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## Spanish Neg-raising: Mood effects on NPI licensing

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## Introduction: Neg-raising and NPIs

**Neg-raising predicates** have two properties:

- 1. They trigger **Neg-raising inferences**: negation in the matrix clause is interpreted as negation in the embedded clause (Bartsch 1973; Horn 1978; Gajewski 2007; Romoli 2013; Jeretič 2022; a.m.o).
  - (1) a. Ana <u>doesn't believe<sub>NEG-RAISING</sub></u> [that the train will arrive] b.  $\rightsquigarrow$ Ana believes [that the train won't arrive] ( $\checkmark$ NR)
  - - b.  $\not\sim$  Ana claims [that the train won't arrive]

 $(\mathbf{X}NR)$ 

## Introduction: Neg-raising and NPIs

**Neg-raising predicates** have two properties:

- 2. They allow the licensing of **strict NPIs** (e.g., *until*) in the embedded clause (Horn 1978; Gajewski 2007).
  - (3) Ana doesn't believe<sub>NEG-RAISING</sub> [that the train will arrive <u>until seven</u>]



Licensing of strict NPIs has often been taken as a main test for if Neg-raising inferencing is possible (c.f. Horn 1978 for discussion)

## Introduction: Neg-raising and NPIs in Spanish

Under some negated Neg-raising predicates, Spanish allows both SUBJ and IND mood (Quer 1998), but sentences with a strict NPI and an IND verb are at best marginally acceptable.

- (5) Ana no cree<sub>NEG-RAISING</sub> [que el tren llegue <u>hasta las siete</u>] (√Neg-raising)
  Ana not believe that the train arrive.SUBJ until the seven
  'Ana doesn't believe the train will arrive until seven.'
- (6) #/?? Ana no  $\operatorname{cree}_{\operatorname{NEG-RAISING}}$  [que el tren llega <u>hasta las siete</u>] (?Neg-raising) Ana not believe that the train <u>arrive.IND</u> until the seven

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#### Disagreement:

- Some argue that **IND blocks Neg-raising altogether** (Rivero 1971; Harrington and Pérez-Leroux 2016)
- Others have reported a Neg-raising inference with IND, but make no comment on NPI licensing (Bolinger 1968; Fignoni 1982; Siegel 2009)

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GOALS: Which hypothesis better accounts for the data and how can it be formalized?

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#### **Main Research Questions**

Research Question 1: How acceptable are NPIs in IND vs. SUBJ embedded clauses? Research Question 2: To what extent is the Neg-raising inference available with IND and SUBJ embedded clauses?

- **Design**: 3x2 design [Construction x Mood]
- (7) a. J. didn't <u>know</u> that A. had<sub>IND/SUBJ</sub> visited the museum that year.
  b. J. didn't <u>think</u> that A. had<sub>IND/SUBJ</sub> visited the museum that year.
  c. J. didn't think that A. had<sub>IND/SUBJ</sub> visited the museum in years. (1)

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  - c. J. didn't think that A.  $had_{IND/SUBJ}$  visited the museum in years.
  - 6 neg-raising predicates & 6 corresponding non-neg-raising predicates

NON-NEG-RAISING	saber	$estar \ seguro$	$ser\ consciente$	$resultar \ evidente$	a segurar	recordar
	'know'	'be sure'	'be aware'	'be evident'	'assure'	'remember'
NEG-RAISING	pensar	creer	considerar	parecer	opinar	dar la impresión
	'think'	'belive'	'consider'	'seem'	'reckon'	'give the impression'

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- Run using PCIbex with 48 native speakers of Peninsular Spanish from Prolific

## Experimental Design: more on the items

- Matrix predicate always in imperfective to avoid attachment ambiguity of the NPI
  - (8) Ana no pensó/\*pensaba en ello <u>hasta las ocho.</u>
     Ana not thought.PERF/IMP in it until the eight
     'Ana didn't think about it until eight.'
  - (9) Ana no pensó que fuera a llegar <u>hasta las ocho</u> (Ambiguous) Ana not thought.PERF that go.SUBJ to arrive until the eight
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    'Ana didn't think it would arrive until eight.'
- Embedded predicate counterbalanced for the two subjunctive forms -ra and -se to avoid dialectal effects
- $\bullet\,$  Only telic verbs with NPI hasta

## Experimental Design: general structure



## Experimental Design: a screenshot





LMER	Mood	Construction	M:C
p-value	0.006 (**)	< 2.2e-16 (***)	1.5e-11 (***)
$\chi^2$	7.58	117	49.91



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- Hyp A: IND blocks strict NPIs & neg-raising inferences
- $\begin{array}{c} \textbf{Hyp $B:$ IND allows strict NPIs \&} \\ \textbf{neg-raising inferences} \end{array}$
- $\begin{array}{c} \mathbf{Hyp} \ \mathbf{C:} \ \mathbf{IND} \ \mathrm{blocks} \ \mathrm{strict} \ \mathrm{NPIs} \ \mathrm{but} \\ \mathrm{allows} \ \mathrm{neg-raising} \ \mathrm{inferences} \end{array}$



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## $\begin{array}{c} \textbf{Hyp A: IND blocks strict NPIs \&} \\ \textbf{neg-raising inferences} \end{array}$

- $\begin{array}{c} \textbf{Hyp $B:$ IND$ allows strict NPIs \&} \\ \textbf{neg-raising inferences} \end{array}$
- $\begin{array}{c} \textbf{Hyp} \ \textbf{C: IND} \ blocks \ strict \ NPIs \ but \\ allows \ neg-raising \ inferences \end{array}$

#### 

## Main goals Which hypothesis best accounts for the data Hypothesis C and how can we formalize it? ??

### Formalising Hypothesis C:

- Step 1. Strict NPIs require anti-additive environments (Zwarts 1998).
- Step 2. Non-truth-conditional content can intervene in the licensing of NPIs (Chierchia 2004; Gajewski 2011).
- Step 3. In Italian, IND carries a speaker commitment presupposition which blocks NPIs (Homer 2008).
- Step 4. Speaker commitment can't fully explain the Spanish data (Montero and Romero 2023).
- Step 5. At least in Spanish, IND may also induce another presupposition:  $p \in CPS$ .
- Step 6. Both  $p \in CPS$  and  $p \in Dox_{sp}(w_0)$  block strict NPIs.

- Weak NPIs require downward entailing environments and strict NPIs require anti-additive environments to be licensed (Zwarts 1998).
  - (11)  $F(A) \Rightarrow F(B)$
  - (12)  $f(X) \wedge f(Y) \Leftrightarrow f(X \vee Y)$

(downward entailing)

(anti-additive)

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(11)  $F(A) \Rightarrow F(B)$  (downward entailing)

- (12)  $f(X) \land f(Y) \Leftrightarrow f(X \lor Y)$  (anti-additive)
- Neg-raising inferences strengthen the environment from downward entailing to anti-additive (Gajewski 2000; Romoli 2013; Jeretič 2022, a.o.)
- - b. John doesn't think that Mary or Bill left  $\lambda w_0. \forall w \in \text{Dox}_i(w_0) : \neg(\text{LEAVE}_w(m) \lor \text{LEAVE}_w(b))$

 $\equiv \lambda w_0.\forall w \in \text{Dox}_j(w_0): \neg \text{LEAVE}_w(m) \land \neg \text{LEAVE}_w(b))$  $\equiv \lambda w_0.\forall w \in \text{Dox}_j(w_0): \neg \text{LEAVE}_w(m) \land \neg \text{LEAVE}_w(b)$ 

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- Both IND and SUBJ allow neg-raising, so both should strengthen the environment from downward entailing to anti-additive.

- Non-truth-conditional content can intervene in the licensing of NPIs (Homer 2008)
  - (14) \*I don't think  $[John]_F$  read anything interesting too  $\sim$  Someone other than John read something interesting

- Non-truth-conditional content can intervene in the licensing of NPIs (Homer 2008)
  - (14) \*I don't think  $[John]_F$  read <u>anything</u> interesting **too**  $\sim$  Someone other than John read something interesting
- let  $\mu$  denote the conjunction of the assertive content and the presuppositions
  - (15) μ([I don't think John read a book too])
     I think [John didn't read a book ∧ someone other than John read a book]
  - (16)  $\mu(\llbracket I \text{ don't think John read a novel too} \rrbracket)$ I think [John didn't read a novel  $\land$  someone other than John read a novel]
- Once the presupposition of *too* is factored in, the context is no longer downward entailing: (15) ⇒ (16). Hence weak NPIs are blocked.

- In Italian, IND carries a presupposition of speaker commitment (Homer 2008)
  - (17) \*Gianni non pensa che Maria e <u>mai</u> andata a Parigi.
     Gianni not think that Maria be.IND ever gone to paris
     → The speaker believes Maria has been to Paris
  - (18) Gianni non pensa che Maria sia <u>mai</u> andata a Parigi. Gianni not think that Maria be.SUBJ ever gone to paris

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- With this presupposition the environment is not downward entailing:  $(19) \neq (20)$ 
  - (19)  $\mu([\text{John doesn't think Mary has.IND been in France}])$ J. thinks [M. hasn't been in France]  $\wedge$  the speaker believes M. has been in France
  - (20) μ([John doesn't think Mary has.IND been in Paris])
     J. thinks [M. hasn't been in Paris] ∧ the speaker believes M. has been in Paris

- In Spanish, some authors have argued that the indicative can also trigger speaker commitment (Quer 1998), but the **judgements are subtle** and there seems to be a lot of **intra-speaker variability**.
- (21) Ana no creía que Lucas era abogado Ana not believe that Lucas was.IND lawyer
   <sup>?</sup>→ The speaker is committed to the proposition "Lucas was a lawyer"
- Recent experimental evidence shows that the factive presupposition is not always triggered (Montero and Romero 2023).

#### Experiment:

- Sentence: X didn't V that p
- Participants were asked what extent they thought the embedded proposition was true:
  - no  $\square$   $\square$   $\square$   $\square$   $\square$   $\square$   $\square$  yes
- 3X2 Design: [Verb Class] x [Mood]
- 5 semi-factive verbs (V1): know, notice, remember, see, find out
- 5 **non-factive/non-fiction** verbs (V2): *believe, think, say, tell, suspect*
- 5 fiction verbs (V3):

dream, fantasize, invent, fake, make believe



No effect of mood on speaker commitment when the verb was non-factive

- These experimental results show that:
  - with semi-factives like know, p.IND **enforces** speaker commitment to p
  - with non-factives like *believe*, p.IND does **not enforce** speaker commitment to *p*.
- This means that, while there may be some contexts in which the use of p.IND is indeed motivated by the speaker's commitment to p, there has to be (at least) another motivation for using p.IND that does not lead to speaker commitment.
- What other meanings does p.IND convey?

- Another meaning that has been mentioned in the literature: the proposition has been mentioned in the previous discourse (Alonso 1999).
- Common propositional space (CPS): set of propositions in which the participants in the conversation are mutually interested (CG  $\subseteq$  CPS) (Portner 2009).
  - (22) Ana no creía que Lucas era abogado.
    Ana not believe that Lucas was.IND lawyer
    'Ana didn't believe that Lucas was a lawyer.'
    → the proposition "Lucas was a lawyer" ∈ CPS

- (23) x doesn't believe/think that p.IND  $\rightsquigarrow p \in Dox_{speaker}(w_0) / \rightsquigarrow p \in CPS$ 
  - Both presuppositions will make the environment non-anti-additive:
- (24) a. μ([[John doesn't think Mary left.IND and John doesn't think Bill left.IND]])
  b. μ([[John doesn't think Mary or Bill left.IND]])

	Neg-raising		Speaker Commitment		Mentioned previously
a.	$\lambda w_0. \forall w \in \mathrm{Dox}_j(w_0) : \neg \mathrm{L}_w(m)$	$\wedge$	$L_{w_0}(m)$	/	$\lambda w''. \mathcal{L}_{w''}(m) \in CPS$
	$\land \forall w \in \mathrm{Dox}_j(w_0) : \neg \mathrm{L}_w(b)$	$\wedge$	$L_{w_0}(b)$	/	$\lambda w''. \mathcal{L}_{w''}(b) \in CPS$
	↓↑		$\downarrow \uparrow \downarrow$		₩↑?
b.	$\lambda w_0. \forall w \in \mathrm{Dox}_j(w_0) : \neg(\mathrm{L}_w(m) \lor \mathrm{L}_w(b))$	$\wedge$	$(\mathcal{L}_{w_0}(m) \vee \mathcal{L}_{w_0}(b))$	$/\lambda \iota$	$v''.L_{w''}(m) \vee L_{w''}(b) \in CPS$

## Conclusion

#### • Empirical Observation:

Mood affects licensing of strict NPIs but doesn't affect Neg-raising inferencing

## • Proposal:

IND carries a presupposition that blocks NPI licensing:  $p \in CSP$  or  $p(w_0)=1$  (or something else)

### • Take-home:

(Un)grammaticality of strict NPIs is not a reliable test of Neg-raising

# THANK YOU



GitHub repository with:

- exp. code and items, results and stats models,
- and additional data investigations



To demo-run the experiment

## Appendix: diachrony polarity mood in Spanish

• The reason why IND was always graded as less grammatical than the SUBJ might be because the construction is being lost in the language when the verb is non-factive.



## Appendix: acceptability of the fillers



#### Pos + Subj

Antonio aseguraba que su hijo fuera a ganar antonio assure that his son was.SUBJ to win la lotería ese año the lottery that year

INTENDED: ungrammatical

) Pos + Ind + Npi

Leonardo era consciente de que Carla iba a Leonard was aware of that Carla was.IND to recibir el paquete <u>hasta enero.</u> receive the package until January

INTENDED: infelicitous

## Appendix: acceptability per predicate



## Appendix: proportion neg-raising inference per predicate



## Appendix: acceptability vs. neg-raising inferencing

# There was no apparent correlation between acceptability and the frequency of neg-raising availability.



## Appendix: the two subjunctive forms -ra vs. -se



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