Children’s early expression of epistemic stance through prosody and gesture

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TIE satellite workshop on
The role of prosody in conveying epistemic and evidential meaning
Canterbury, August 31, 2016
Epistemic stance is marked multimodally in speech through:

**Lexical cues:**
epistemic adverbs
*maybe, certainly*
grammatical particles /
mental state verbs
*think, know* (e.g. Smith & Clark, 1993)

**Prosodic cues:**
fillers, delays, linguistic hedges & intonation
H% (e.g. Corley & Stewart, 2008, Swerts & Krahmer, 2005)

**Gestural cues:**
eyebrow-movement, head
movement etc. (e.g.
Swerts & Krahmer, 2005;
Borràs- Comes et al., 2011)
Introduction - Perception

- Major focus on children’s acquisition of epistemic stance expressed through verbal means (see Matsui, 2014 for a summary)

- Children acquire the difference between lexical expressions encoding certainty and uncertainty by four years (languages investigated: English, German, etc. (a.o. Matsui et al. 2009; Moore et al., 1990))

- Except: Earlier detection through grammaticalised particles in Japanese (Matsui et al., 2009)
Introduction – Perception

- Prosodic and lexical cues to speaker (un)certainty start to be understood around 4 years (Moore et al., 1990).
- Lexical cues to a speaker’s belief state initially seem to be more dominant, with prosody playing a secondary role, modulating the effects of the lexical cues.

Young children (3-years-old) access a speaker’s uncertainty earlier through intonation than through lexical cues (Hübscher et al., forthcoming)

- Maybe vs.

Also gestural cues overall helped as scaffolders (Armstrong et al., 2014; Hübscher et al., forthcoming)

Lexical bias

Prosodic bootstrapping hypothesis to pragmatic meanings
• Krahmer & Swerts (2005) investigated children’s production (and perception) of uncertainty
  • They found that while adults speaker’s were uncertain, they were likely to use ‘fillers, delays, high intonation, eyebrow movements and ‘funny faces’.

• Also in children (aged 7-8) the presence of a verbal or visual signal is associated with a lower feeling of knowing (higher uncertainty), yet differences are small, except for funny face and delay.

What about younger children’s production of epistemic stance?
Research Questions

• How do 3-5 year-old-children integrate verbal and non-verbal behaviour when marking their expression of epistemic stance?

• Do younger children first express epistemic stance through prosody and gestural means (facial expression and eye gaze and gestures) before doing so through lexical means?
Methodology
Participants

- 50 Catalan-dominant children were video-recorded in public pre-schools in or near Barcelona (central variety)
  - Preliminary pilot data analysed of 6 Catalan-dominant children (Three 3-4.5 year-olds and three 4.5-5 year-olds) and 3 Catalan-dominant adults
Methodology – Structure of the Experiment

- 2 experimental conditions (within subjects)
  - 1. Five objects previously seen and touched
    - Llibre (Book)
    - Claus (Keys)
    - Goma (Eraser)
    - Cullera (Spoon)
    - Boligraf (Pen)
    - Supposed to trigger certainty answers
  - 2. Five new objects
    - Tros de suro (piece of wood)
    - Espelma (candle)
    - Avellana (Hazlenut)
    - Cinta adhesiva (Tape)
    - Bossa de te (tea bag)
    - Supposed to trigger uncertainty answers
Procedure

Caixa magica – Magic Box

Adaptation of Phan et al.’s methodology (2010)

Interaction Schema:
Input: participant receives object
Latency: period in which participant is thinking
Answer: participant gives a response
A total of 60 trials (children) and 30 trials (adults) were analysed in ELAN. In each trial (interaction phase) the following was annotated:

- **Trial Info**
  Condition, item, guessed correctly or not

- **Duration**
  Latency, Answer time

- **Speech**
  Verbal (linguistic) items, intonation contour

- **Gestures**
  Facial expressions (eyebrows, eyes, mouth), eyegaze, head, shoulders
Results
Pilot results

3;8 years

Certainty Condition

4;10 years

Uncertainty Condition
Pilot results – duration
Pilot results – answer

![Answer type](image)

**Answer type**

- **Certainty condition**
  - Younger Children: 100%
  - Older Children: 100%

- **Uncertainty condition**
  - Younger Children: 0%
  - Older Children: 0%

![Answer type adults](image)

**Answer type adults**

- **Certainty Condition**
  - Verbal: 100%
  - Non-verbal only: 0%

- **Uncertainty Condition**
  - Verbal: 100%
  - Non-verbal only: 0%
Pilot results – verbal answer

Additional cues are hesitations such as: *hmm, uuuuna*

Additional words are both hesitations such as: *hmm,* Or also lexical cues such as *this is* or *maybe* etc.
Pilot results – intonational marking
Pilot results – gestural marking

Certainty Condition

Non-verbal marking in certainty condition

Certainty Condition Younger Group
Certainty Condition Older Group

Non-verbal marking in certainty condition adults
Pilot results – gestural marking

Uncertainty Condition

Non-verbal marking in uncertainty condition

Non-verbal marking in uncertainty condition adults
### Discussion

<table>
<thead>
<tr>
<th>Younger Group (3-4;5 years)</th>
<th>Older Group (4;4-5 years)</th>
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<tbody>
<tr>
<td><strong>Duration</strong></td>
<td></td>
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<tr>
<td>• Latency is very high, answer time short</td>
<td>• Latency time decreases slightly, answer time increases</td>
</tr>
<tr>
<td><strong>Verbal / lexical patterns</strong></td>
<td></td>
</tr>
<tr>
<td>• Only target item, no additional verbal cues and lexical markers in answer</td>
<td>• Start to use additional hesitation markers apart from target item like <em>hmm</em> but no lexical epistemic markers such as <em>maybe</em>.</td>
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<tr>
<td><strong>Intonational patterns</strong></td>
<td></td>
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<tr>
<td>• Certainty marking is developing</td>
<td>• Certainty marking becoming adults like</td>
</tr>
<tr>
<td>• Do not yet mark uncertainty through rising intonation</td>
<td>• Start to mark uncertainty through rising intonation</td>
</tr>
<tr>
<td><strong>Gestural patterns</strong></td>
<td></td>
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<tr>
<td>• Answers in certainty condition rather unmarked</td>
<td>• Use head nod in certainty condition</td>
</tr>
<tr>
<td>• 40% of answers in uncertainty conditions were nonverbal only -&gt; mainly to mark ignorance (shoulders)</td>
<td>• Speech and gestures are co-present in the answers</td>
</tr>
<tr>
<td>• Strong gestural marking in uncertainty condition</td>
<td>• Use of gesture patterns in uncertainty condition becomes more adult like</td>
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</tbody>
</table>
Conclusion

To sum up:

- 3 to 5-years seems to be a crucial age range to investigate children’s multimodal development of epistemic stance.
  - Important gestural markers of epistemic stance seem to arise at the age of 3 years
  - Important prosodic markers of epistemic stance (especially uncertainty) seem to arise between the ages of 4 to 5-year-old children.

- 3-year-olds tend to distinguish between knowing and not knowing, 4-5 year-old children start to express their uncertainty multimodally through prosodic and gestural patterns first.
Future steps

- Analyse whole data set.

- Linguistic vs. social functions: is there a correlation between children’s understanding of emotions and their performance in the production task?
Acknowledgments

Thank you to:

- Judith Llanes (research assistant)
- Pre-schools: Vilafranca del Penedès (Escola Pública Dr. Estalella Graells), Clot (Farigola del Clot), Arenys (Escola Sant Martí)

This project is funded by the Spanish Ministry of Science and Innovation (grant FFI2015-66533-P „Intonational and gestural meaning in language“.) and a grant awarded by the Generalitat de Catalunya (2014 SGR 00925) to the Prosodic Studies Group.
Thank you!
Moltes gràcies!

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