Children’s use of prosody to compute syntactic structure on-line

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Yves Laloy - Les petits poissons rouges...les petits pois sont verts - 1960
Prosody

[ The boy ] [ [ is eating ] [ an apple ] ]

NP VP NP

Phonological phrase boundaries tend to coincide with syntactic boundaries (Nespor & Vogel, 1986)
Prosody – Syntax

**In adults**: exploit phonological phrase boundaries online to resolve syntactic ambiguities
(Millotte et al., 2007; 2008; Snedeker & Yuan, 2008; Kjelgaard & Speer, 1999; Schafer, 1997)

**In children**: Several studies have found no effect of prosody on children’s interpretation of structurally ambiguous sentences
(Halbert et al., 1995; Snedeker & Trueswell, 2001; Vogel & Raimy, 2002; Choi & Mazuka, 2003).

Only Snedeker & Yuan 2008 found one (weak effect, perseveration)
Our goal:

To test whether children could use prosody online to constrain syntactic analysis.
The small farm pleases him a lot

The little girl closes the toy box
Two experiments:
Experiment 1: Oral completion task

[La petite ferme]... vs. [La petite] [ferme] ...

The small farm
The little girl closes
Results

Experiment 1:

16 French-speaking children
(4;3 to 5;3, $M = 4;9$)

8 pairs of words
(Noun/Verb)
[ferme, porte, marche, etc. ...]

Each child heard only one sentence from each N/V pair
(half noun, half verb; counterbalanced across participants. Total = 8)

$F_1(1,14)=79.43; p < 0.001$*** ; $F_2(1,7) = 32.37; p < 0.001$***
Discussion

4-year-old children use prosodic boundaries to find syntactic boundaries and infer the syntactic category of an ambiguous word

But, does prosody constrain syntactic processing online, or is it only used for (re)verification of an utterance?
Experiment 2: Eye-tracker

La petite ferme

Two measures:
- Pointing towards the images
- The time course of eye-gaze

Participants:

18: 3-year-olds
(3;4 to 4;3, $M = 3;7$)

18: 4-year-olds
(4;3 to 5;10, $M = 4;8$)
Results

• Pointing task:

\[ F_1(1,16)=28.64; \ p < 0.001 \ ; \ F_2(1,7) = 16.65; \ p < 0.004 \]

\[ F_1(1,16)=79.75; \ p < 0.001 \ ; \ F_2(1,7) = 14.01; \ p < 0.01 \]
Results

- Eye-tracker:

Proportion of looks toward the images (Noun x Verb) during the onset of test sentences

\[ F(1,16) = 11.98; \ p < .01 \]
Discussion

Young children, upon hearing the first words of a sentence, exploit prosody on-line to calculate the syntactic category of a word.
Going further...

- Prosodic cues with function words allow children to constrain the syntactic analysis of a sentence and in particular, to calculate the syntactic category of a word.
  
  (Homophones: fermeN/fermeV)
  
  This computation of the syntactic category could be done even for unknown words.

- The syntactic category of a word constrains its meaning.
  
  Nouns vs. Verbs: inferring the syntactic category of a novel word can be extremely helpful during early language processing (Gleitman, 1990)

- Children could exploit prosody, with function words, to categorize unknown words, and use this information to constrain the acquisition of word meanings.

- This mechanism could be active as early as 18 to 24 months.
Thank you for your attention!

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References:


