Intonation (and gesture) as encoders of semantic operations

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Workshop on Questions, Answers and Negation
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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):

- Speech act management
- Information structure
- Epistemic management
- Politeness management
- Affective management
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:
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 sto  ‘it is probably going to rain’
so mo ujang no   ‘it is definitely going to rain’
so mo ujang kata ‘someone said it is going to rain’
so mo ujang kote ‘I sense that it is going to rain (I felt the first raindrops)’
so mo ujang kang? ‘it is going to rain, isn’t it?’

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:

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 kwa  ‘but it is going to rain!’
so mo ujang so?  ‘is it really going to rain?’
so mo ujang to  ‘it is going to rain, as you may know’

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)
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

<table>
<thead>
<tr>
<th>Type</th>
<th>Type</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 degrees of speaker commitment</td>
<td>Low</td>
<td>I am asking. I have no info</td>
</tr>
<tr>
<td>2</td>
<td>Mid</td>
<td>I am asking, but I think that X</td>
</tr>
<tr>
<td>3</td>
<td>High</td>
<td>I am asking, but just saw that X (direct evidential)</td>
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<tr>
<td>4</td>
<td>High</td>
<td>I am asking to just double check.</td>
</tr>
<tr>
<td>5</td>
<td>Mid</td>
<td>I think X. She says Y. I am asking but I accept it.</td>
</tr>
<tr>
<td>6</td>
<td>Low</td>
<td>I think X. She says Y. I am asking but I do not agree with it.</td>
</tr>
</tbody>
</table>
Confirmatory/evidential questions

Que ja has anat a plaça?

‘Did you already go to the market?’
Incredulity questions

Jo?  ‘Me?’

I’d prefer YOU do take the pictures.
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
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 correigoc (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

![Graph showing mean acceptability with different degrees of speaker commitment and intonation patterns.](image-url)
different degrees of speaker agreement
## Interim conclusion

<table>
<thead>
<tr>
<th></th>
<th>Type</th>
<th>Intonation Preferences</th>
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<tbody>
<tr>
<td>1</td>
<td>degrees of speaker commitment</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td></td>
<td>L* H%</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>High</td>
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<td></td>
<td></td>
<td>H+L* L%</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>High</td>
</tr>
<tr>
<td></td>
<td></td>
<td>L+H* L%</td>
</tr>
<tr>
<td>4</td>
<td>degrees of speaker agreement</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td></td>
<td>L+H* LH%</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td></td>
<td>L* H%</td>
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</table>
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

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

*Ningú* ‘Everybody’ (Catalan)  
*Default contour: L+H* L%
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
  

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

- \(\text{YES (}\text{ASSERT}) + \ L+H^* \ L!H\% \ (\text{REJECT}) \rightarrow \text{encodes}\) a contradicting answer to a negative question.
Yes-answers to negative yes/no-questions

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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
CONTRADITION

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’inclo cs cap al “no”.  
... no em queda clair si ha arribat o no.  
... dubto, però m’inclo cs cap al “si”.  
... 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(φ)** (encoded through the positive word, where φ 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!

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