrastive focus, and intonation have also been highlighted as potential DN triggers (Corblin 1995, 1996; and Déprez 1999, 2000 for standard French; Vinet 1998 for Québec French; Corblin and Tovena 2003 for French and Italian; Molnár 1998 and Puskás 2006, 2012 for Hungarian; Zanuttini 1991, 1997, Godard and Marandin 2007, and Penka 2007 for Italian; Falaus 2007 for Romanian; Huddlestone 2010, Biberauer and Zeijlstra 2012 for Afrikaans, see also de Swart 2010). Pragmatic factors can also influence the

availability of DN readings is some languages. For example, a DN reading is generally favored in the following French example in (9) and also possible in other languages such as Spanish, Italian and Romanian:

(9) a. Personne ne commet aucun peché.
no one NEG commits no sin
'No one commits no sin.'

b. Personne ne meurt jamais.
no one NEG dies never
'No one never dies.'

Comparable facts, however, do not seem to obtain readily in Catalan n-word sequences.

In sum, although NC readings are generally thought to be the default reading for sequences of negative expressions, DN readings are also sometimes possible, but generally argued to emerge only under a narrow set of circumstances not yet fully understood but quite generally held to be exceptional in some ways.

2.2. The role of no

This section focuses on the role of the sentential marker *no* 'not' in Catalan negative sentences. As a preliminary, note that first and foremost, the Catalan sentential negative marker *no* is the linguistic form that encodes the monadic negative operator ¬ and expresses an interpretable negative formal feature.

In sentences containing n-words in preverbal positions, as noted above, *no* is always possible, but not systematically required. The source of this optionality remains unclear.

On the one hand, traditional prescriptive grammars of Catalan encourage the use of

no with preverbal n-words to distinguish non-negative uses of n-words from negative ones as in the following examples from Fabra (1912: 218), since the presence of *no* here appears to make a meaning difference.

(10) a. Si *mai* vinguéssiu, què farien ells?
if ever $\text{come}_{\text{SUBJ}}$ what do_{COND} they
'If you ever came, what would they do?'

b. Si *mai no* vinguéssiu, què farien ells?
if ever not $\text{come}_{\text{SUBJ}}$ what do_{COND} they
'If you never came, what would they do?'

On the other hand, descriptive grammars of contemporary Catalan claim that, if preverbal n-words are focalized (the capital letters stand for emphasis), then *no* is preferably explicit (Espinal 2002: 2766, exs, (106b,c) and (107b,c)):

(11) a. *Ningú (no)* ha vist *res.*
nobody not has seen nothing
'Nobody has seen anything.'

b. *NINGÚ no* ha vist *res.*
nobody not has seen nothing
'Nobody has seen anything.'

(12) a. *Enlloc (no)* es veia *ni una anima.*
nowhere not CL saw not a soul
'Nowhere was a soul to be seen.'

b. *NI UNA ÀNIMA no* ha vist.
not a soul not has seen

227 ‘Not a soul has (s)he seen.’

228 Espinal (2002: 2767) further states that the negativity of a sentence is intensified
229 when the negative marker is explicit, (13). Moreover, she also notes that the tendency to
230 prefer an overt negative marker increases as the distance between the pre-verbal n-word
231 and the verb gets larger (14).

232 (13) De *cap* manera *no* vull que em deixis diners.
233 of no way not want that me$_{DAT}$ lend money
234 ‘By no means do I want you to lend me money.’

235 (14) *Cap* de les plantes que vam deixar a la banyera abans
236 none of the plants that PAST leave in the bathtub before
237 de marxar de vacances *no* sembla que s’hagi mort.
238 of leave of holidays not seem that CL.has$_{SUBJ}$ died
239 ‘None of the plants that we left in the bathtub before leaving on holidays seems to
240 have died.’

241 These facts suggest that the prosodic phrasing of *no* along the pre-verbal n-word may be
242 of relevance in influencing its presence. Notwithstanding the precise conditions of its
243 appearance, the sentential negative marker *no* is quite generally assumed to have no
244 semantic effect on the overall interpretation of these type of sentences. In particular, *no* in
245 such contexts is not taken to contribute an additional semantic negation.

246 In sum, while prescriptive grammars recommend the use of a negative marker *no* in
247 preverbal position of negative sentences generally, descriptive grammars acknowledge
248 that native speakers hesitate on the use of *no* after preverbal n-words (Solà 1973: 97,
249 Espinal 2002: 2767). The reasons of this hesitation are not well understood, but could

well reflect sociolinguistic factors, such as age, language dominance of the speaker's area of living, and percentage of use of Catalan in daily life. According to Vallduví (1994: 273, note 8), the optionality of *no* "is a matter of register". And indeed, the current tendency in spoken Catalan and in the media-variety is to omit the negative marker.

Espinal (2007) interestingly observed that a comparable optionality and lack of semantic effect in the use of the negative sentential marker 'no' is also found in other Catalan sentence types, namely in contexts of so-called expletive negation (EN). EN "refers to a pleonastic (paratactic or redundant) use of negation that does not modify the truth value of the proposition in which it appears (Jespersen 1917; Vendryes 1950; Martin 1984; Muller 1991)" (Espinal 2007: 51). Characteristic Catalan examples are given in (15), with the optional expletive negative marker in parentheses and the lexical trigger of EN in italics:

(15) a. *Abans* que *(no)* arribi l'amfitrió, deixeu que em presenti.
before that not arrive$_{SUBJ}$ the.host let that me introduce$_{SUBJ}$
'Before our host arrives, let me introduce myself.' (Espinal 2007: 50, ex. (1a))

b. La policia *evità* que *(no)* hi hagués un accident.
the police stopped that not CL had$_{SUBJ}$ an accident
'The police prevented an accident.'

c. Gasta *més* ell en tres mesos que *(no)* tu en tot l'any.
spends more he in three months that not you in whole the.year
'He spends more in thres months that you in a year.'
(Espinal 2002: 2777, ex. (136a))

d. Va prometre que s'esperaria *fins* que el seu xicot

PAST promise that CL.wait until that the his boyfriend

(no) tornés de la guerra.

not come.back from the war

'She promised to wait until her boyfriend came back from the war.'

(Espinal 2002: 2777, ex. (136b))

For Espinal (1991, 1992) and van der Wouden (1994a, 1994b), expletiveness is a semantic effect that obtains in Logical Form when the negative property of specific syntactic constituents (either the negative marker *no* or an n-word) is absorbed by the semantic contribution of another expression in the context. As illustrated in (15), expletive *no* is licensed under non-veridical contexts, under conditions that quite parallel those of polarity licensing. As Espinal suggests the expletive negation of (15) may well be a type of polarity dependency comparable to the one observed in (16) with n-words.

(16) a. *Abans* que *ningú* digui *res*, deixeu-me donar-vos la benvinguda.

before that nobody say_{SUBJ} nothing let.me give.you the welcome

Before anyone says anything, let me welcome you.'

(Espinal 2007: 50, ex. (1b))

b. La policia *evità* que hi hagués *cap* accident.

the police stopped that CL had_{SUBJ} any accident

'The police prevented that an accident.'

Espinal further observes that the conditions of use of the Catalan expletive *no* strikingly parallel those of the optional *no* with preverbal n-words. There is comparable optionality, and the hesitation or register variety of use observed in the Catalan population seems to cross both of these constructions equally, and presumably along the

same patterns. This commonality of occurrence clearly suggests that both phenomena should profitably receive a parallel account. In particular both the optionality of *no,* when in co-occurrence with preverbal n-words, and the expletiveness of *no* in the context of specific lexical triggers suggest that Catalan could manifest two homophonous distinct lexical variants of *no*, one semantically negative and the other not, akin to the lexical distinction found in French between the semantically negative marker *pas* and the expletive negative marker *ne.* This is indeed what Espinal and Tubau (to appear) propose, as is further discussed below. The existence of two distinct lexical negations is also defended for Afrikaans by Biberauer (2008, 2009, 2012). Biberauer (2013) gives the following list of properties distinguishing the two:

Property	Nie_1	Nie_2 = expletive
Omission → meaning change (polarity reversal)	Yes	No
Modifiability	Yes	No
Substitution by emphatic negator	Yes	No
Stressability	Yes	No

Table 1. Properties to distinguish between semantically negative and expletive *nie* in Afrikaans

These properties, which are clearly reminiscent of those of the two distinct negation markers found in French, *pas* and *ne,* also obtain in Catalan.

In an attempt to explain away the optionality of *no,* Van der Wouden and Zwarts (1993: 216-7) were to our knowledge the first to hypothesize the existence of a dialectal variation. According to them, "there exists one dialect of Catalan that parallels French (or Afrikaans) in the sense that a doubling element *no* (that may express negation on its own) is always obligatory whenever negative elements show up in the sentence, and another

dialect that behaves like Italian, with doubling only from postverbal positions". According to this description, in one dialect (Variety I) *no* is always obligatory, whereas in the second one (Variety II) *no* is only obligatory to license postverbal n-words.

However, contrary to these claims, recent work by (Espinal and Tubau 2014) has concluded (i) that Variety I does not exist, since there is no variety of Catalan for which *no* is always obligatory, and (ii) that Variety II does not characterize any dialect at all, since all postverbal n-words, PIs and minimizers, can be licensed by the negative marker, or an n-word in preverbal position. We take up this issue further in our discussion section, after the results of our experiment have been presented. But first, we briefly summarize recent theoretical approaches that propose an account for this specific issue, as well as for the other properties of Catalan NC described above.

2.3 Theoretical background

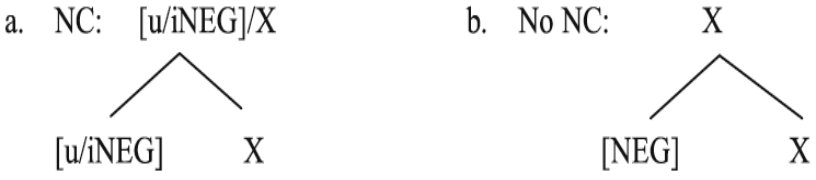
The literature on NC is vast, with two main issues traditionally articulating the discussion. One is the negativity of n-words; the other is their quantificational status. N-words have been claimed to be universal quantifiers, both negative (Zanuttini 1991, Haegeman and Zanuttini 1991, among others) and non-negative (Giannakidou 2000), non-negative polarity items (Bosque 1980, Laka 1990, among others), and indefinites, both negative (Suñer 1995) and non-negative (Ladusaw 1992, 1994, Zeijlstra 2004, Tubau 2008, among others). Other accounts have cast n-words as zero numerals (Déprez 1997, Espinal 2000) with underspecified quantificational force, or as items that are lexically ambiguous between polarity items and negative quantifiers (Herburger 2001). Theoretical approaches to NC are always narrowly linked to the status proposed for n-

words, but as a proper review of this abundant literature would take us too far afield we restricted our focus here on the most prominent recent accounts that have made a specific proposal regarding Catalan NC. Before presenting the micro-parametric approach to NC recently developed in Espinal and Tubau (to appear), we oppose two views, namely the macro-parametric account in Zeijlstra (2004) and subsequent work, and the polyadic quantification approach of de Swart and Sag (2002).

2.3.1. A macro-parametric account: Zeijlstra (2004)

For Zeijlstra (2004 and subsequent work) the phenomenon of NC is nothing but the realization of a syntactic agreement (formalized under Chomsky's (1995) Agree operation) between a single negative operator (which can be overt or abstract) carrying an interpretable negative formal feature, [iNeg], and one or more elements carrying an uninterpretable negative feature, [uNEG]. For him, n-words are semantically non-negative elements that carry an uninterpretable negative feature [uNEG] that must be checked by an interpretable negative feature [iNEG] on a semantic negation. Zeijlstra (2004, 2008) further argues that NC languages are distinguished from DN languages by a macro-parameter that states that the former have a formal negative feature, while in the latter the negative feature has no formal status but is purely semantic. This macro-parametric variation is formalized as in (17):

(17)



To further distinguish among varieties of NC languages, such as Strict and Non-Strict NC languages (Giannakidou 1998), Zeijlstra assumes that negative markers can differ as negative expressions do in DN vs. NC languages, that is, in being either semantically negative (i.e., [iNeg]) in Non-Strict NC languages, or semantically non-negative (i.e., [uNeg]) in Strict NC languages. This yields the typology in Table 2.

	N-words semantically negative	N-words semantically non-negative
Negative markers semantically negative	DN languages: *Dutch, German, Swedish*	Non-strict NC languages: *Spanish, Italian, Portuguese*
Negative markers semantically non-negative	*Afrikaans A*	Strict NC languages: *Czech, Serbo-Croation, Greek, Afrikaans B*

Table 2. Biberauer and Zeijlstra's (2012) typology of NC and DN languages

With respect to this typology, as Zeijlstra (2004) notes, Catalan appears to be a misfit because of the optional occurrence of its negative marker, which is neither obligatory as in Strict NC languages, nor limited to co-occur with only postverbal n-words as in non-Strict NC languages. In an effort to reduce this Catalan misfit to the NC patterns observed elsewhere, Zeijlstra (2004) follows Van der Wouden and Zwarts (1993: 216-7) in claiming that the Catalan negation optionality flags the existence, side by side, of two distinct varieties. For him, Variety I, on the one hand, has Strict NC characterized by the obligatory presence of *no* for n-words in all syntactic positions, in similarity with Greek and Romanian. Variety II, on the other hand, must disallow *no* with preverbal n-words, as it features Non-Strict NC, in similarity with Italian and Spanish. On this view, the optionality of *no* is illusory.

Zeijlstra's approach makes very clear empirical predictions. First and foremost, it predicts that in a NC language, DN should simply not arise. Furthermore, for Catalan in particular, speakers of Variety I should find sentences lacking *no* with preverbal n-words

379 to be as ungrammatical as they are in other Strict NC languages. For speakers of Variety
380 II, in contrast, sentences featuring a preverbal n-word with *no* should be ungrammatical
381 or have a systematic DN reading, as reported for in Non-Strict NC languages. These
382 predictions, however, do not accord with the traditional descriptions of Catalan
383 summarized above where sentences with preverbal n-words that lack *no* are considered
384 grammatical for all speakers and where the co-presence of *no* is quite generally assumed
385 to leave the solid NC interpretation of sentences with n-words fully unaltered. Our
386 experiments meant to verify these predictions.
387
388 *2.3.2. The polyadic quantification approach of de Swart and Sag (2002)*
389 In contrast to Zeijlstra (2004 and following), de Swart and Sag (2002) and de Swart
390 (2010) take n-words to always be negative quantifiers. For them, NC corresponds to one
391 interpretation that is afforded by the interaction of these negative quantifiers in a polyadic
392 quantifier framework (van Benthem 1989; Keenan and Westerståhl 1997). On this
393 approach, there is no parametric distinction between NC and DN languages, since every
394 sentence involving multiple negative elements can receive both a resumptive and an
395 iterative interpretation. The first corresponds to a NC reading, the second to a DN
396 reading. However, while NC / DN ambiguities for multiple negative constructions are
397 well attested in French and Romanian (i.e., languages for which independent resumption
398 analyses were respectively proposed by Déprez (2000), Falaus (2007), and Iordăchioaia
399 (2010)), in other languages commonly exhibiting NC, no comparable systematic
400 ambiguity has so far been reported, and DN readings are quite generally thought to only
401 arise under restrictive and unusual contextual conditions, as discussed above for Catalan.

Thus, for a resumption analysis to be able to account for cross-linguistic variations in NC, an additional mechanism must be assumed. To tackle NC typological differences, de Swart (2010) proposes to embed her resumptive analysis in a bidirectional optimality framework. Her analysis of Catalan involves the interaction of five constraints presented below:

- MaxNeg: Mark the argument of a negative chain.
- NegFirst: Negation is preverbal (Jespersen 1917, Horn 1989).
- MaxSN: a negative clause must bear a marker of sentential negation.
- *Neg: avoid negation in the output. (Markedness constraint).
- InterpretNeg (IntNeg): Interpret all neg expressions in the input as contributing a negative meaning in the output.

We reproduce here the crucial OT tableaus that pertain to Catalan (de Swart 2010:173-174). The order from right to left in the tableau reflects the ranking of the constraints. Note in the tableau in (18) that it is the high ranking of the NegFirst constraint that enforces the obligatory presence a preverbal marker of sentential negation with postverbal Catalan n-words, as in Italian, Spanish or Brazilian Portuguese.

(18)

Tableau 9 Generation of Catalan/Brazilian Portuguese with postverbal n-word

Meaning ¬V∃x	Form	MaxNeg	NegFirst	MaxSN	*Neg	IntNeg
	V neg		*	*	*	
☞	sn V neg				**	

With preverbal n-words, in contrast, looking at the tableau in (19), since it is the n-word that satisfies the NegFirst constraint, the output is derived through the competition between the lower ranked constraints MaxSN and *Neg. If MaxSN and *Neg are unranked with respect to each other, as indicated here by the doted line in the tableau in

(19) below, the grammar generates two optimal outputs. This is what is assumed to derive the optionality of *no* with preverbal n-words described by traditional Catalan grammars.

(19)

Tableau 10 Generation of Catalan/Brazilian Portuguese with preverbal n-word

Meaning $\neg\exists x_1 V \exists x_2$	Form	MaxNeg	NegFirst	MaxSN	*Neg	IntNeg
☞	neg V neg			*	**	
☞	neg sn V neg				***	

De Swart (2010) also argues that the possibility of two distinct dialects is derivable on her approach if, instead of being unranked, MaxSN and *Neg are ranked. If MaxSN dominates *Neg, then *no* will be obligatory with the input or tableau (19) as in the Variety I described by Zeijlstra (2004). The reverse domination of these two constraints produces a dialect were *no* is disallowed again as in Zeijlstra's Variety II. We note here that although this approach predicts both the optionality of *no* described by traditional Catalan grammars and the possibility of the two dialects distinguished by Zeijsltra and Van den Wouden, it does not however predict what to expect with respect to the distribution of DN vs. NC readings in either. In regards to interpretation, De Swart states that in her account, both dialects are NC ones with the ranking *Neg >> IntNeg in the semantics, so that sentences with and without a marker of sentential negation are interpreted as conveying single negation under both grammars. In short, de Swart predicts a variety of possible grammatical outputs for Catalan, but does not match these distinct outputs to distinct interpretations.

2.3.3. The micro-parametric approach

In contrast to de Swart and Sag (2002) and de Swart (2010 and following), Déprez (1997, 2000 and following) argues that the resumption analysis first proposed in May (1990) for

English negative sequences is a restricted form of NC only available is some NC constructions or languages, i.e., the ones in which n-words are true negative quantifiers, but that does not generalize across all NC constructions or languages where n-words can have a distinct nature. She posits the existence side by side of two basic types of NC, one derived under resumption, and the other obtained under strong NPI licensing (non-veridical licensing) that can mix and interact in distinct NC constructions within single languages or cross-linguistically, depending on the nature of the n-words involved in particular negative sequences. See in particular Déprez (2011b) for a recent development of this approach. In short, Déprez's approach combines the semantic ingredients of the former two approaches in a micro-parametric framework where the choice of one or the other type of NC, resumption or licensing, is determined by the nature of the internal morpho-syntax semantic mapping of the n-words that a particular language or sequence comprises.

A detailed micro-parametric approach that takes into account the possibly variable nature of the negative elements involved in a negative sequence has independently been developed for Catalan in the works of Espinal (2000) and, more recently, Espinal and Tubau (to appear). In this section we present the ingredients of this micro-parametric approach to Catalan NC. This approach suggests that the difference between the two varieties of Catalan presented earlier (namely Variety I and Variety II) is based on lexical ambiguity, not only, with respect to the nature of n-words, but also regarding the negative marker.

As mentioned above, to account both for the possibility of EN and the optional occurrence of the sentential marker *no* with pre-verbal n-words, Espinal and Tubau

propose that Catalan has two homophonous lexical variants for the sentential negative marker *no.*

(20)a. no_1*:* semantic negation; formally specified [iNEG] (Zeijsltra 2004, ff.).

b. no_2: expletive negation; formally specified with a strong [+σ] feature that is characteristic of polar items and characterizes semantically dependent items (Chierchia 2006, Labelle and Espinal 2014).

Moreover, they further propose that n-words come in two varieties as well, a dependent n-word type and a negative quantifier, each specified as follows:

(21)a. n-word$_1$: numeral negative indefinite meaning characterized [+σ].

b. n-word$_2$: indefinite negative quantifiers meaning ¬∃.

Espinal and Tubau (2014) additionally posit two varieties of Catalan that respectively have the following distribution of negative markers and n-words. In Variety A, where the negative marker is optional with preverbal n-words, n-words are most often polarity items assumed to be endowed with a semantic feature, [+σ], which induces domain-widening and needs to be licensed by an appropriate semantic operator (Chierchia 2006, Labelle and Espinal 2014). Espinal and Tubau (to appear) further argue that these can participate in NC structures because they undergo a process of word syntax that allows the feature [uNeg] to merge with their root specified as [+σ]. Once [uNeg] is part of the n-word, it requires a licensor specified as [iNeg] to Agree with.[3] Alternatively, in Variety A, n-words may also be existential negative quantifiers, but this seems to be an emergent

[3] Following Espinal and Tubau (to appear) what this means is that n-words are assumed to be semantically non-negative, but syntactically active to participate in NC structures. We assume that n-words start as roots defined [+σ], and that in the course of the derivation these roots can merge with a [uNeg] feature to build a complex item.

possibility that is less common than the use of non-negative n-words.[4] Finally, Variety A distinguishes two negative markers, one which is inherently negative, specified with the formal feature [iNeg], and another one which is expletive and carries also a polarity [+σ] feature (Espinal and Tubau to appear).

In Variety B, in contrast, the negative marker is fundamentally semantically negative and, hence, specified as [iNeg]; the expletive negative in this variety is basically non-existent (and hence specified as 'regressive' in Table 3). Furthermore, in this variety there are also two different lexical entries for n-words, as postulated in (21), which are in competition. As negative existential quantifiers, n-words are endowed with an inherent Focus feature [uFoc], which requires movement of the n-word to the left periphery of the DP (Déprez 2012). Espinal and Tubau's (to appear, 2014) assumptions for Catalan n-words and negative marker(s) are summarised in Table 3.

Catalan	N-words in negative contexts	Negative marker(s)
Variety A	1. [+σ] 2. ¬∃, [uFoc] (emergent)	1. [iNeg] 2. [+σ]
Variety B	1. [+σ] 2. ¬∃, [uFoc]	1. [iNeg] 2. [+σ] (regressive)

Table 3. Lexical variation in n-words and the negative marker in Catalan

Having surveyed various formal accounts of Catalan we now turn to discuss our experimental design before we consider the results of our two experiments.

3. Methods

Recall from the introduction that we designed two experiments aimed at exploring four questions; first, whether NC is always the default preferred interpretation for sequences

[4] Espinal et al. (to appear) provide independent empirical evidence for the fact that n-words can be negative existential quantifiers in Catalan: for a significant number of tested subjects, isolated n-words that occur as answers to negative questions are interpreted as conveying a positive reading when associated to a particular intonation contour.

508 of multiple negative elements in Catalan; second, whether the processing of NC is faster
509 than that of DN; third, whether the co-presence of the negative marker *no* could influence
510 the readings of n-word sequences and boost DN readings, as predicted by Zeijlstra
511 (2004), and fourth, whether morpho-syntactic conditions and syntactic order could
512 influence the emergence of DN readings. Overall, these questions can be understood as
513 pertaining to the general issue of whether semantically non-compositional NC readings
514 have a general unmarked status for the interpretation of sequences of negative
515 expressions as compared to compositional DN readings.

516 To investigate our four questions, we designed two experiments in which subjects
517 had to match a verbal stimulus with a visual one. In Experiment 1, the sentential negative
518 marker *no* was absent after preverbal n-words whereas in Experiment 2 the critical items
519 as well as one of our control conditions (the control NPI condition) had the negative
520 sentential marker *no* 'not' after preverbal n-words. Thus the verbal stimuli submitted to
521 the participants of the two experiments only differed in absence vs. presence of *no* 'not'
522 in the set of critical items and the NPI control condition. Speakers were asked to choose
523 between two pictures representing distinct scenes the one that best corresponded to the
524 meaning of the sentence they were presented with in written form on a computer screen.
525 The design was a preference test and the task a forced choice one. This section of the
526 paper details our experimental protocol.

527 Section 3.1 presents the participants. Section 3.2 describes the materials used in our
528 experimental design, as well as the structure of the design. Section 3.3 explains the
529 procedure with which the experiment was run. Finally, Section 3.4 presents the statistical
530 model that was used to analyse our results.

531

532 *3.1. Participants*

533 70 native speakers of Catalan (58 women and 12 men, aged between 19-61 with a
534 majority between 20-23), mostly students and staff at the Universitat Autònoma de
535 Barcelona, participated in the two experiments. Our subjects were mostly from the
536 Barcelona area, but some of them were from other parts of the Catalan-speaking
537 territories. To take into consideration potential dialectal variations, speakers were asked
538 to answer a brief sociolinguistic questionnaire at the end of the experiment. In this
539 questionnaire, participants were asked about sex, age, place of birth and living area for
540 the past 10 years and their daily use of Catalan. Our sample population, however, was
541 not balanced for these factors. Answers to these questions were codded as follows:

542 (22) a. Regular use of Catalan in daily life: yes, no

543 b. Percentage of Catalan use: plus 75%, minus 75%

544 c. Sex: male, female

545 d. Age: 18-24, 25-34, more than 35

546 d. Birthplace: Central (CEN), Occidental (OCC), and Other (OTH)

547 d. Current living area: Central Metropolitan (CENMET), Central non-
548 Metropolitan (CENnotMET), and Other (OTH)

549 It should be pointed out that most Catalan speakers are bilingual, Spanish being their
550 other native language. However, in our subject population, Catalan dominance
551 (understood as the self-perceived amount of use of Catalan in the speaker's daily life)
552 was reported to be over 75% for 70% of our subjects, 50-75% for 27.14 % of our

553 subjects, and between 20-50% for only 2.86%. In sum, the great majority of our
554 participants predominantly used Catalan in their daily interactions.

555 Subjects were randomly assigned to one of the two experiments. 35 speakers took
556 Experiment 1 without *no* 'not' (31 women and 4 men, aged between 20-59), and 35
557 speakers (27 women and 8 men, aged between 19-61) took Experiment 2 with *no* 'not'.

558

559 *3.2. Materials*

560 The experimental material comprised 96 stimuli sentences matched to two pictures each
561 subdivided into 8 conditions: 4 critical conditions, 4 control conditions and 4 different
562 filler conditions. There were 8 token sentences for each condition, totalling 32 critical
563 items, and 32 control items. In addition, 32 filler items were also presented. Each verbal
564 stimulus was matched with two pictures representing scenes between which the subjects
565 were asked to choose by mouse clicking which one best represented the meaning of a
566 sentence visually presented on a computer screen.

567 The order of presentation of the verbal and visual stimuli was pseudo-randomized to
568 obtain a balanced item presentation and avoid (i) ordering effects, (ii) stimuli repetition,
569 whether visual or verbal, and (iii) left-right effects for the choice of pictures. 8 distinct
570 lists of 8 blocks with 12 distinct stimuli sentences each were created. In each list, the
571 order of presentation of the 8 blocks was distinct. Each block of 12 sentences was further
572 subdivided into 4 sub-blocks each containing 3 sentences, with random ordering between
573 1 critical, 1 control and 1 filler sentence.

The speakers were presented with two scenes, each representing a situation that corresponded to a distinct reading of the sentence. A sample visual stimulus is given in Figure 1 for Experiment 1 (without *no*), and in Figure 2 for Experiment 2 (with *no*).

Figure 1. Slide used in Experiment 1 (without *no*). The text translates literally as 'nobody sings none of the songs'. The image on the right is true for the NC or single negation interpretation of the sentence, the one on the left represents the DN reading.

Figure 2. Slide used in Experiment 2 (with *no*). The text translates literally as 'nobody not sings none of the songs'. The image on the right corresponds to a NC or single

586 negation interpretation of the sentence (i.e., 'Nobody sings any of the songs') and the one
587 on the left to a DN reading cancelling out to a positive statement (i.e., 'Nobody doesn't
588 sing none of the songs'; that is, Everybody sings some song).
589
590 For Figure 1 and 2, we expected speakers interpreting the target sentence as meaning
591 'Nobody sings any of the songs', i.e., an NC reading, to click on the right picture, and
592 speakers interpreting it as 'Nobody sings none of the songs', i.e., an DN reading to click
593 on the left picture.
594 The sentences used in the two experiments were organised as follows: four critical
595 conditions, which featured sequences of two n-expressions that vary in internal syntactic
596 complexity (simple pronouns –encoded Pro– vs. full noun phrases –encoded DP–), their
597 syntactic position (preverbal or postverbal), and parallelism (same n-word type in
598 preverbal and postverbal position, distinct n-word type in both positions). This yielded
599 the following four combinations: critical DP DP, critical Pro Pro, critical Pro DP and
600 critical DP Pro.
601 Items exemplifying these four critical conditions contained the four different
602 combinations of n-words listed and illustrated in (23), where DP means that the n-word
603 has both a prenominal Specifier and a noun phrase or a partitive complement, and *Pro*
604 means that the n-word is a one-word pronominal form. Since sample sentences in
605 Experiment 1 (without *no*) and Experiment 2 (with *no*) only differed with respect to the
606 presence vs. absence of the sentential negative marker *no* 'not', this is indicated in (23)
607 by means of parentheses.
608 (23) *Critical DP DP* (parallel complex)

a. *Cap* dels alumnes (*no*) llegeix *cap* llibre.

none of.the students (not) reads no book

'None of the students reads any book.'

Critical DP Pro (non-parallel complex subject)

b. *Cap* dels nens (*no*) beu *res*.

none of.the children (not) drinks nothing

'None of the children drink anything.'

Critical Pro DP (non-parallel simple subject)

c. *Ningú* (*no*) canta *cap* de les cançons.

nobody (not) sings none of the songs

'Nobody sings any of the songs.'

Critical Pro Pro (parallel simple)

d. *Ningú* (*no*) trenca *res*.

nobody (not) breaks nothing

'Nobody breaks anything.'

The four control conditions are listed and illustrated in (24). The control DN condition was introduced to test the capacity of speakers to produce DN readings in unambiguous biclausal sentences containing two sentential negative markers. We reasoned that speakers that could not get DN readings in these unambiguous cases would not get DN readings in our critical conditions. As it turns out, one of our participants in Experiment 2 failed this control (with a 100% error) and was removed from further analysis.

631 The control Universal Quantifier was introduced to test the capacity of speakers to
632 interpret sentences with universal quantifiers in subject position in combination with
633 existential quantifiers in postverbal position; we reasoned that DN readings can logically
634 correspond to Universal Quantifier readings (i.e., if there is something that none of the
635 characters in the pictures do not do, then this is something that all of them in fact do).
636 Thus, we needed to check that participants could independently get such readings.
637 Sentences exemplifying this control were judged as true of a pictorially represented
638 situation where a specific action was performed by all the characters in the picture.

639 The control Negative Quantifier set of sentences aimed to check the capacity of
640 native speakers to associate a single negation reading to sentences with only one
641 preverbal n-word. Both Experiment 1 (with *no*) and Experiment 2 (without *no*) shared the
642 same set of sentences.

643 Finally, control NPI aimed to check the interpretation associated with preverbal n-
644 words followed by an indefinite expression, without *no* 'not' in Experiment 1 and in
645 combination with *no* 'not' in Experiment 2. Both are equally described as conveying a
646 single negation interpretation in traditional and descriptive grammars of Catalan, where
647 *no* is described as simply optional.

648 (24) *Control DN*

649 a. *No és el cas que* els turistes *no* pesquin cap peix.

650 not is the case that the tourists not fish no fish

651 'It is not the case that the tourists did not catch any fish.'

652 *Control Universal Quantifier*

653 b. *Tothom* mou *alguna cosa*.

everybody moves some thing

'Everybody moves something.'

Control Negative Quantifier

c. *Ningú* perd les claus.

nobody loses the keys

'Nobody loses the keys.'

Control NPI

d. *Ningú (no)* neteja *alguna cosa*.

nobody not cleans some thing

'Nobody cleans something.'

A set of the 32 filler sentences (four fillers per critical sentences) meant to distract the participants from focusing on negative sentences. A sample of these items is given in (25), with various combinations of nominal expressions in preverbal and postverbal position of a transitive verb: with definite or indefinite articles, demonstratives, bare plurals, positive indefinite quantifiers, and a few more sentences with universal quantifiers as objects.

(25) a. Els nens miren un programa.

the children watch a programme

'The children watch a programme.'

b. Aquests convidats beuen sucs.

these guests drink juices

'These guests drink juice.'

c. Uns turistes pesquen aquests peixos.

some tourists fish these fish

'Some tourists catch these fish.'

d. Cada home tiba una caixa.

every man pulls a box

'Every man pulls a box.'

3.3. Procedure

Participants were individually seated in a quiet computer room at the Universitat Autònoma de Barcelona. The stimuli presentation used the Neurobehavioral Systems' Presentation 17.0 software. Participants were presented with a set of instructional slides, the body of the experiment, and a final sociolinguistic questionnaire on their age, sex, birthplace, current place of living, and amount of Catalan use. Participants were instructed to press the space bar after reading aloud as naturally as possible the stimulus sentence to display the relevant two pictures on the screen. The reading was recorded[5] and the stimulus sentence remained on the screen to prevent confusion. Picture choice was made by mouse click on the centre of the picture. Mouse trajectory and time to picture choice were measured, starting from the moment when the pictures appeared to the choice click. From time to time (approximately every 10 pictures) participants were asked to explain their choice orally responding to the question: why this choice? The experimenter listened to these responses. A total of 6,624 responses were obtained, 3,360 for Experiment 1 (32 critical + 32 controls + 32 fillers x 35 participants), and 3,264 for

[5] The reading was recorded to allow for prosodic analysis to be conducted in further research. No information was given to the participants regarding the pragmatic setting against which the sentence could be interpreted. That is, the experiment did not contain any explicit contextual information that deliberately favoured the emergence of DN readings.

698 Experiment 2 (32 critical + 32 controls + 32 fillers x 34 participants). Each of the
699 experiments lasted approximately between 10 and 15 minutes.
700
701 *3.4. Measures and analyses*
702 The responses were analysed using a Generalized Linear Mixed Model fit by maximum
703 likelihood (R packages lme4, Bates et al. 2014a, 2014b, and multcomp, Hothorn et al.,
704 2008) with a logistic regression (logit). Picture choice was recorded with two measures:
705 mouse tracking (trajectory) from centre point, and mouse clicking (the final choice). The
706 time between picture appearance (after bar-pressing) and picture choice (by mouse
707 clicking on the picture chosen) was also recorded.
708 In the next section we report our results on picture choice (NC / single negation vs.
709 DN interpretation for our critical items, and true vs. false for the control conditions and
710 fillers), as well as on the time that the choice took for distinct readings. A prosodic
711 analysis of the recorded readings and a quantitative analysis of the mouse trajectory have
712 been left for future analysis.
713
714 **4. Results**
715 In this section, we start by considering responses to our control items represented in
716 Figure 3.

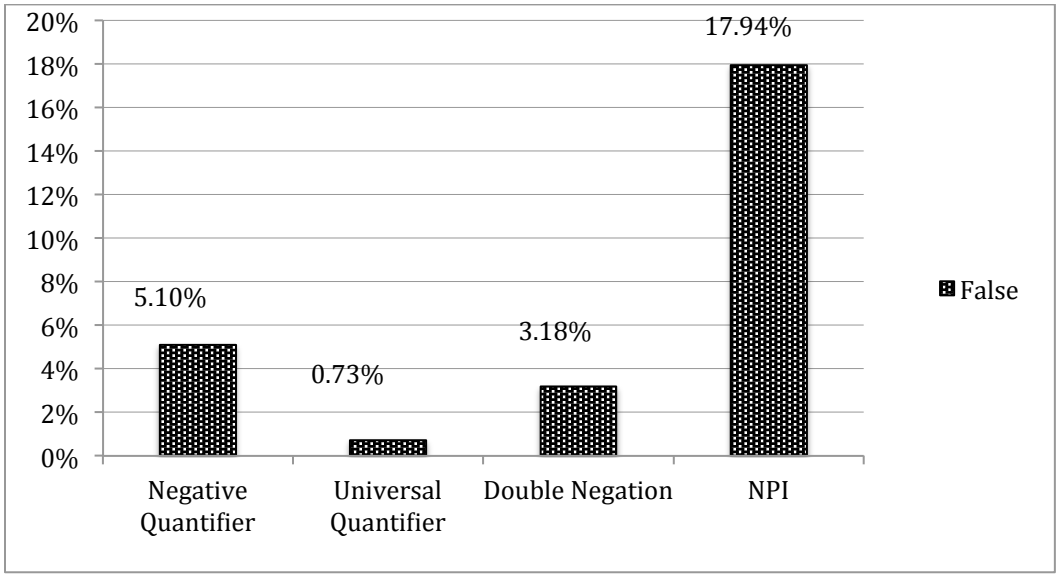


Figure 3. Percentage of error in the expected interpretation of control conditions in Experiment 1 (without *no*) and Experiment 2 (with *no*).

Figure 3 shows the percentage of errors participants made under the control conditions described above in Section 3.2. Considering the overall results of the two experiments together, the total percentage of errors on control items amounted to 6.88% of the responses. For the Negative Quantifiers control the percentage of errors was at 5.10%. For the Universal Quantifier control it was 0.73% and for the Double Negation control (i.e., those with the complex double proposition structure in (24a)) it was 3.18%. Notably, this control was entirely failed by one of our participants (100% error), who was then removed from all analyses. Finally, for the NPI control, we note that the rate was distinctly higher with 17.94% of errors.

This much higher error rate requires clarification. Recall that the above results put together the controls for the two experiments, since in both cases, the assignment of speakers to Experiment 1 (without *no*) or Experiment 2 (with *no*) was random, so that no group difference was expected, and the tested items were all identical, except for the NPI

733 control. Concerning the NPI control, for Experiment 2 (with *no*), we opted to add *no* 'not'
734 to the NPI control sentences.[6] This choice was guided by the following reasoning:
735 without *no* our NPI sentences, which sports a single n-word in preverbal position
736 followed by an indefinite in postverbal position, like *Cap serventa trenca un gerro* (lit. no
737 servant breaks any vase), are unambiguous and only have a single negation reading. As
738 described by traditional Catalan grammars, and as is the case for our native speaker co-
739 authors, the addition of the sentential negation marker *no* to such sentences should leave
740 their meaning unaffected. On this view, then, the addition of *no* should have left the
741 validity of our unambiguous control unaffected. As it turns out, however, this was clearly
742 not the case in our experiment. Thus while in Experiment 1 (without *no*) the percentage
743 of errors on NPI control was a low 2.90%, as expected, confirming the unambiguity of
744 such sentences, it was an unexpected high 32.50% in Experiment 2 (with *no*). The
745 addition of *no* in fact strongly affected the speakers' choice, allowing a DN reading to
746 surface from the combination of the preverbal n-word with the added *no* and creating an
747 ambiguity, such that the NPI sentence type could no longer be considered a control item.
748 Rather than errors, indeed, it turned out that our participants' choice of picture reflected a
749 clear DN reading, where the negation of the preverbal n-word was cancelled by sentential
750 *no*, contrary to the predictions drawn from traditional Catalan descriptions. We return to
751 this important point in more detail below, where we opted to consider this condition
752 along with our other critical conditions.

753 Returning to Figure 3 above, it is important to note that when the results for control
754 NPI receive separate consideration, the overall percentage of errors drops to 3.20%. This
755 is an overall low rate that clearly shows that the task was well understood by the

[6] This was not done for the other control items, as it was not pertinent.

participants, who had little difficulty picking the picture representing the relevant meaning of the sentences they were presented with. Even if the sentences containing n-words had a more elevated rate of errors than the Universal Quantifier control condition, it remains low enough to validate the experimental design.

Let us now turn to considering our overall results on critical items in both Experiment 1 (without *no*) and Experiment 2 (with *no*). Consider first Figure 4, which shows the percentage of NC vs. DN interpretation overall, all critical conditions confounded.

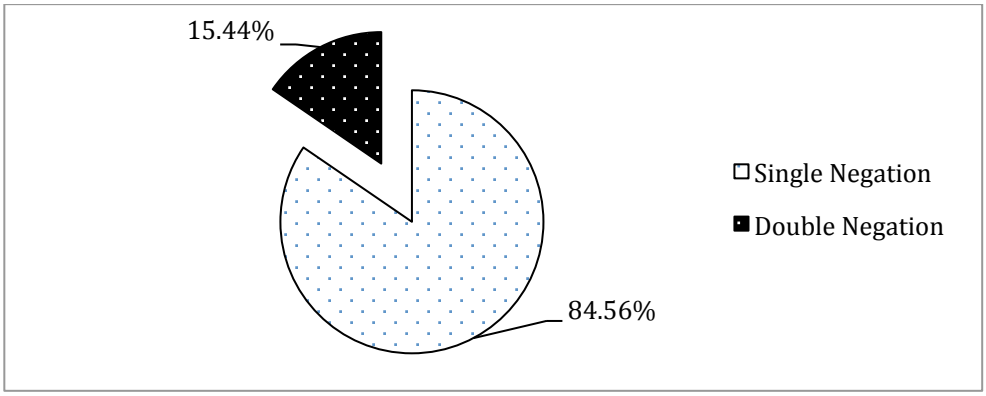
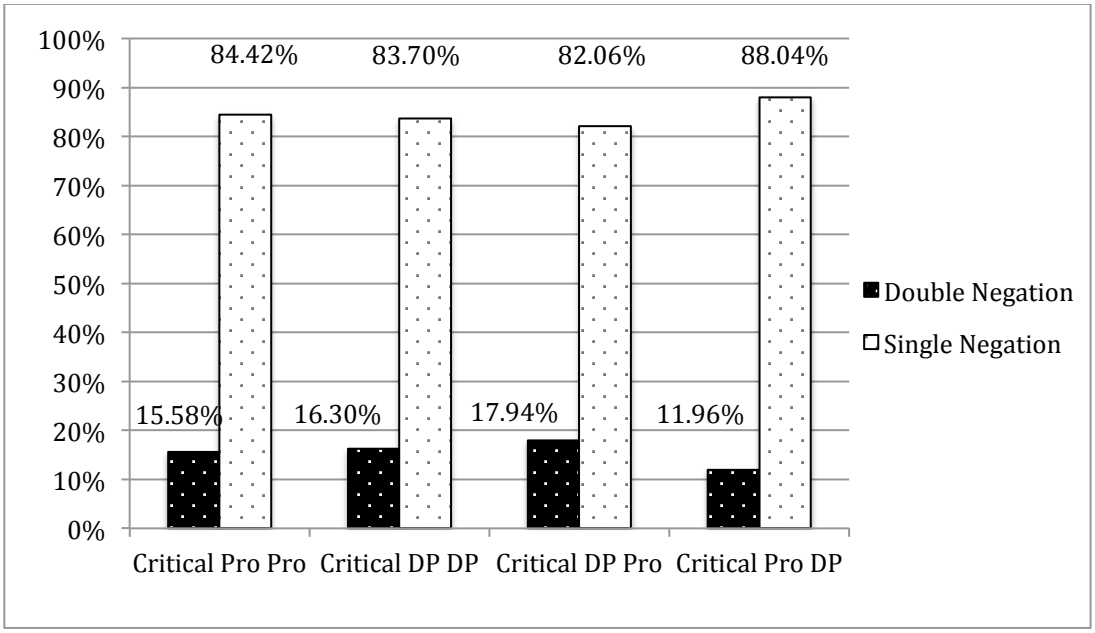


Figure 4. Total percentage of NC / single negation readings vs. DN readings in Experiment 1 (without *no*) and Experiment 2 (with *no*) confounded.

Figure 4 shows clearly that the choice for NC / single negation is undoubtedly the preferred reading for simple transitive sentences with two argument n-words in Catalan. Taking into account all critical items for both experiments, 84.56% of the responses show a choice for the NC reading. The comparison between NC / single negation readings vs. DN readings indicate the rate of prominence of NC choice in a solid NC language. Choice for a DN interpretation was, overall, 15.44% and is thus clearly the dis-preferred interpretation choice. It is worth emphasising, however, that beyond this clear preference,

774 our results also indicate that DN readings are far from being entirely absent in either
775 experiment, an observation that we detail below.

776 Figure 5 shows that DN readings emerge somewhat differently in all our critical
777 conditions, which feature simple transitive sentences that contain negative expressions of
778 different syntactic complexity distributed in preverbal and postverbal positions. This
779 figure again collapses the results of both Experiment 1 (without *no*) and Experiment 2
780 (with *no*) together. Eyeballing Figure 5 as compared to Figure 4, it is rather clear that the
781 amount of DN in both experiments largely exceeds the amount of errors in our control
782 conditions. A Wilcoxon rank sum test shows that the overall proportion of DN is greater
783 than the proportion of errors in Fillers ($p<0.001$). The choice for DN, then, cannot merely
784 be attributable to errors.



785

786 *Figure 5*. Percentage of NC / single negation interpretation and DN interpretation in
787 critical conditions with different syntactic complexity in Experiment 1 (without *no*) and
788 Experiment 2 (with *no*) confounded.

789 It should be noted, however, that across both experiments, 23 of our 69 participants (4 in
790 Experiment 2) never chose a DN reading in any and all the critical conditions plus the
791 NPI control. Such results clearly provide overwhelming empirical support to the claims in
792 the literature that DN is a marked interpretation for Catalan n-word sequences

793 When considering the results of both experiments separately, we find that in
794 Experiment 1 (without *no*) only a small number of DN readings (6.34%) were obtained
795 for all our critical items overall. This result does not appear to strongly differ from the
796 rate of errors noted in our control conditions and, thus, could plausibly be attributed to
797 mistakes. To confirm this, we conducted pairwise comparisons using a Wilcoxon rank
798 sum test with Holm correction. The comparison of DN responses in our critical
799 conditions to the number of errors in the controls and fillers lead no statistically
800 significant difference with a p=1 value.

801 Notably, however, the presence of the sentential negative marker *no* severely
802 increased DN interpretations in Experiment 2 (with *no*), with the percentage of DN
803 reading climbing to 24.29% across the four critical conditions. This figure is far too high
804 to be attributable to error.

805 A GLMM analysis was run over our entire data set with perceived DN as the
806 dependent variable. The random factors were 'subject' and 'sentence'. The fixed factors
807 were 'Experiment' (without *no* vs. with *no*) and 'Condition' (critical DP DP, critical Pro
808 Pro, critical DP Pro, critical Pro DP). First and foremost, a massive effect of the presence
809 of *no* was observed ($p<0.001$).

810 In Experiment 1 (without *no*), the random factor 'Sentence' had little effect
811 (Variance = 0.1754), whereas the effect of the factor 'Subject' was higher (Variance =

812 3.9156). Comparing the four critical conditions with the control NPI yielded significant
813 effects in two conditions: these were critical DP Pro ($p<0.00206$) and critical Pro Pro
814 ($p<0.00504$). [7] This indicates that these are the conditions that most favoured DN
815 readings when tested items only contained interacting n-words but no sentential negative
816 marker. Concerning these effects, however, it needs to be kept in mind that overall the
817 level of DN in Experiment 1 (without *no*) is not significantly different from the level of
818 errors in our control conditions as noted above.

819 Comparing the critical conditions among themselves by means of Tukey Contrasts
820 Multiple Comparisons of Means (Tukey 1953), we obtained significant effects between
821 critical DP Pro and critical Pro DP ($p=0.0174$), as well as, between critical Pro Pro and
822 critical Pro DP ($p=0.0398$). Additionally, the contrast between critical DP DP and critical
823 DP Pro is significant at $p<0.1$. This indicates an overall DN enhancing effect of DP in
824 preverbal position as compared to Pro.

825 For Experiment 2 (with *no*) there was little effect of the random factor 'Sentence'
826 (Variance = 0.003822), as in Experiment 1 (without *no*), whereas for the factor 'Subject',
827 the effect was much higher (Variance = 4.528526). This indicates that the variation
828 among subjects was higher, a point we return to below when discussing subject data.
829 Statistical significant effects were obtained in three critical conditions when these were
830 compared with the control NPI: critical Pro DP ($p<0.001$), critical Pro Pro ($p<0.001$), and
831 critical DP Pro ($p<0.001$). This indicates that these are the conditions that most differed
832 from the control NPI in terms of how they influenced the rate of DN response. Critical

[7] In this GLMM analysis, the control NPI was taken as the reference of comparison because it was formally the closest to the critical conditions in that the items in this control were not combined with a preverbal *no* in Experiment 1 (without *no*) but were in Experiment 2 (with *no*), in similarity with the critical items.

Pro DP was the condition that resulted in the least amount of DN responses, as compared to control NPI that manifested the highest rate, followed by the critical Pro Pro condition and the critical DP Pro condition. After NPI, the condition that most favoured DN was DP DP, which showed no significant difference with the control NPI.

We further conducted a Tukey Contrasts Multiple Comparisons of Means (Tukey 1953) analysis to compare the four critical conditions among themselves with the aim of finding out which one favoured a DN reading more in Experiment 2 (with *no*). The output of this test was that the critical conditions that yielded a significant difference were critical Pro DP as compared to the condition critical DP DP ($p=0.04616$). In this case, the latter condition was the one that showed the most DN readings. This suggests that a complex DP in preverbal position is a significant factor that favours DN readings.

Consider now Figures 6 and 7, which provide the results of DN readings obtained for the critical conditions in Experiment 1 (without *no*) and in Experiment 2 (with *no*), respectively, as compared with the NPI condition. For Experiment 1 (without *no*), the condition that produced the most DN readings is the critical DP Pro, followed by critical Pro Pro, critical DP DP and finally critical Pro DP. Recall, however, that the low levels of DN in this experiment are not significantly different than error rate in the control conditions.[8]

[8] A finer analysis (GLMM over Experiment 1 alone) showed a significant effect only when comparing the DP Pro condition and the Pro Pro condition against the control Universal Quantifier condition, which was the control in which the speakers had the least amount of error. No significant effect is obtained when comparing to the control DN or even the control Negative Quantifier.

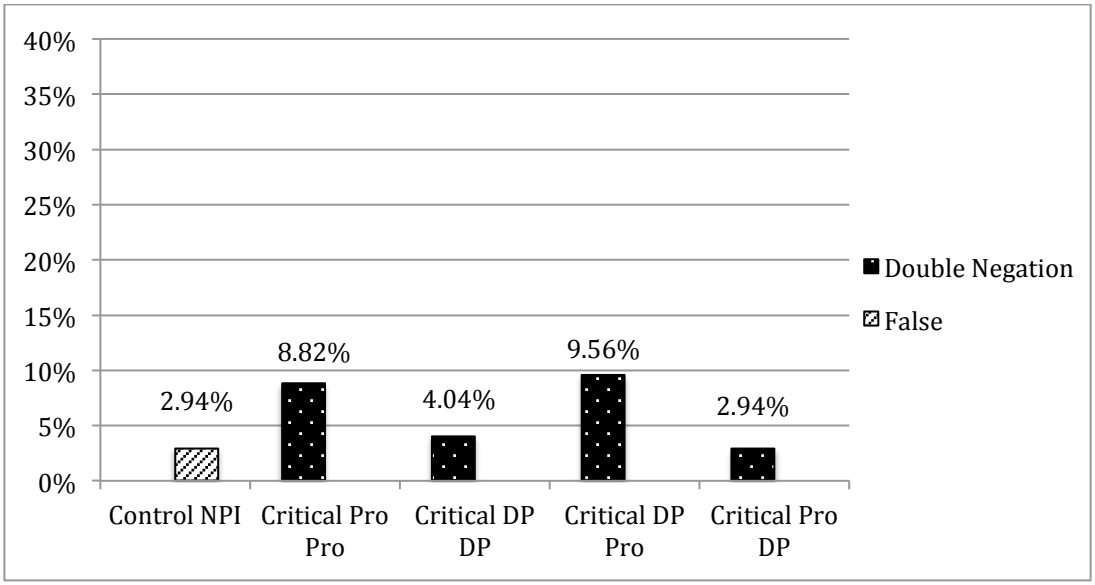


Figure 6. Percentage of DN interpretation in critical conditions in Experiment 1 (without *no*) as compared to the NPI control.

In Experiment 2 (with *no*) the highest rate of DN is found in the NPI control. As compared to this control, the next highest rate of DN is observed in the critical DP DP condition, followed by the critical DP Pro condition, the critical Pro Pro condition and the critical Pro DP condition. This leads an apparent effect in favor of increased DN when the subjet of the transitive sequence is a DP.

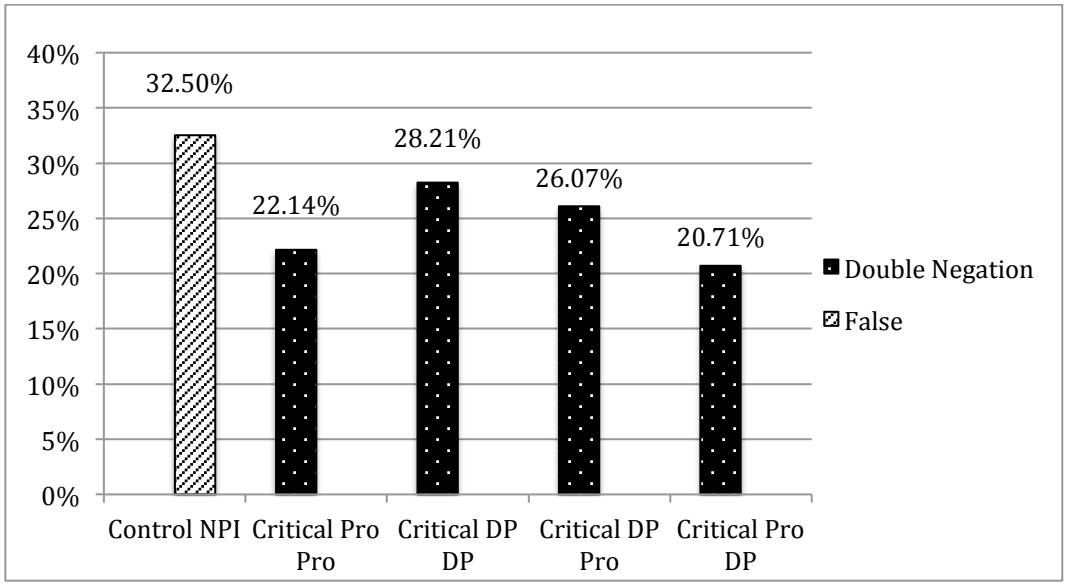


Figure 7. Percentage of DN interpretation in critical conditions in Experiment 2 (with *no*) as compared to the NPI control.

For Experiment 2 (with *no*) a further binomial comparison was conducted to compare n-word sequences with parallel morpho-syntactic structures, i.e., conditions that had two n-words of the same morpho-syntactic structures (parallel), to n-word sequences with non-parallel n-words. Figure 8 compares the critical conditions DP DP and Pro Pro (=parallel) together to the critical conditions Pro DP and DP Pro (=non-parallel). The effects of parallelism were not found to be significant. For clarification, this comparison was conducted because it was suggested in May (1990), that parallel sequences of quantifiers may favour a resumptive quantification reading. This suggestion was not confirmed in our data, presumably because of the otherwise DN enhancing effect of DP in preverbal position (see below), which in all likelihood interfered in the above comparison.

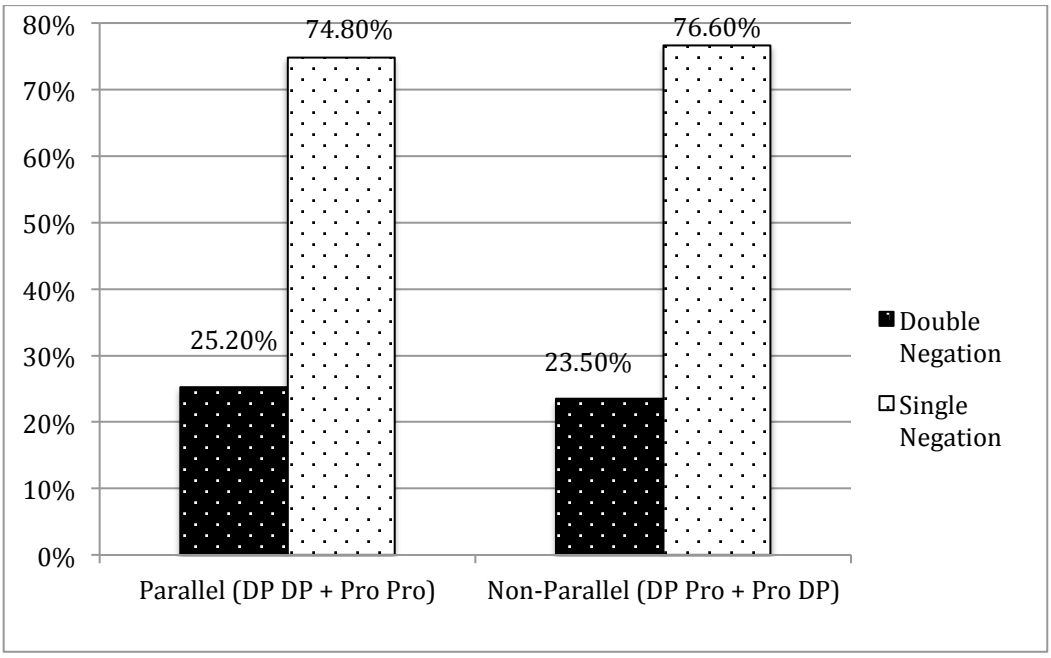


Figure 8. Parallelism effect in the responses to critical conditions (critical DP DP and critical Pro Pro) in Experiment 2 (with *no*).

A further analysis was conducted to determine the effect of the complexity of the negative expression in both preverbal (Figure 9) and postverbal (Figure 10) positions. Figure 9 reveals that the complexity of negative expressions in preverbal position clearly favors DN readings. A t-test comparison reveals that the difference between conditions in which a DP is in preverbal position (DP DP and DP Pro) significantly increases the rate of DN in comparison to conditions in which Pro is in preverbal position (Pro DP, Pro Pro) ($p < 0.001$).

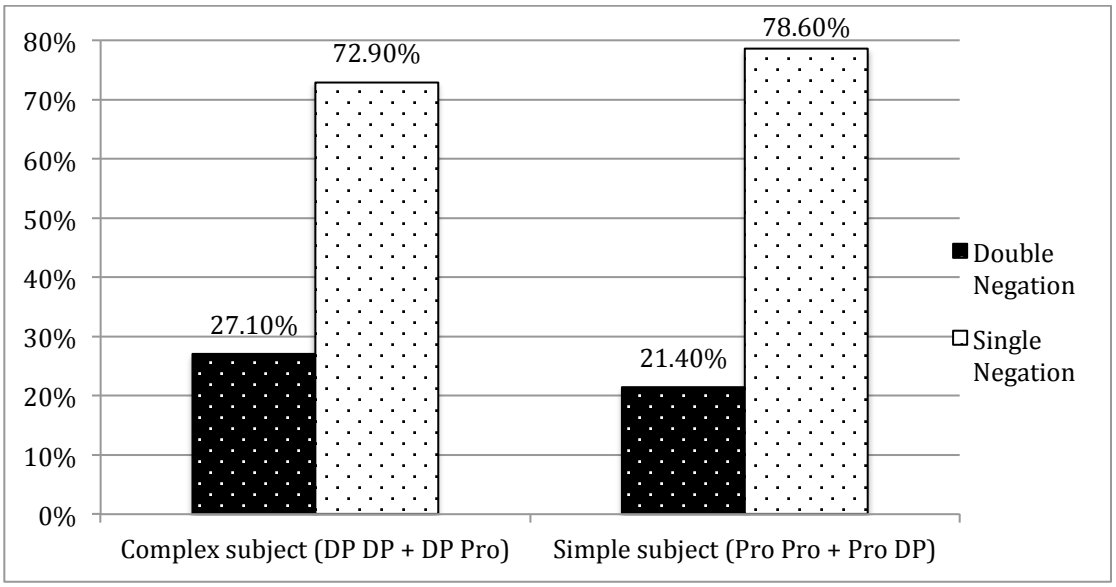


Figure 9. Complexity effects of negative expressions in preverbal position in Experiment 2 (with *no*).

By contrast, the complexity of negative expressions does not matter in postverbal position as shown in Figure 10.

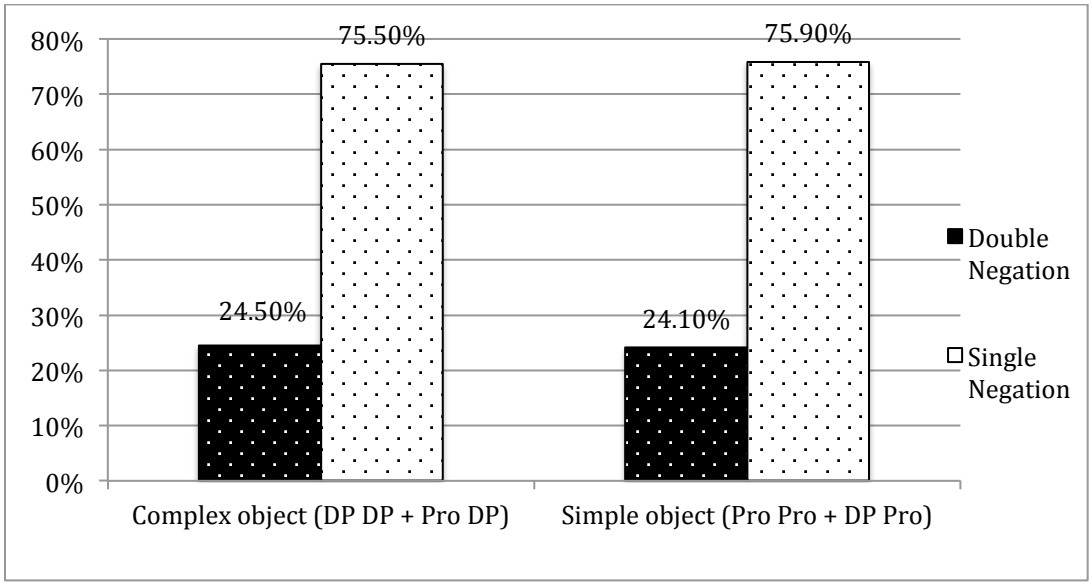


Figure 10. Complexity effects of negative expressions in postverbal position in Experiment 2 (with *no*).

Let us finally turn to individual subject results. Figure 11 reports the percentage of DN responses per subject in the critical and NPI conditions of Experiment 2 (with *no*). This Figure reveals that 4 subjects had no DN interpretation at all, that 15 participants had between 1-10% of DN responses, 5 between 10-25% DN readings and that 11 participants had between 40 and 90% DN responses. The overall picture appears to be one in which there are essentially two populations, one (the largest) with participants hardly or infrequently responding with a DN choice and the other where the DN choice represents a clear option that cannot be ignored.

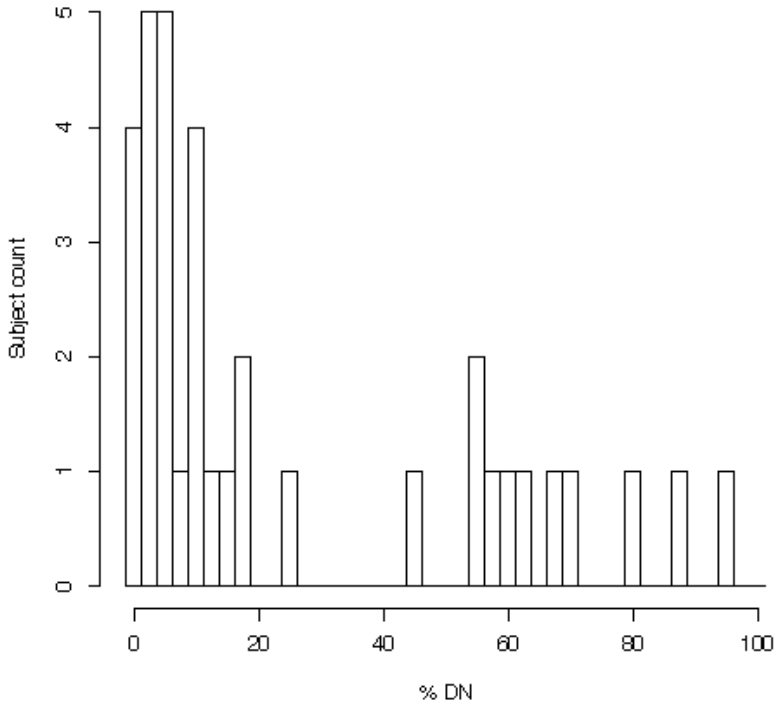


Figure 11. Distribution of number of DN readings with respect to number of subjects in Experiment 2 (with *no*).

A final remark is of interest concerning our subject data. Recall from the Methods section that our subjects filled up a small questionnaire at the end of their participation concerning their place of birth, current living location, age range, sex and percentage of Catalan use in their daily life. In general, the overall population was not sufficiently balanced for any of these factors to produce a significant effect on the linguistic results. Nevertheless, one factor that had a suggestive effect nearing significance was the percentage of Catalan use in daily life. As the figure below reveals, there was overall less DN interpretation in Experiment 2 (with *no*) for subjects that used Catalan in their daily life between 75% of the time or more. This suggests that the speakers that used Spanish more frequently in their daily lives were also the ones who tended to have more DN

interpretations. But to be confirmed, such a tendency would need to be examined in an experiment with a balanced subject population.

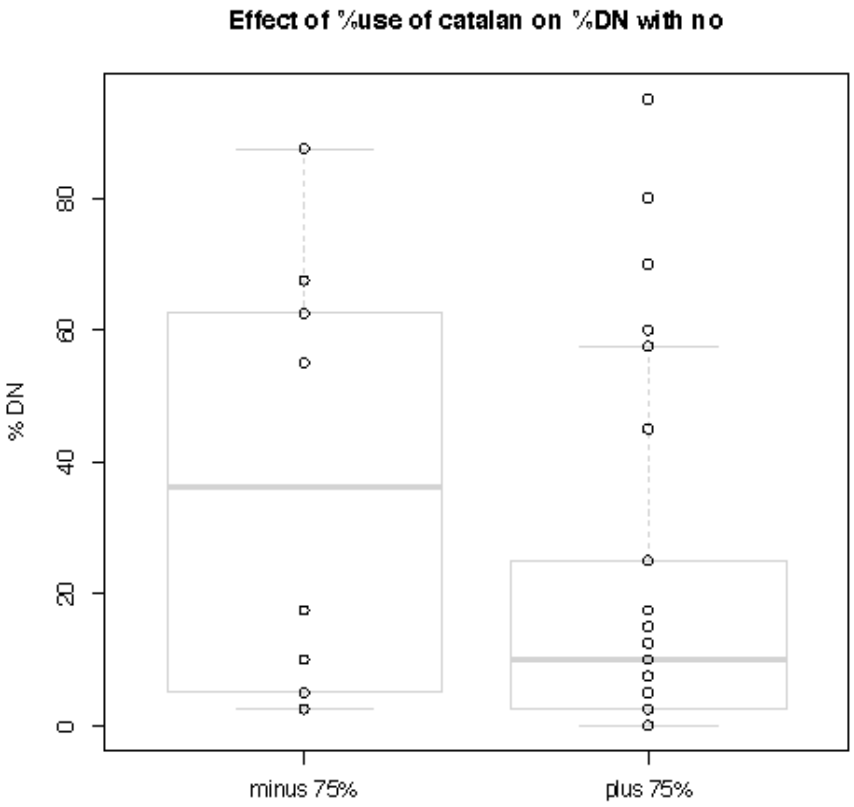


Figure 12. Effect of percentage of use of Catalan on DN choice in Experiment 2 (with *no*)

A final result takes into account our processing factor. Consider Figure 13.

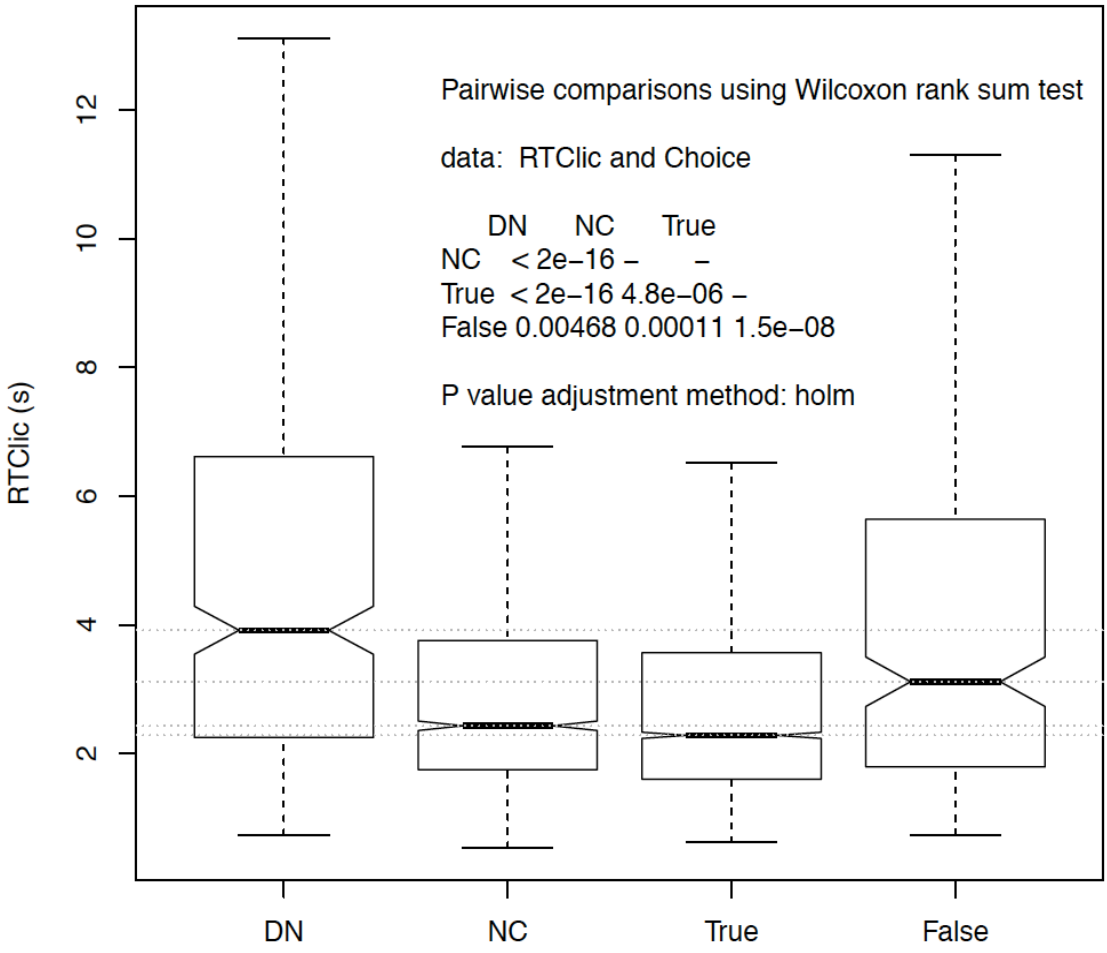


Figure 13. Reaction time (in seconds) between display of the images and the participants' click on the chosen image.

Wilcoxon rank sum tests with Holm correction revealed significant differences between False vs. True responses in the control conditions ($p<0.001$). True responses were faster than False ones (on average, 3.13s for True and 4.95s for False). Significant differences were also found between DN vs. NC / single negation responses in the critical conditions ($p<0.001$). The Figure clearly indicates that NC / single negation responses are processed faster than DN ones (on average, 3.41s for NC and 5.35s for DN).

5. Discussion

In this section, we return to the four initial questions that our experiment was designed to investigate concerning, first, whether, as standardly assumed by Catalan grammarians, NC is systematically and consistently the default interpretation for sentences with multiple n-words; testing this possibility was important both to prove the nature of Catalan n-words with regards to whether or not they could be negative expressions, as de Swart (2010), among many others, hypothesized, and to establish a baseline for further manipulations. Our choice of a preference test was guided by an aspiration to find out not only whether NC is always a default reading but also to what extent, if at all, DN readings could arise as a possible interpretation of Catalan n-word sequences in monoclausal transitive negative sentences. Second, to deepen this question, we further asked whether NC could be easier to process than DN readings, as hypothesized by Corblin et al. (2006), DN being quite generally assumed to be cross-linguistically more marked than NC (de Swart 2010, Puskás 2012). Third, we explored whether the co-presence of the negative marker *no* could influence the readings of n-word sequences and boost DN readings, as predicted by Zeijlstra (2004) if Catalan has a variety with Non-Strict NC, such as Spanish or Italian, but contrary to the traditional description of Catalan. Finally, we sought to examine whether the morpho-syntactic complexity of n-words and their syntactic position (DP vs. Pro) could influence the reading of Catalan negative sequences, favoring NC or DN as was suggested to be the case for other NC languages (Italian, French) (Acquaviva 1995, 1997; Déprez 2000, 2011). This question also aims at proving both the nature of Catalan n-expressions, surveying in particular whether their morpho-syntactic composition can affect the reading they trigger in a negative n-word sequence, and the

nature and stability of the Catalan concord dependency across a variety of negative expressions.

The section is organized as follows. We begin by summarizing the experimental results that bear on the question of the default nature of Catalan NC, and then turn to consider what our processing results bring to this issue. We then move to considering the DN boosting effects that the co-presence of *no* had on Catalan n-word sequences, assessing how proposals in the literature fare in view of our experimental results. Finally, we turn to the properties of n-words that our results have revealed, the consideration of their effects in influencing the interpretation of n-word sequences, and how these could be explained in current theoretical approaches to NC.

5.1. NC as a default reading in Catalan

Turning to our first question on the default nature of NC readings, it is evident that first and foremost, our results, with 84.56% NC preferred choice in both experiments confounded, bring conclusive experimental confirmation that NC is indeed uncontroversially the prevalent interpretation in Catalan for negative sequences of all the types considered here, namely monoclausal transitive sentences with n-words in both preverbal and postverbal positions with and without *no*. In this respect, our experimental findings, which fully accord with the abundant traditional and theoretical literature on Catalan negative dependencies (see references in the Introduction), is evidently, not novel. It is worth noting, however, that a fully comparable experimental protocol yielded quite different results for another presumed uncontroversial NC language, namely French, in which Déprez (2014) found no comparable NC prevalence. Thus, our Catalan

975 results are not as trivial as it may appear, as they establish –for the first time, to our
976 knowledge– an experimental baseline of how prevalent the choice of an NC interpretation
977 can be in an undisputable NC language, thus providing an informative basis for further
978 cross-linguistic comparison of NC vs. DN preference.

979 Just as clearly, but surely more surprisingly, our experimental results further show
980 that DN readings can in fact arise in simple transitive Catalan clauses, with a certain
981 amount of variability that depends essentially on two central factors: (i) the overt
982 presence of preverbal *no* 'not', shown to be massively significant in inducing possible
983 and preferred DN readings, and (ii) the complex vs. non-complex nature of n-words and
984 their position, which also clearly influenced the availability of DN readings, though to a
985 lesser degree. We return to a more detailed discussion of the significance of each of these
986 factors and their combination below.

987 Briefly, however, let us here comment on the rather surprising observation that DN
988 interpretation arose at all in simple Catalan monoclausal transitive sentences with two n-
989 words, in the absence of sentential negation or any favoring context (see Figure 6 for
990 Experiment 1). This possibility evidently raises the question of where the two conflicting
991 semantic negations required for a DN reading could come from. Clearly, a first semantic
992 negation must be triggered by the presence of an n-word in preverbal position, which, as
993 is otherwise known, suffices to produce a negative sentence. The second semantic
994 negation, however, could just as clearly, only come from the postverbal n-word. As such,
995 this appears to provide a first piece of evidence that Catalan n-words cannot simply
996 always be non-negative indefinites, as they must –at least sometimes– have the possibility
997 of being semantically negative on their own or of triggering the presence of an additional

998 abstract negative operator. In Section 5.3 below, we further discuss how exactly such a
999 DN reading can arise in the grammar of Catalan, as several possibilities are imaginable,
1000 including lexical variants (Herburger 2001), syntactic variants (Déprez 2000), or a
1001 difference in feature composition (Labelle and Espinal 2014, and Espinal and Tubau to
1002 appear, 2014). Here we wish only to underscore the mere existence of these DN readings
1003 in neutral contexts, as this possibility, unexpected in a language in which NC is clearly
1004 the default interpretation, is predicted to be excluded under a strict macro-parametric
1005 approach to NC. But of course, it must be kept in mind that, if surprising, this observation
1006 only concerns a rather small proportion of responses in Experiment 1 (without *no*),
1007 namely only 6.34%, which although slightly larger than the overall proportion or errors in
1008 our most challenging control, the Negative Quantifier control (5.10%), is not statistically
1009 significantly different. In this regard, although suggestive, this observation surely cannot
1010 constitute firm evidence that Catalan n-words must be negative, as these could, in
1011 principle, mostly be due to errors. Below, however, additional evidence in support of this
1012 possibility is examined.

1013 To sum up, although our experimental results basically uphold the overall traditional
1014 picture of Catalan as a strongly NC language, they also paint a more nuanced picture that
1015 is not entirely compatible with the predictions of formal syntactic approaches casting NC
1016 as the direct consequence of a rigorous macro-parametric choice. In the upcoming
1017 sections, we focus our discussion on exploring possible explanations for why certain
1018 factors (i.e., the overt presence of preverbal *no*, the syntactic complexity and the
1019 distribution of negative expressions) should matter at all in eliciting DN interpretations in
1020 Catalan, given that this language is primarily an uncontroversial NC language. We also

1021 focus on understanding what this reveals about the nature of Catalan negative
1022 dependencies. Before we turn to these points, however, we examine the impact of the
1023 processing results in our experiments, which revealed a significant difference between
1024 NC and DN.
1025
1026 *5.2. Processing NC vs. DN*
1027 As was shown in Figure 13 above, our experimental results demonstrate that Catalan
1028 speakers clearly required less time to choose a picture corresponding to a NC reading and
1029 more time to choose a picture corresponding to a DN one, in both Experiment 1 (without
1030 *no*) and Experiment 2 (with *no*) confounded. Moreover, in Experiment 1 the time to NC
1031 choice is essentially the same as the True choice for our control items, suggesting that
1032 monoclausal transitive negative sentences are processed easily under an NC reading.
1033 Although the measure we recorded (time to picture choice) is not fully comparable to that
1034 of a more standard reading time, since it involves conscious choice rather than an
1035 unconscious reading speed, it nonetheless records a measure of reaction. In this regard,
1036 we conjecture that this measure can be revealing of the comprehension process that is
1037 taking place in the speaker's mind after reading the relevant sentence. Understood as
1038 such, the significant difference we found here in Catalan between NC and DN choice
1039 appears to provide strong support for Corblin's (1996) hypothesis that NC is easier to
1040 process than DN. This, along with the observation that languages featuring NC are
1041 usually more frequent in the world's cross-linguistic landscape (cf. Dryer and
1042 Haspelmath 2013) than those featuring DN, and with Bickerton's (1983) well-known
1043 remark that NC is common to all creole languages, further appears to strengthen the

already commonly held view that NC could be universally a more natural default reading for sequences of negative expressions than DN (de Swart 2010 among others). Should NC turn out to be easier to process than DN quite generally, then these cross-linguistic generalizations could perhaps even be rethought in processing terms.

However, it must be kept in mind that surprisingly little is in fact known about the processing of either NC or DN constructions cross-linguistically. Furthermore, although simple negative sentences are quite generally thought to take longer to process than positive ones, recent work by Deutsch et al. (2009) shows, in contrast, that negation can be processed unintentionally and very quickly. Similarly, an analysis of negative dependencies in English using an experimental protocol similar to the one used in our study shows that in English, DN readings are in fact processed faster than DN ones and about as fast as control items (Déprez 2014). In addition, note that while Corblin's (1996) ease of NC processing conjecture was originally offered to explain NC preferences in French, it turns out that as Déprez (2014) shows also on the basis of experimental results obtained in conditions fully parallel to the ones discussed here, French, in fact, manifests no comparable speed advantage for NC over DN choices. That is, in French, contrary to Catalan, both DN and NC choices took essentially the same time, with no statistically significant difference between the two. Thus, ease of processing for NC seems in fact to be language relative, with possible cross-linguistic variation and not a fully general characteristic of DN across languages.

Furthermore, note that if ease of processing were a general NC processing characteristic, as conjectured by Corblin, the facts observed here, namely that DN interpretations seem sensitive to the syntactic complexity of n-words and to their

syntactic position (DP vs. Pro in preverbal position) would be rather unexpected. The logic of Corblin's argument indeed should lead to the reverse expectation at least considering complexity. To see that, consider a sequence of n-words with a certain complexity. Assuming with Corblin (1996) that speakers choose an NC reading to ease its processing, it would be expected that if the sequence is made syntactically more complex, the pressure to pick a reading easier to process should increase. Our results, however, show the opposite tendency. Increased complexity in the n-word sequence, i.e., at least the presence of DP n-words vs. the simpler Pro in preverbal position, favors an increase in DN readings, not NC. Hence, what both this language-internal observation and the cross-linguistic difference between French and Catalan NC processing suggest is that ease of processing may not be a factor that generally favors NC readings, but rather it could be the processing speed that depends on the choice of NC. If so, our processing results for Catalan here can be said to uphold Corblin's (1996) hypothesis, but with a twist, namely that ease of processing could be a consequence of a grammatical or semantic pressure for NC in Catalan, and not a motivation underlying the NC choice. Note furthermore, that if NC readings had different sources cross-linguistically, i.e., if they derived from distinct semantic processes such as variable binding (NPI licensing) or resumptive quantification in different languages or in different negative sentence types (Déprez 1997 and following), then it may well be that ease of processing could characterize some of these semantic processes that derive NC, but not others. Thus, for instance, if French but not Catalan NC results from resumptive quantification (Déprez 2000, de Swart and Sag 2002), then cross-linguistic variation and even language-internal variation in the processing ease of NC could be expected.

5.3. The role of no*: are there two NC varieties for Catalan?*

In this section, we turn to what is perhaps both the most unexpected and the most interesting result of our experiments, namely the massive increase in DN readings that arose in n-word sequences in the co-presence of the sentential negation marker *no*. Although as noted above, DN readings are by and large statistically undistinguishable from errors on our controls in Experiment 1 (without *no*), this is not at all the case in Experiment 2 (with *no*), where overall, a solid 24.29% of DN –highly significantly different from error rate on controls– is observed. It is, hence, clear that the increase in DN here is not due to error. In this section, we discuss possible explanations for this result, and their relation to the existence of two competing varieties for Catalan NC.

Recall from Section 2.2 that in the linguistic literature, the optionality of *no* in Catalan has been related to the existence of two NC dialects (van der Wouden and Zwarts 1993, Zeijlstra 2004). In these approaches, the optionality of *no* is taken to be essentially illusory as it results from the interaction of two distinct varieties, unclearly distributed in the population. According to Zeijlstra (2004), in the variety identified as Catalan I above, the presence of the sentential marker should be as obligatory as in Strict NC languages such as Greek, or Romanian, and have no effect on an unambiguous NC interpretation. In the variety identified as Catalan II, in contrast, the presence of the sentential marker should essentially be disallowed with preverbal n-words, and when enforced, should lead to an obligatory DN interpretation, as in Non-Strict NC languages such as Spanish or Italian.

If we focus on our data, it seems clear that the overall results of our Experiment 2 (with *no*) fail to support traditional Catalan descriptions, since there is little doubt that the presence of *no* significantly affected the interpretation of negative sentences, as indicated by the sharp increase of DN choice.

However, if instead we focus on our subject data, we observe that the effect of *no* is unevenly distributed in our population. Going back to Figure 11, note first that there are at least some speakers (actually 4) for whom the co-presence of *no* with preverbal n-words makes no difference at all. These subjects simply never chose a DN reading in any of our critical condition as well as in the NPI control, which as explained above, was parallel in this regard to our critical conditions in Experiment 2. To these subjects, one could add some more speakers that produce an amount of DN that essentially hovers around the amount of errors that occurs in our control items (see the Results section). But the exact number and cut is far from clear, as it partly depends on the control items taken as referent, and the leniency adopted for inclusion in this group. Nevertheless, what is of interest in Figure 11 is that overall, we observe an essentially bimodal distribution of our subjects, with a larger group of 24 speakers choosing DN between 0-25% of the time, and a smaller group of 11 speakers chosing DN almost half of the time or more.

These data may indeed suggest, as hypothesized by Zeijlstra (2004) among others, that there are two varieties of Catalan, one with a largely negligible amount of DN readings and the other for which DN readings are clearly a possible option, since for this second group of subjects, DN is chosen from 40% of the time up to almost all the time (90%), depending on the subjects. As it turns out, however, neither of these two populations appears to pattern in complete accordance with Zeijlstra's predictions for

Catalan. Recall from Experiment 1 (without *no*), that all speakers clearly interpreted n-word sequences without *no* massively as NC and they made this choice as fast as that of correct responses to our controls. This strongly confirms the traditional grammar view that Catalan sentences with preverbal n-words and without *no* are fully acceptable for all speakers and, hence, that there is no variety of Catalan equivalent to a Strict NC language where the co-presence of sentential negation is required with preverbal n-words. Thus, if there are indeed two varieties of Catalan, which seems likely in view of the bimodal distribution of subjects observed, the first variety is one in which *no* is optional and leaves the preferred NC interpretation essentially unaffected, exactly as described by traditional Catalan grammars.

Note that for this variety, Zeijlstra's macro-parametric model is problematic. Recall that in his typology, Strict NC languages are characterized by a semantically non-negative ([uNeg]) sentential marker and semantically non-negative ([uNeg]) n-words. To correctly predict that n-words in Strict NC languages always require the negation marker, only this sentential negative marker should be able to trigger the presence of an abstract [iNeg] operator, so that a preverbal n-word cannot suffice to license a postverbal one by mutually checking their [uNeg] features. But this makes incorrect predictions for the Catalan variety I. To correctly account for the Catalan variety I in which *no* is optional and leaves the NC interpretation unaltered, what is required is n-words that can be semantically negative (or trigger the presence of an abstract negative operator) in preverbal position and the existence of a sentential negation marker that is semantically non-negative, i.e., an expletive negation. Recall from the Introduction that Espinal (2007) and Espinal and Tubau (to appear) argue that such a marker is independently needed in

Catalan to account for the phenomenon of expletive negation and is essentially a strong NPI-like element.

The second variety that Figure 11 revealed is one in which the presence of *no* significantly increases DN readings, but, in which, crucially, DN readings are not obligatory, since NC remains overall the favored interpretation for negative sequences, even in Experiment 2 (with *no*). Here Zeijlstra's (2004) macro-parametric model also encounters difficulties. In this model, the presence of preverbal *no,* assumed to be always semantically negative in Non-Strict NC languages such as Spanish and Italian, is predicted to always yield DN. Given that Zeijlstra's Catalan II is described as Non-Strict, the existence of a group of speakers for whom DN is the only choice for preverbal n-words followed by *no* is expected, but this is not what we found. For this second variety, we thus have to conclude that a non-negative *no* is also part of this variety, but does not have to be used even whenever it is licensed.

Assuming that Catalan has two lexically distinct (but homophonous) sentential negative markers no_1 and no_2 as proposed in (20) (Espinal and Tubau to appear), and two lexical variants of n-words: $n\text{-}word_1$, which is a polar variant that can trigger a negative operator, and $n\text{-}word_2$, a negative existential quantifier, as proposed in (21) (Espinal and Tubau 2014), the distinction between the two varieties we observed can be accounted for as follows. In variety A, whenever *no* is present, speakers use the expletive form whenever it is locally c-commanded by a non-veridical licensing element. This correctly predicts that only the expletive form can be used with preverbal n-words, but not with postverbal ones, since in this case, the expletive *no* would itself not be appropriately licensed. This variety appears to be characterized by a constraint that requires that only

1181 the highest potentially negative element in a chain be associated with an actual semantic
1182 negation, either overtly or covertly (characterized [iNeg]), and precludes all the following
1183 potentially negative elements in a chain to be negative ones. This is a form of Neg-first
1184 constraint, though distinct from the one proposed by de Swart (2010)[9], since it concerns
1185 negative interpretation, rather than morpho-syntactic marking. For some of these
1186 speakers, we suggest that the rather small amount of DN that surfaces could presumably
1187 arise from errors or from the interaction of two (possibly negative) n-words, as seen in
1188 Experiment 1 (without *no*) (see Figure 6), but not from the presence of *no.*

1189 In variety B, in contrast, the use of the expletive form of the negator is not enforced
1190 under c-command by an [iNeg] element. Speakers instead may use freely either the
1191 semantically negative sentential marker or the expletive one, with a lot of intra-speaker
1192 variability, and the latter option being regressive and becoming less and less common.[10]
1193 This accounts for the fact that the massive DN triggering *no*-effect we observed is largely
1194 driven by this smaller group. However, here as well, Zeijlstra's Catalan II is not strictly
1195 realized, although it seems nevertheless apparent that some speakers are transitioning to
1196 it. Note that these observations provide rather strong support for the view defended in
1197 Section 2.2 that contemporary Catalan has two different lexical entries for *no*, one no_1
1198 which is semantically negative, and one no_2 which is semantically non-negative, i.e.,
1199 expletive. Recall that in this regard, Catalan appears similar to Afrikaans, for which

[9] Recall that this Optimality Theory constraint specifies that "Negation precedes the finite verb" (de Swart 2010: 96).

[10] It is interesting to note that in this respect, Catalan is also rather similar to Québec French in which both negative markers, *ne* and *pas* participate in NC constructions. Strikingly, however, as observed by Daoust-Blais (1975), Muller (1991), Di Sciullo and Tremblay (1996), and Déprez and Martineau (2004), among many others, only *ne* can surface in sentences with preverbal n-words, while *pas* is excluded or leads to DN readings. In recent work, Burnett and Tremblay (in press) show additionally that there is much variation in the co-occurence of *pas* with distinct types of n-words. The subject variability that we observe here in Catalan with respect to the effect of *no* does clearly not seem to be unique to this language.

Biberauer (2013) similarly recently concluded that a strong macro-parametric model such as the one proposed by Zeijlstra (2004, and subsequent work) made incorrect predictions.

It is therefore interesting to note in regards to the variety here distinguished, that our results suggest that there seems to be a tendency for the speakers of variety A to be in the class of speakers that use Catalan more than 75% of the time in their daily lives, as the following table reveals.

Percentage of subjects	minus 75% Catalan	plus 75% Catalan
%DN > 25%	14. 28%	17.14%
%DN <= 25%	14.28%	54.28%

Table 4. Correlation between percentage of DN readings and percentage of use of Catalan in daily life.

Observe that 54.28% of our subjects use Catalan more than 75% of the time in their daily lives and have less than 25% of DN. These are the subjects closest to what traditional grammars describe. But the cut is not as sharp as one could wish, since in this category of 75%-of-Catalan users, there are still 17.14% who chose DN between 40% to 90% of the time. To confirm the tendency here observed, a follow-up study that would properly balance the sampled population for age, use of Catalan in daily life, region and socio-economic factors would be needed. If confirmed, this would demonstrate that the Catalan speakers that deviate from the model described by traditional grammars are speakers that may be more under the influence of their second native language, namely Spanish, a textbook characteristic Non-Strict NC language.

In sum, the complex profile of the NC and DN distribution that our results revealed is one that only partially fits the predictions of either the traditional view of Catalan or of

Zeijlstra's proposed model. With respect to the use of *no*, we conclude that *no* is optional in all varieties of Catalan and there is no variety in which it is either systematically required, or systematically rejected. Yet, with respect to the existence of two NC varieties, our data indeed suggest that they are attested, and we suggest that whereas for one population an expletive *no* most often (optionally) co-occurs with preverbal n-words, in another population this is a regressive option and both the negative and the expletive variants are variably allowed. Hence, the presence of *no* is increasingly associated with DN readings, as it is interpreted as semantically negative to a varying extent.

5. 3. The nature of Catalan n-words

While it is clear that the most important factor triggering potential DN readings in Catalan is the co-presence of *no* with n-words, Experiment 2 (with *no*) also provided strong evidence that the differing mopho-syntactic nature of n-words matters in influencing the interpretation of negative sentences and fostering DN readings. In particular, our results showed that complex n-words, i.e., full DPs with NP complements, or partitive DPs, in contrast to simple Pronominal n-words, have the effect of significantly raising the number of DN choices that speakers made, particularly when they occur in preverbal positions. Concerning the types of negative sequences we tested, we observed specifically that in Experiment 2 (with *no*), our Control NPI sequences most increased the choice for DN, followed by DP DP sequences, DP Pro sequences, Pro Pro and finally Pro DP sequences (cf. Figure 7). In this section, we examine how these results bear on what has always been a core question about NC, namely the nature of the dependent negative expressions that participate in it.

Before we turn to a more detailed account of the specific influence of n-word types on DN vs. NC choice, it is worth stressing here that the mere existence of such effects is unpredicted under a macro-parametric approach to NC. Clearly, a macro-parameter that regulates whether or not a language has a formal negative feature [+/- u/iNeg] has nothing to say about why certain types of n-words can induce more DN / NC readings than others within the same language. A proper account of how the nature of n-words can differently affect NC / DN choice requires attention to the internal micro-parametric make-up of the n-expressions themselves and not just to the general nature of the dependency, as strongly advocated in Déprez's works (1997-2011). These type of data, then, demonstrate that languages are not homogeneously of NC or DN types as expected under a macro-parametric approach, but rather feature NC inducing vs. DN inducing negative structures and expressions that can be similar or not across languages and that can differ or not language-internally. Thus the variation in interpretation due to the use of diverse n-word types within a single language here uncovered provides an important experimental confirmation for a micro-parametric inside out approach, i.e., going from n-expression to NC interpretation (Déprez 2011b, Labelle and Espinal 2014).

Returning to the question of n-word types, recall that by and large four families of approaches to the nature of n-words have been commonly distinguished in the literature. The first one considers n-words as non-negative indefinite expressions that depend on negation (or non-veridical operators) to be licensed (Ladusaw 1992, 1994; Zeijlstra 2004; Penka 2011; among others); in the second one n-words are always negative quantifiers (Zanuttini 1991, Haegeman and Zanuttini 1991, de Swart and Sag 2002, among others) and NC obtains through resumptive quantification; in the third one, n-words are wide

scope universals that outscope their licensing negation (Giannakidou 2000); and in the fourth one, they are ambiguous between the first and second type (Herburger 2001). On the first and third views, n-words are essentially a variety of strong NPI that require specific contexts, usually non-veridical ones, to be licensed. For Catalan, recall from our Introduction that in Espinal and Tubau's (to appear, 2014) model, these variety of n-words are characterized with a strong [+σ] feature, following Chierchia's (1996) characterization of NPIs, and with a [uNeg] feature. However, Catalan n-words cannot just be of this type, as otherwise the possibility of DN readings that we see arising in both Experiment 1 (without *no*) and Experiment 2 (with *no*) would remain unaccounted for.[11] NPIs indeed, even of the strongest type, never lead to DN readings, even in denial contexts (otherwise known to favor the felicity of such readings). To allow for DN readings to arise at all outside of any particular facilitating contexts (cf. Experiment 1), it must be assumed that Catalan n-words can also either systematically trigger the appearance of their own abstract negative operator, or have the ability to be semantically negative by themselves. In other words, our results support the view that Catalan n-words must be ambiguous, allowing both for a non-negative NPI-like variant in sentences with an NC interpretation and for a semantically negative one to allow DN (cf. (21) in the Introduction section).

The idea that n-words are ambiguous is of course not new, as it has been repeatedly proposed in different versions at different times. Among the first to argue for such an

[11] Puskás (2012) provides an interesting account of why DN could arise in a symmetric NC language like Hungarian under particular contextual circumstances. It is however unclear how her proposal could transpose to the cases under considerations here, particularly for Experiment 1 (without *no*) since there is no sentential negation involved. Moreover, even for Experiment 2 (with *no*), the sentences here considered are not embedded in the contexts that Puskás assumes to be necessary for a DN interpretation to arise in Hungarian.

ambiguity was Longobardi (1987), but perhaps the best known defense of this type of analysis is that of Herburger (2001), who argued that Spanish n-words are lexically ambiguous between a negative and a non-negative type. Déprez (2000) offers yet another ambiguity proposal, arguing that n-words can be morpho-syntactically ambiguous, with each interpretation corresponding to a different internal morpho-syntactic structure: semantically negative n-words occupy a high position in their nominal structure, those that are non-negative indefinites occupy a low DP internal position. Recently, Déprez (2011b) proposed more specifically that semantically negative n-words occupy a (contrastive) topic/focus position within their internal DP structure (see for instance Ticio 2005 among others for such a position in the DP) that can either be derived via a DP-internal displacement (Kayne 2005) or be grammaticalized as a result of historical evolution. Schematically, the morpho-syntactic distinction can be represented as follows:

(26) negative n-word : $[_{\text{Top/Foc}}$ **N-word** $[_{\text{DP ....}}[_{\text{NumP}}$ $[_{\text{NP}}$]]]]

non-negative n-word : $[_{\text{Top/Foc}}$ $[_{\text{DP ....}}[_{\text{NumP}}$ $[_{\text{NP}}$ **N-word**]]]]

Assuming DP to be a phase (Chomsky 2000), Déprez's (2011b) proposal is that the negative feature of n-words only becomes accessible at the sentence level (i.e., at a higher phase) and hence semantically interpretable if n-words occupy the edge of their constituent, i.e., here the highest structural position in the DP in these cases. Otherwise, when buried deep inside the DP constituent, the negative feature remains uninterpretable at the sentence level, so that n-words are interpreted as non-negative.

Yet another proposal for n-word ambiguity is offered in Labelle and Espinal (2014) and Espinal and Tubau (to appear, 2014). These authors argue that n-words can have a different feature make-up, and that it is their distinct feature composition that is

responsible for their differing interpretation. One lexical variant is a polarity item (defined as [+σ] following Chierchia (2006)), which may acquire a syntactic formal feature [uNeg] in syntax that requires an Agree dependency to be established with an [iNeg] constituent; the other is a lexical variant that is a negative existential quantifier (¬∃) endowed with an uninterpretable Focus feature, [uFoc]. Such a proposal is in line with Déprez's (2011b) proposal that negative n-words that are semantically negative occupy a Focus position within their DP structure.

Arguing for a choice among these alternative proposals for the ambiguity of Catalan n-words lies beyond the scope of this particular paper. Of relevance to our purpose here is the idea that in Catalan both the n-words and the sentential negative marker *no* can have distinct variants that compete within the same language. Let us now turn to consider what possibilities these assumptions offer in regards to our experimental findings.

In comparison with the macro-parametric view that Zeijlstra (2004) developed, the micro-parametric approach here advocated which takes into account the possible ambiguous make-up of the Catalan negative marker and of the Catalan n-words clearly offers more flexibility. It predicts that Catalan should allow for at least the following possibilities. The combination of a semantically negative sentential marker with n-words that are semantically non-negative evidently leads an NC reading which is comparable to the reading obtained in polarity dependencies. As we have seen, this is clearly a possibility in Catalan, and is perhaps the most common one featuring a dependency between a sentential negation and a postverbal n-word. To obtain this combination, we suggest that the semantically negative version of the sentential negative marker is its default interpretation and one that is shared by all speakers of Catalan in all variants. For

n-words, in contrast, we take the non-negative variant to be the default one. Concerning the two Catalan variants discussed above, we suggest that when the optional negation is c-commanded by a negative n-word speakers of variety A use the expletive sentential maker. Moreover, they only allow preverbal n-words to trigger a negative operator.[12] This allows for the optionality of *no* without affecting the preferred NC reading of the sequences. In these cases, the postverbal n-word in the sequence is licensed by the negative operator triggered by the n-word in preverbal position under familiar non-veridical conditions.

Let us now turn to consider the variety in which DN readings are clearly a possibility. Here we suggest that DN readings emerge from the combination of a negative n-word in preverbal position and the semantically negative sentential negation marker, accounting for the massive effect of *no* that our data have uncovered. Additionally, we conjecture that for the same type of speakers, the possibility of DN readings in n-word combinations without *no* is also allowed to emerge from the possibility of having negative existential quantifier n-words both in preverbal and in postverbal positions. Evidently, this second possibility also arises in the presence of *no*, and also leads to a DN reading. For all varieties, additionally, the presence of either a negative n-word in preverbal position or a negative sentential negation marker and non-negative n-words in postverbal position leads to the preferred NC reading that is observed for all varieties.

Table 3, repeated here as Table 4 for convenience, summarizes the options our proposal have made available. A question that remains to be answered at this point then is when these variants are allowed or fostered.

[12] We discuss below where this restriction may come from.

Catalan	N-words in negative contexts	Negative marker(s)
Variety A	1. [+σ] 2. ¬∃, [uFoc] (emergent)	1. [iNeg] 2. [+σ]
Variety B	1. [+σ] 2. ¬∃, [uFoc]	1. [iNeg] 2. [+σ] (regressive)

Table 4. Lexical variation in n-words and the negative marker in Catalan

Concerning the non-negative negative marker, it has been hypothesized in Espinal (1997) and Espinal and Tubau (to appear, 2014) that speakers that have this variant of *no* also use it in so-called expletive negation constructions. This makes the clear prediction that speakers who chose a NC reading in sentences that combine two n-words with the sentential negative marker *no* (variety A) are also the ones who will otherwise manifest a relatively frequent use of expletive negation in the relevant constructions. Vice versa, speakers who chose a DN reading for these negative sequences (variety B) will also lack or tend to reject expletive negative constructions. We aim to conduct further experimental work to verify this prediction.

Concerning the availability of the negative variant of n-words, several possibilities can be entertained, which ultimately depend on what the exact source of ambiguity turns out to be. One interesting point deserves mentioning. Recall that our data showed that the complexity of DP structure matters in fostering DN readings. As it turns out, most of the complex DP in our experimental material and particularly those in preverbal positions were partitive DPs (like for instance *cap dels alumnes* 'none of the students'). In recent work on Catalan partitive DPs, Martí i Girbau (1999) argued that these complex DPs involve DP-internal movement (predicate inversion) to a high position in the DP structure, as shown in (27):

(27) a. molts dels llibres
many of.the$_{PL}$ books

'many of the books'

b. [DP molts$_i$ [D/PP [D/P° de [DP els [FP[NP llibres [F°[XP t$_i$]]]]]]]]

Associated with Déprez's structural proposal on n-word ambiguity, Martí i Girbau's (1999) structure for partitives suggests an interesting explanation for the increase in DN readings that we observed with full DPs that are mostly partitive n-words in our experimental results.[13] Note, furthermore, that, as is rather well known, subject DPs are far more often topics than object DPs (Prince 1992). If sentential DP topics are also DPs in which a DP internal (contrastive) topic/focus movement is fostered, this again hints at a plausible avenue to explain why DN readings should be particularly favored by complex DPs in preverbal positions. That is, the idea here is that the DN reading is fostered under a kind of structural parallelism between a DP occurring in a higher edge sentential position (topic/focus in Rizzi's 1997 sentential structure) and n-words occurring in their higher edge DP-internal position not available in postverbal position, the edge position in both serving to enhance the visibility / interpretability of the negative feature in the sentential domain. Here too, further experimental verification that targets partitive n-words and topic structure/focus structure within the DP and in the larger sentential domain is called for to solidify these conjectures.

But independently of these particular conjectures, it is clear that what our current experiment results have shown is that the internal structure of n-words matters for the overall interpretation of negative sentences. Note that this is exactly what a micro-

[13] Sleeman and Kester (2002) propose an alternative analysis of partitive constructions in French without DP-internal predicate inversion. They argue for a clausal analysis in which the numeral/quantitative part of the partitive occupies a high position in the DP as in (i):

(i) deux pro$_i$ [FP t$_i$ F° [PP t$_i$ P° ses amis]]
two of his friends

Given the similarity between numerals and n-words proposed in Déprez (1997, 2000) and Espinal (2000), such an analysis naturally extends to partitive n-words.

parametric approach such as the one advocated in independent work (Déprez et al. 2004, Déprez 2011b; Espinal and Tubau to appear, 2014) predicts. We therefore conclude that the complex empirical landscape of the distribution of DN and NC interpretation that our experiment has uncovered provides solid support for such a micro-parametric approach to NC that takes into account possible lexical variants in the interpretation of the sentential negation marker and in the structure and interpretation of n-words that can vary and compete within a single language.

6. Conclusion

To conclude, this paper has presented experimental work that explored the interpretation of n-word sequences in Catalan with and without the co-occurrence of the negative marker *no*. Our results have shown that the empirical landscape of these constructions is far more complex than standardly assumed in the literature. Clearly, and unsurprisingly, our results have first and foremost confirmed experimentally that NC readings are overall the favoured reading of n-words sequences in Catalan, both with and without the co-presence of the negative marker *no*, hence establishing an experimental base line useful for further cross-linguistic experimental investigation of NC constructions. But beyond this empirical confirmation, our results have also shown that in contrast to the traditional description of Catalan, the co-presence of the negative marker *no* with preverbal n-words clearly affects the interpretation of n-word sequences as it can sometimes elicit DN readings in simple sentences outside of any particular favouring contexts. Interestingly, however, such DN readings are not elicited for all our subjects. As hypothesized by Zeijlstra (2004), the existence of two variants of Catalan that co-exist in the native

speaker population seems to be supported by the near bimodal distribution of DN readings we observed in our sample population. The two variants, however, did not entirely pattern as predicted under Zeijsltra's model, as Catalan clearly does not feature a variant with Strict NC, but only a variant in which the co-presence of the negative marker is indeed optional, as described by traditional Catalan grammars. For the second variant, DN readings, which are generally not obligatory, are mostly elicited by the co-presence of *no* but were also shown to increase with the particular structure of n-words, and more specifically for complex DP n-words such as partitive n-words in preverbal position. To account for these facts, we argued for a micro-parametric approach to Catalan NC that features both an ambiguous negative marker –semantically negative or expletive, the latter option being readily available for the speakers of Variety A, and regressive for the speakers of Variety B–, and ambiguous n-words, non-negative and negative, variably available for all Catalan speakers, but with the negative variant being emergent for speakers of Variety A. The paper further offers conjectures as to why certain types of n-words can foster an increase in DN interpretation and why the preverbal position also matters. Overall, one of the central points of our experimental work is the demonstration of how crucial taking into account the elicitation of possible DN readings can be for a better understanding of the nature of negativ constructions in Catalan and cross-linguistically. In this regard, we hope that our work will encourage the experimental exploration of the variable emergence of DN readings in the cross-linguistic landscape of NC constructions.

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