

# Intonation (and gesture) as encoders of semantic operations

Pilar Prieto

ICREA – Universitat Pompeu Fabra



Berlin, 20-22 January  
2016

Workshop on Questions, Answers and Negation

## Collaborators



Teresa Espinal  
UAB



Joan Borràs-Comes  
UPF-UAB



Susagna Tubau  
UAB



Santiago González  
UPF

# Road Map

**Part 1** – Introduction. Evidence of intonation as an encoder of a COMMITMENT and AGREEMENT operators

Intonational meaning

Intonational and gestural encoding of epistemic management

**EXPERIMENT 1: Biased questions**

**Part 2** – Evidence of intonation and gesture as encoders of REJECT operators

**EXPERIMENT 2.** Double Negation

**EXPERIMENT 3.** Yes-answers to negative questions

# Part 1. Introduction

Intonational (and gestural)  
meaning

# Intonational meaning

- Traditionally, **prosodic studies** have focused on the study of **intonational form**.
- Similarly, the fields of **semantics** and **pragmatics** have paid relatively little attention to:
  - the **pragmatic uses of intonation**
  - and **how they interact** with other linguistic components.



- Posodic patterns across languages can convey a **multidimensional set** of pragmatic meanings which complement propositional meanings (e.g., Prieto 2014):



# Gestural meaning

- Researchers agree that gestures are tightly intertwined with speech in **time** and **semantic function**.
- McNeill's (1992) put forth five main arguments to back up the claim that speech and gesture belong to one **integrated system**:
  - **gestures and speech are semantically and pragmatically coexpressive;**



Research on **audiovisual prosody** has shown that gestures encode pragmatic meanings that are similar to those encoded by intonation:

Speech act management

Information structure

Epistemic management

Politeness management

Affective management



## Epistemic management

- Traditionally, **epistemic stance** refers to the **speaker's** epistemic perspective on the proposition.
- It refers to the degree of certainty, **commitment**, to the content of the speaker's proposition



# Encoding of speaker commitment

- Languages can encode different degrees of **speaker commitment** (epistemic and evidential meanings) through a variety of **sentence-final discourse particles**, both in statements and questions:

## Manado Malay

so mo ujang <b>sto</b>	‘it is <b>probably</b> going to rain’
so mo ujang <b>no</b>	‘it is <b>definitely</b> going to rain’
so mo ujang <b>kata</b>	‘ <b>someone said</b> it is going to rain’
so mo ujang <b>kote</b> ’	‘ <b>I sense that</b> it is going to rain (I felt the first raindrops)’
so mo ujang kang?	‘it is going to rain, <b>isn’t it?</b> ’

Stoel, Ruben (1995). Particles and intonation: the expression of information structure in Manado Malay. IAAAS Newsletter, 37, p. 15.

Intonation (and gesture) have been shown to encode

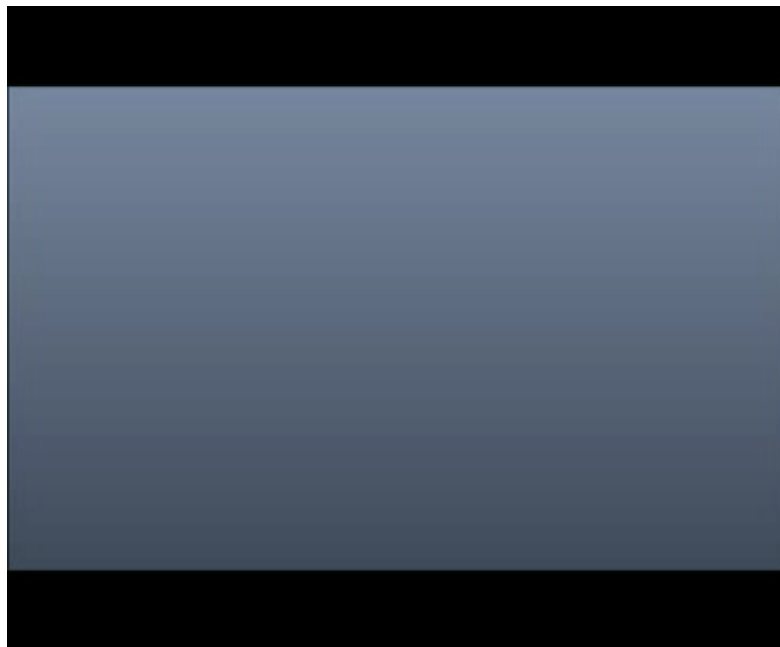
- different degrees of **speaker knowledge** across languages (e.g., Grice and Savino 2012, Vanrell et al 2012, González et al. 2014)
- and also direct **evidentiality** (Vanrell et al. 2014).

# Ex. low commitment

Catalan uses intonation (and gesture) extensively to mark epistemic commitment, both in relation to the speakers' and to the addressee's propositions:

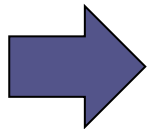
Low commitment to  
speakers' proposition

*Potser no li agradarà*  
'Maybe (s)he will not like this'.



## Dialogical view

- Even though traditionally the study of epistemicity has been centered on the speaker, dynamic models of meaning incorporate a strong **interactional perspective**.
- Enfield et al (2014) propose the concept of **epistemic gradient**, e.g. the difference between interlocutors in degree and kind of **epistemic commitment** (see also Portes et al, 2014)



Need to take into account the marking of **epistemic agreement** and **disagreement**



# Marking of speaker ‘agreement’

- Again, many languages use sentence-final particles to mark different degrees of **speaker agreement** (or **disagreement**) with the context or with the addressee’s views, both in statements and questions:

Manado Malay

so mo ujang le	‘and now it is even going to rain!’
so mo ujang <b>kwa</b>	‘ <b>but it is</b> going to rain!’
so mo ujang so?	‘is it <b>really</b> going to rain?’
so mo ujang to	‘it is going to rain, as you may know’

Stoel, Ruben (1995). Particles and intonation: the expression of information structure in Manado Malay. IAAAS Newsletter, 37, p. 15.

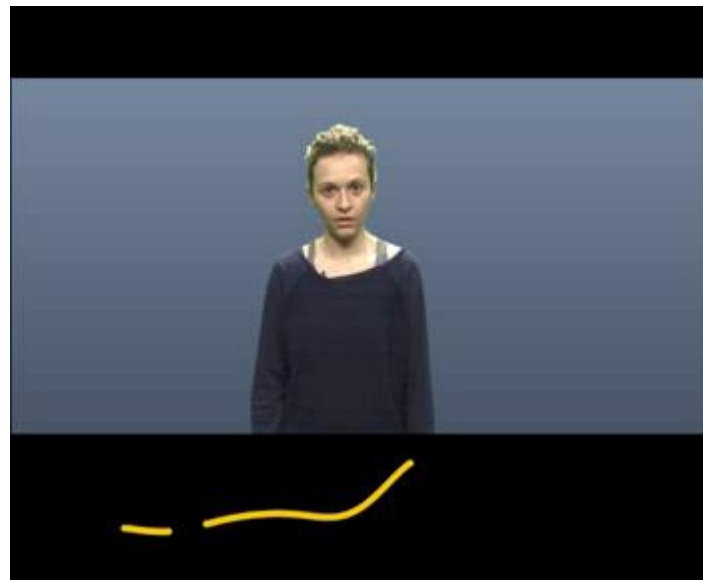
# Ex. epistemic (dis)agreement

Catalan uses intonation (and gesture) extensively to mark epistemic commitment **not** only in relation to the **speakers'** but also in relation to the **addressee's propositions**:

Low commitment to  
addressee's' proposition

CATALAN  
CONTRADICTION TUNE

L+H\* L!H%



*D'en Jaume!!*  
*'It's Jaume's (I do not agree with you)'*

# Semantics of relational speech acts

- Dialogical view of speech acts: **semantics of relational speech acts**  
(Krifka 2014), based on work by, e.g., Gunlogson, Beyssade & Marandin, and Cohen and Krifka, Büring, Bruce and Farkas, etc.





# Research question, Exp 1

- Can **prosody** and **gesture** encode the following operations in Catalan questions?
  - **Epistemic commitment (ASSERT)**
  - **Epistemic agreement or disagreement (ACCEPT, REJECT)**

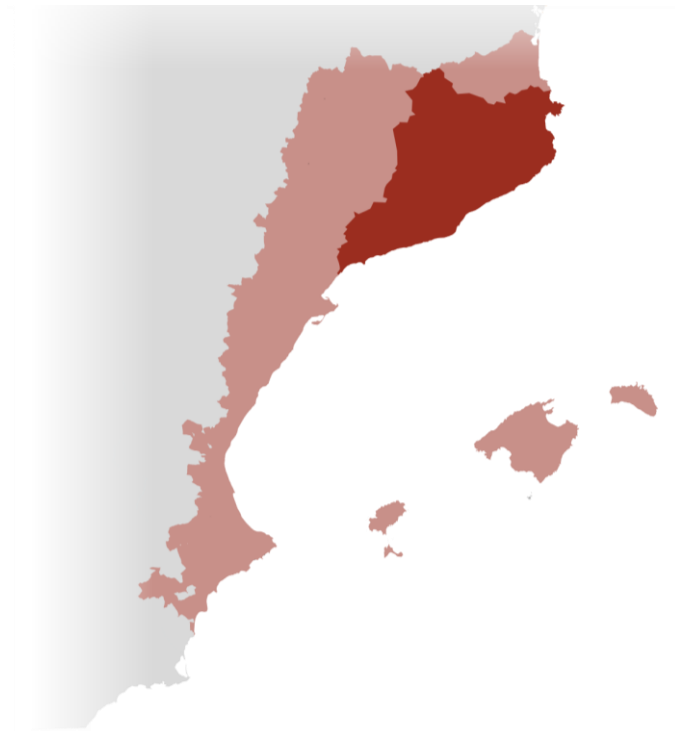
# Question intonation contours as dynamic epistemic operators

Borràs-Comes, J. and P. Prieto (under review).  
Question intonation contours as dynamic and gradient epistemic operators. *Journal of Pragmatics*.



# Question intonation and speaker commitment in Catalan

- We hypothesize that **question intonation** in Catalan can encode the following **epistemic operators**:
  - **different degrees of speaker commitment** to the content of the proposition (**ASSERT**)
  - **different degrees of speaker agreement** of the content of the proposition of the addressee (**REJECT, ACCEPT**)

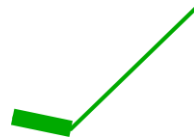


# Central Catalan

This variety uses at least 4 contours for yes/no questions (Prieto et al. 2015):

- **Final rise**

- info-seeking
- incredulity



- **Final fall**

- confirmation-seeking



- **Rise-fall**

- surprise



- **Rise-fall-rise**

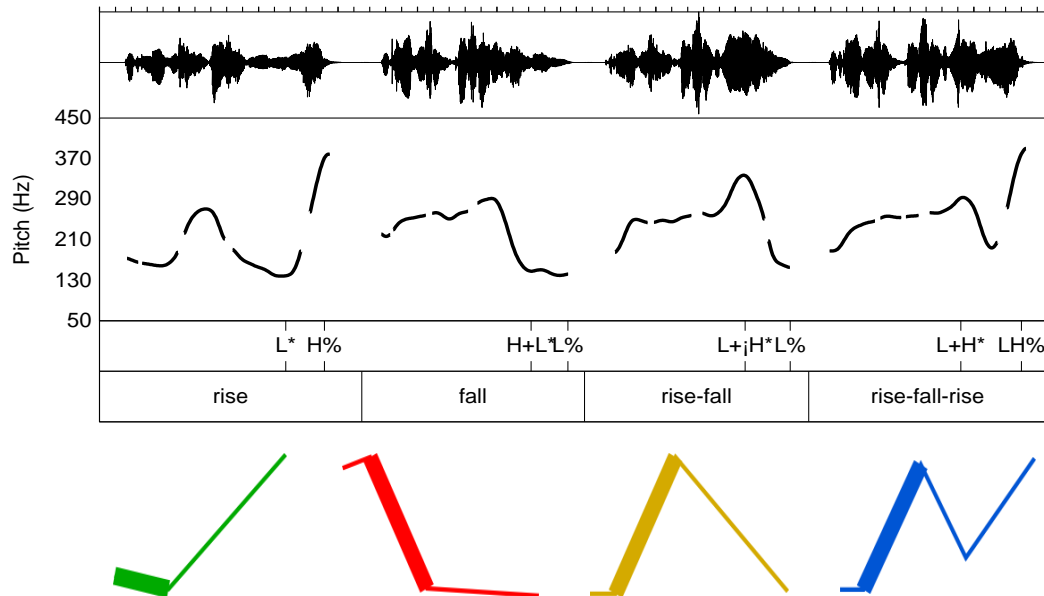
- echo



*Tens gana?*  
'Are you hungry?'

# Methodology

- Acceptability judgment task(k=48)
  - 4 types of intonation contours



- placed within different communicative contexts representing 6 epistemic conditions (2 items each) = 12 contexts per subject

# Materials: epistemic conditions

	Type	Type	Summary
1	degrees of speaker commitment	Low	I am asking. I have no info
2		Mid	I am asking, but I think that X
3		High	I am asking, but just saw that X (direct evidential)
4	degrees of speaker agreement	High	I am asking to just double check.
5		Mid	I think X. She says Y. I am asking but I accept it.
6		Low	I think X. She says Y. I am asking but I do not agree with it.

## Confirmatory/evidential questions

*Que ja has anat a plaça?*

‘Did you already go to the market?’



## Incredulity questions



Jo?



'Me?'





# Procedure

- **151** Central Catalan speakers
- Mean daily usage of Catalan: 86.4%.



- **Acceptability rating task** (0-100) of each of the **4** intonation contours for each of the **6** contexts

## SurveyGizmo

Interrogatives Absolutes (estiu 2014)

Context 10

6%

**Context:** Ahir abans de plegar de la feina havies d'imprimir uns documents i ho vas deixar per l'endemà perquè no us quedaven folis. Avui, quan hi tornes, li dius al teu company que ara tornes, que vas a buscar-ne un paquet.  
—Ei, abans ja n'he agafat dos paquets a la consergeria.  
—Has anat a buscar folis?

Context

00:00 00:09

Opció 1 00:00 00:03

Opció 2 00:00 00:03

Opció 3 00:00 00:03

Opció 4 00:00 00:03

12. D'acord amb el context, valora l'adequació del darrer enunciat de la conversa (marcat en negreta), en cadascuna de les formes en què te'l presentem: \*

Inadequada Adequada

Opció 1	<input type="range"/>
Opció 2	<input type="range"/>
Opció 3	<input type="range"/>
Opció 4	<input type="range"/>

Back Next

6%

## 1. Speaker commitment: LOW

- Not long ago you moved to a new neighborhood and this week they are having their festival. Tonight your neighbor tells you they are doing a *correfoc* (street fireworks), but you don't know what route they'll take.
- Will they go by our house?

## 2. Speaker commitment: MID

- It's November, and a few weeks ago all the fruit vendors have had mandarins for a few weeks now. **You go shopping and go by a fruit vendor, assuming they'll have some.**
- Do you have mandarins?

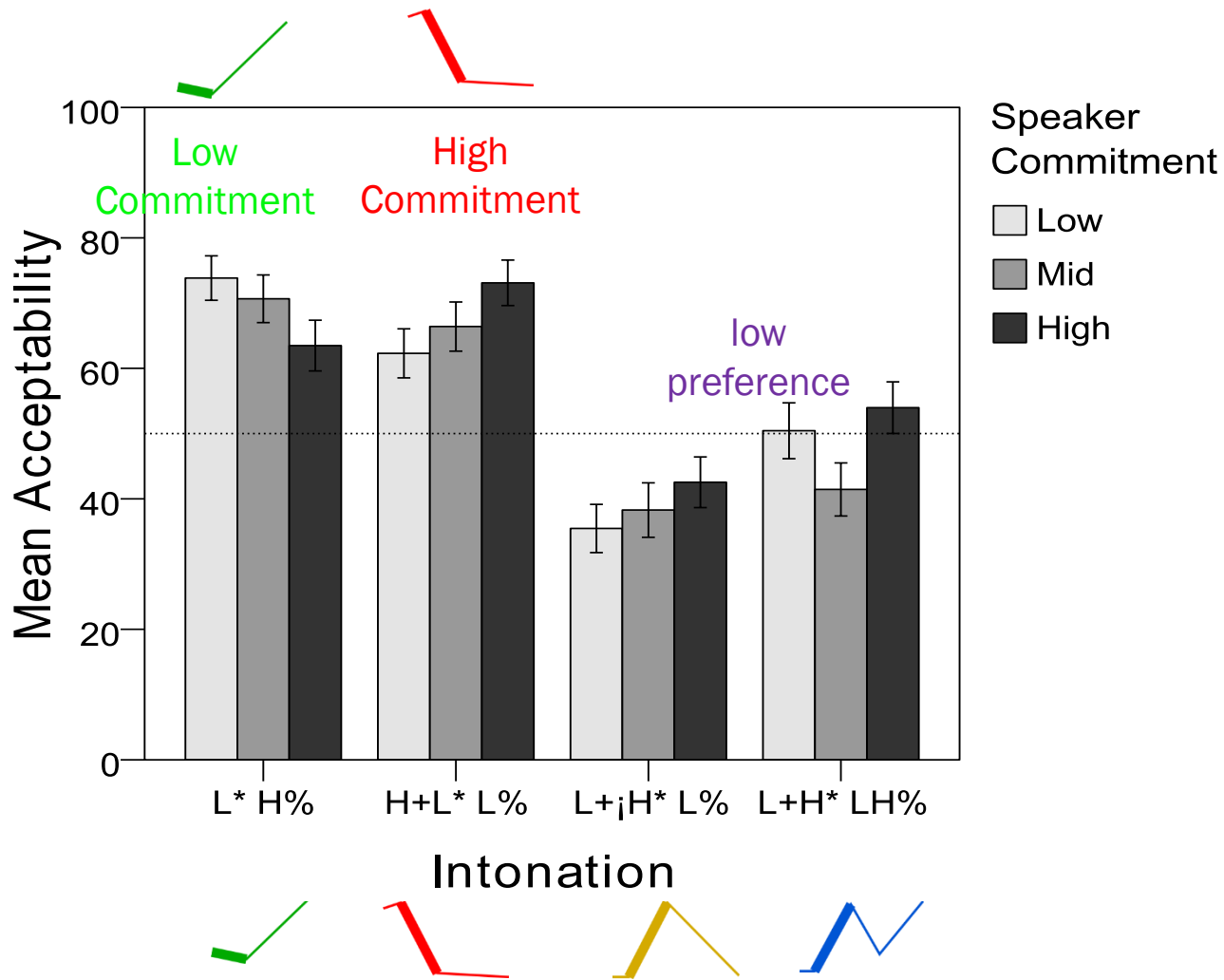
## 3. Speaker commitment: HIGH

- It's almost two in the afternoon and you and Sonia are together working in the office, **as always**. You're concentrating on your work when **all of a sudden you hear her stomach growl.**
- Are you hungry?

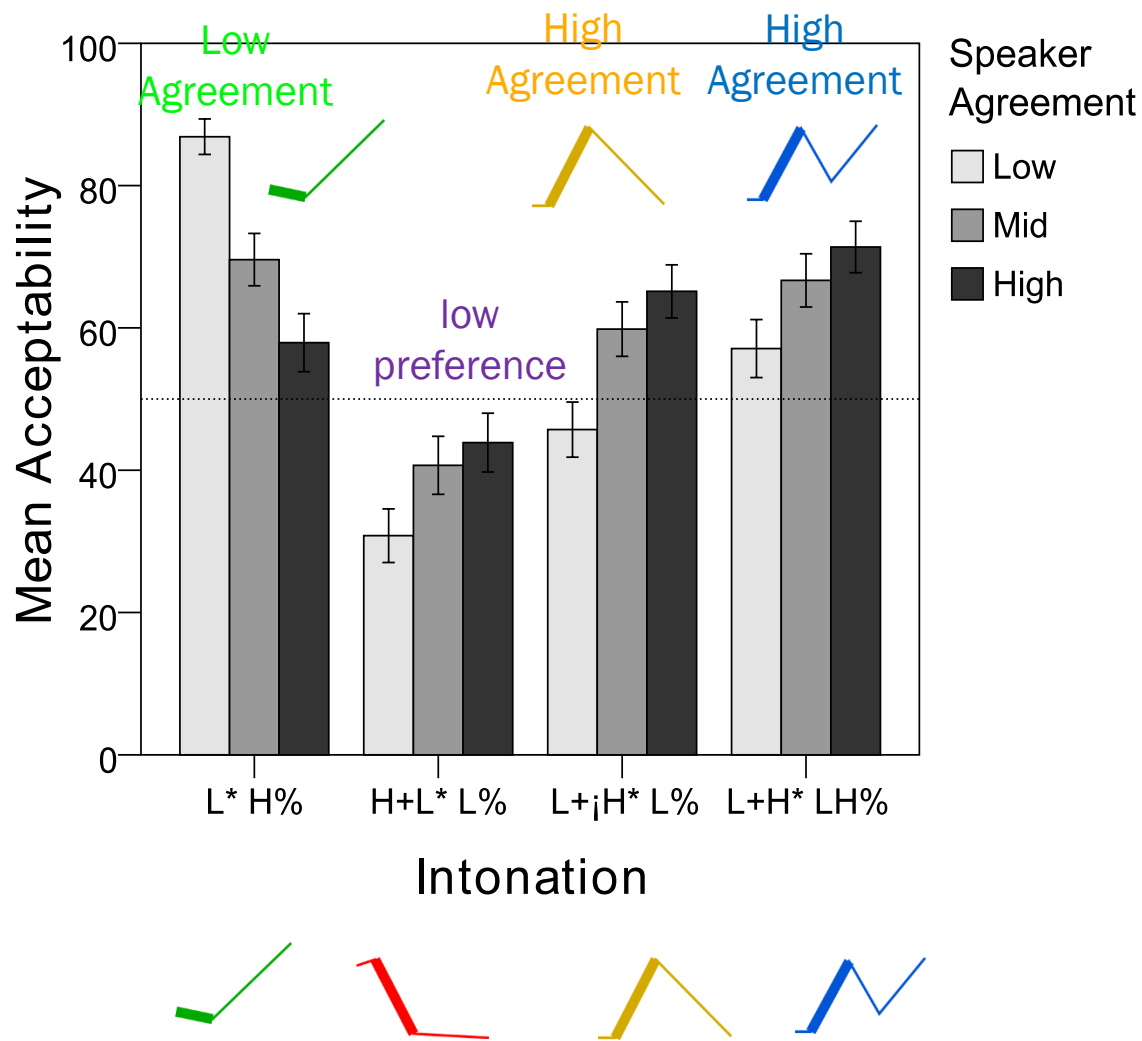


# RESULTS






# different degrees of speaker commitment



# different degrees of speaker agreement

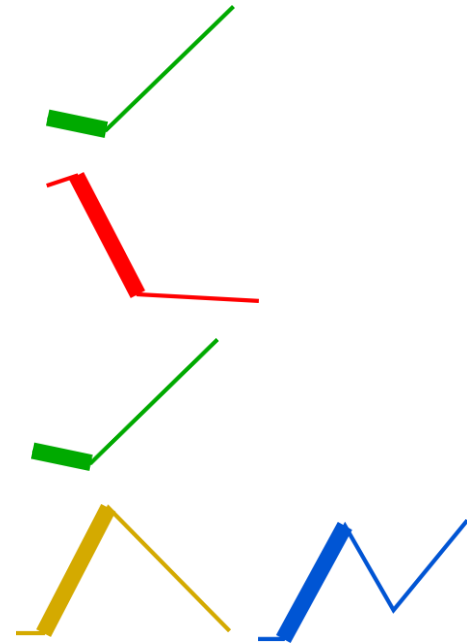


# Interim conclusion

	Type	Type	Intonation Preferences
1	degrees of speaker commitment	Low	L* H% 
2			
3		High	H+L* L% 
4	degrees of speaker agreement	High	L+H* L% 
5			L+H* LH% 
6		Low	L* H% 

In sum, Catalan intonation  
encodes dynamic epistemic  
operations related to speaker  
commitment and speaker  
agreement

In conjunction with  
lexical and  
morphosyntactic  
marking.



## PART II

# Prosody and gesture as encoders of REJECT

- EXPERIMENT 2 - Double Negation
- EXPERIMENT 3 - Contradicting yes-answers to negative yes-no questions





# Double Negation

Pilar Prieto - M.Teresa Espinal

Joan Borràs-Comes

Susagna Tubau

Prieto, P. – Borràs-Comes, J. - Tubau, S. - Espinal, T. (2013). “Prosody and gesture constrain the interpretation of double negation”. *Lingua* 131: 136-150.

Espinal, M.T. – Prieto, P. (2011). “Intonational encoding of double negation in Catalan”. *Journal of Pragmatics* 43: 2392–2410.



Universitat Autònoma de Barcelona



UNIVERSITAT  
POMPEU FABRA



# Negation and rejection

**Negative polarity items** can have two uses in natural languages:

- (a) truth-functional or **semantic operators** on propositions;
- (b) a device for **objecting** to a previous utterance

Horn (1985)

Horn (1985:153): “We have observed a number of cases where a speaker uses metalinguistic negation not strictly to DENY S (or to call S false) but rather, more broadly, to REJECT S, or its implicata, or the way it was uttered”.

Horn’s (1985:165): “I have argued that, while there is indeed only one semantic negation operator in English and other languages, the ordinary truth-functional interpretation of this operator motivates it for an extended use as a general metalinguistic sign of rejection or objection.”

- We will use Krifka’s **REJECT operator** to encode this **objecting function**: “The addressee can react to an assertion by rejecting it (..) for which I assume an operation REJECT”.

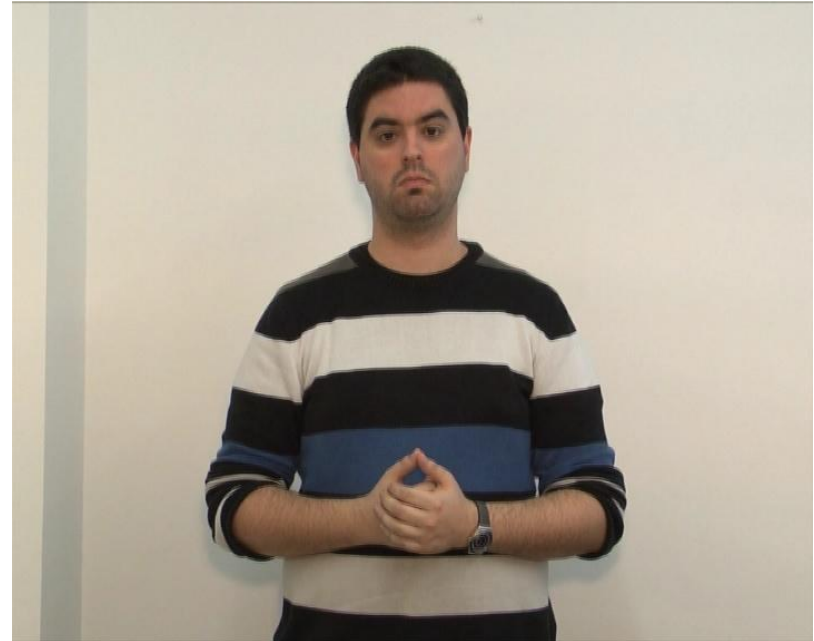
In natural conversation **prosody and gesture** may instantiate the **semantic operator REJECT**.

These conventional devices **help distinguish between these two functions of negation**, namely NEGATION vs. REJECT/OBJECT.

# Negation and rejection gestures, CATALAN

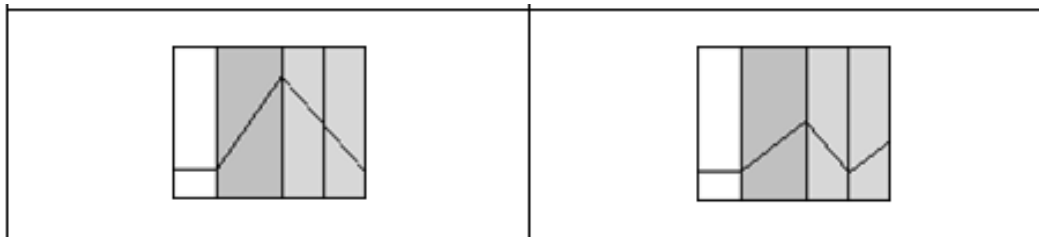


*Ningú* 'Nobody' (Catalan)



*Ningú* 'Everybody' (Catalan)

**Default** contour  
L+H\* L%



**Contradiction**  
contour:  
L+H\* L!H%

# Double Negation in NC Langs

- **Negative Concord languages (NC)** typically allow for the combination of two or more negative items to express a **single negation with no cancellation**:

Catalan

*No he vist ningú*

*‘I haven’t seen anybody’*

- Yet, in fragment answers we can obtain DN readings:

- **DN CONTEXT – PRESUPPOSITION DENIAL**

A technician is called to another office to repair their computers, **but he comes to your office instead**. When he arrives he asks:

*-What isn’t working?*

*-Res.*

*nothing ‘Everything is working’*

- **Condition on presupposition denial:** In order to license a DN interpretation, some authors have pointed out the requirement of a **denial of an accessible negative proposition or presupposition**

Geurts (1998); Espinal and Prieto (2011); Dryer (1996); Prince (1992).

- **Prosodic conditions:** Contrastive focus, stress, prosodic phrasing, and intonation have been highlighted as favoring DN readings crosslinguistically

Corblin (1995, 1996); Vinet (1998) for French; Corblin and Tovenia (2003) for French and Italian; Molnár (1998) and Puskás (2006, 2012) for Hungarian; Zanuttini (1991, 1997), Godard and Marandin (2007), Penka (2007) for Italian; Falaus (2007) for Romanian; Huddleston (2010), Biberauer and Zeijlstra (2012) for Afrikaans; Espinal and Prieto (2011) for Catalan.

# Prosody and gesture in the encoding of DN

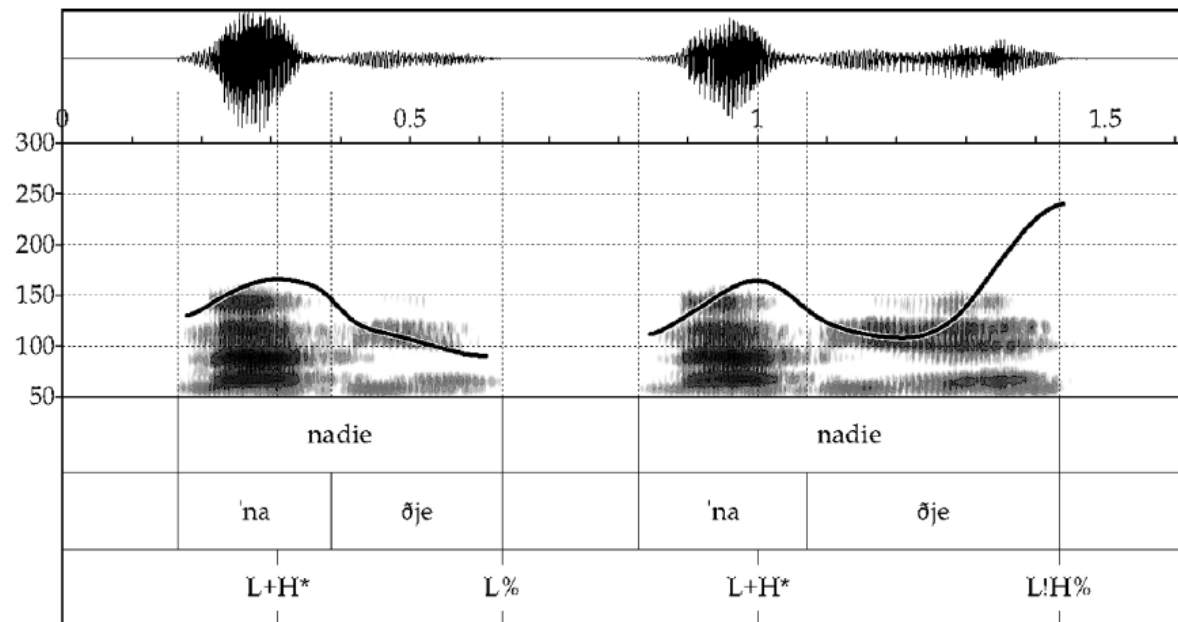
- In the DN project, we investigated the role of **prosody** and **gesture** on the interpretation of DN in two Negative Concord languages, **Catalan** and **Spanish**.
- The work showed that the so-called “contradiction **prosodic** and **gestural patterns**” (e.g., those conveying a meaning of **REJECT** or **presupposition denial**) are strongly associated with **DN** interpretations;

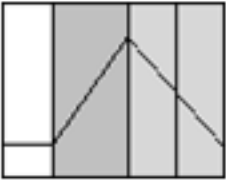
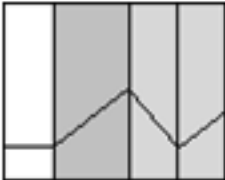
# Experimental design

- **Rating experiments:** Participants had to rate the answers/stimuli as meaning either ‘nobody/nothing’, or ‘everybody/everything’ after hearing a wh-question such as “*Who is not eating dessert?*”
  - **Two/four target n-words** (Cat./Spa. *ningú/nadie* ‘nobody’ and *res/nada* ‘nothing’) produced in a discourse context by different pairs of subjects.
  - **Two target conditions:** Broad focus prosody/gesture vs. contradiction/rejecting prosody/gesture
  - **Four presentation conditions:** Audio-Only, Video-Only, and Audio-Visual congruent and AV incongruent
- We obtained a total of 5760 responses for the AO and VO tasks and 5760 for the congruent and incongruent AV tasks.



# The 'contradiction tune'



Single negation	Double negation
	

# Broad focus vs. rejection gestures



*Nadie* 'Nobody' (Spanish)



*Nadie* 'Everybody' (Spanish)

# Results

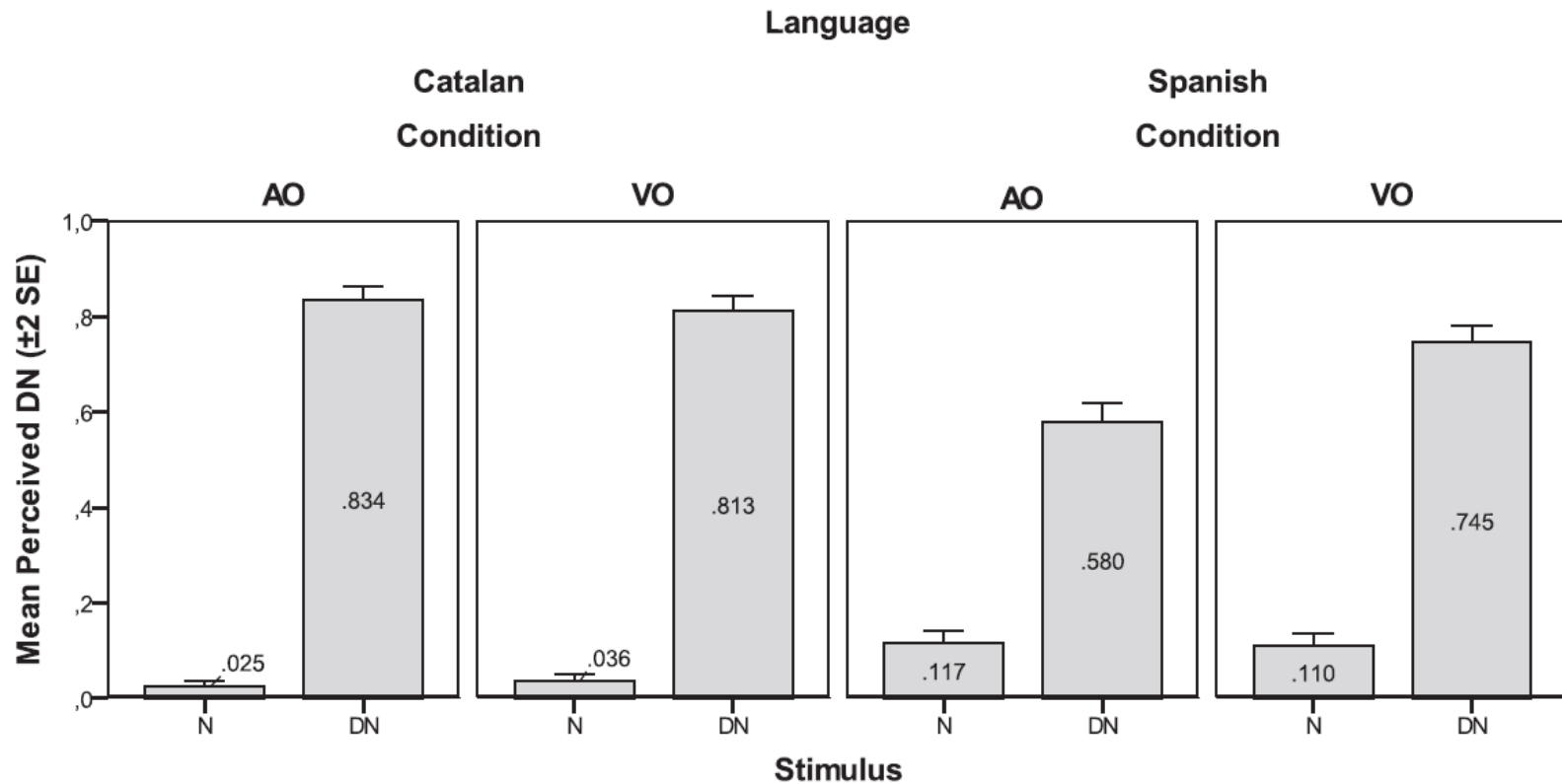



Fig. 4. Mean perceived DN ratings in the two unimodal conditions AO (left) and VO (right) in the two languages: Catalan (left) and Spanish (right). The x-axis represents the intonation/gestural conditions, while the y-axis represents the perceived meaning: 0 for N and 1 for DN.

# Conclusion

- **Prosodic and gestural patterns** encoding REJECT operators convey a general meaning of **presupposition denial**.
- In Catalan this REJECT operator can combine with n-words to encode double negation readings.

 Can these REJECT prosodic and gestural operators also combine with positive polarity items like YES?

- **YES (ASSERT) + L+H\* L!H% (REJECT) → encodes a contradicting answer to a negative question.**

# Yes-answers to negative yes/no-questions

Susagna Tubau  
Santiago González-Fuente  
M.Teresa Espinal  
Pilar Prieto



González-Fuente S., Tubau S., Espinal M.T. and Prieto P. (2015). "Is there a universal answering strategy for rejecting negative propositions? Typological evidence on the use of prosody and gesture". *Frontiers in Psychology* 6: 899. [OpenAccess].

Tubau, S. - González-Fuente, S., - Prieto, P. - Espinal, T. (2015). "Prosody and gesture in the interpretation of yes-answers to negative yes/no-questions". *The Linguistic Review* 32(1), pp. 115-142.

# Polarity-based languages

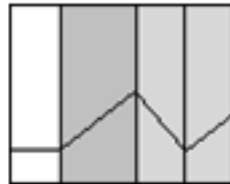
- **Polarity-based languages** such as Catalan or English **contradict** the truth of the negative proposition by answering yes.

Q: No prenen cafè? (Catalan)  
'Don't they drink coffee?'

A: #Sí. L\* L%  
yes

A: Sí. L+H\* L!H%  
yes

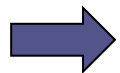
[Yes, they do]



# Experimental study

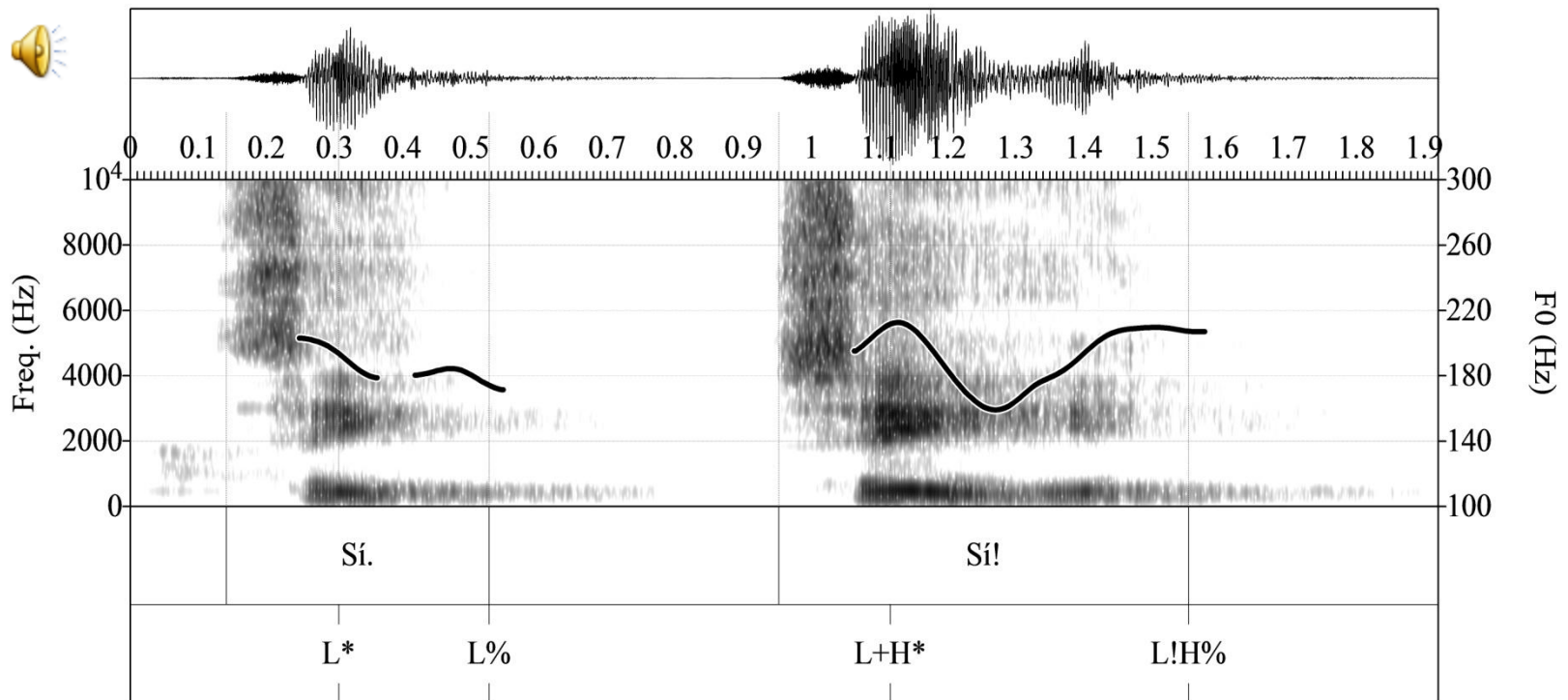
## Research questions

- (i) EXPERIMENT 1 - Are *yes*-answers to negative *yes/no*-questions in Catalan perceived as ambiguous by native speakers when prosody and gesture are not available?



- (ii) EXPERIMENT 2 - Is the interpretation of *sí* 'yes' as an answer to a negative *yes/no*-question dependent on the prosodic and gestural properties of the answer?

# Materials





CONTRADICTION

CONTEXT

(L+H\*L!H%

contour)



SHOULDERS: shrug

HAND/ARM: moving from vertical axis

HEAD: nodding

EYEBROWS: raising

# Procedure

- 40 participants were presented with 16 question –answer pairs and had to rate both certainty and **naturalness**.
- Questions were presented in audio condition and answers either in **audio-only** (AO) or in **audio-visual** (AV) condition (4 different speakers).
- Independent variables:
  - Presentation modality: AO vs. AV;
  - Audiovisual Marking: broad focus vs contradiction prosody and gesture)
- A total of 1280 responses were obtained (640 naturalness and 640 certainty).

Clica *play* per escoltar la pregunta: "Que ha arribat, ta mare?"



Clica *play* per veure la resposta.



(Si vols tornar a veure la resposta has de clicar a L'EXTREM INFERIOR ESQUERRE DEL QUADRE)

Com interpretes la resposta a la pregunta? \*

...estic segur/a  
que no ha  
arribat.



...dubto, però  
m'inclino cap al  
"no".



...no em queda  
clar si ha arribat  
o no.



...dubto, però  
m'inclino cap al  
"sí".



...estic segur/a  
que ha arribat.



Valora de l'1 (gens natural) al 5 (completament natural) si et sembla que la resposta a la pregunta és natural. \*

☐ 1

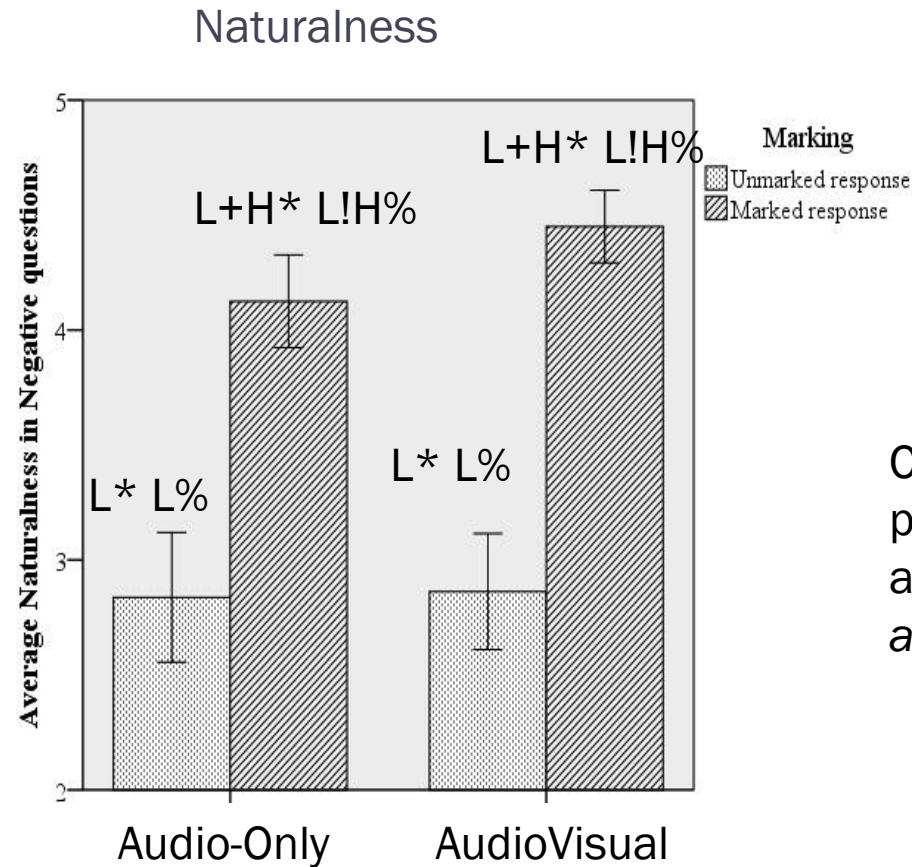
☒ 2

☐ 3

☐ 4

☐ 5

# Results



Contradiction' L+H\* L!H%  
prosodic and gestural patterns  
are needed to interpret the yes-  
*answer* as contradicting.

- In Catalan, the contradicting answer to a negative question ‘yes’ is composed of **REJECT** (encoded by prosody and gesture) plus **ASSERT( $\phi$ )** (encoded through the positive word, where  $\phi$  is the propositional discourse referent).

# Interim Conclusions

- In **Catalan**, *sí* ‘yes’ expresses ASSERT and intonation and gesture encode REJECT.
- In **German and in French**, *doch* and *si* are a lexical composites expressing both **REJECT** and **ASSERT**
- Work comparing **Catalan** and **Russian** shows that the two systems share the same universal semantic strategy of combining **REJECT+ASSERT** operators (e.g., González, Tubau, Espinal and Prieto 2015).

- The distinction between truth-based and polarity-based cannot be formulated on the basis of lexical responses alone.
- A full comprehension of the answering systems of natural languages can only be achieved if grammatical (i.e., lexical and syntactic) strategies are analyzed together with intonational and gestural patterns.

# General conclusions

We showed evidence that **prosody** and **gesture** may instantiate a set of **semantic operators** that are similar to those encoded by discourse final particles;

Conventionalized intonation and gesture patterns independently encode two sets of epistemic dimensions, e.g. COMMITMENT and AGREEMENT.





- With respect to the **encoding of denial**, **prosody** and **gesture** can encode **REJECT** independently;
- Prosodic and gestural patterns complement lexical and morphosyntactic strategies. We advocate for their full integration in language research.
- Further research needs to be carried out for a full understanding of the various means that different languages have to express **these epistemic operators**.

# THANK YOU!



**Grup d'Estudis de Prosòdia**



**Universitat  
Pompeu Fabra  
Barcelona**

**\*iCrea**

## FINANCIAL SUPPORT:

- Spanish MINECO, FFI2011-23356, FFI2012-31995, FPU2012-05893
- Generalitat de Catalunya, 2009SGR-1079, 2009SGR-701