The role of prosody in toddlers’ interpretation of verbs’ argument structure

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Learning Verbs

Syntactic Bootstrapping hypothesis  Gleitman, 1990
Verb’s interpretation is guided by the syntactic structure in which the verb appears.

Relationship between verb’s meaning and sentence structure

Wash
- One participant acting on another
- Transitive sentence structure
  - Anna is washing the dog (2 NPs)

Sleep
- Solo action
- Intransitive sentence structure
  - John is blicking the car

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Experimental evidence  Yuan & Fisher (2009)

Condition Transitive  
A: Guess what? Jane blicked the baby!  
B: Hmm, she blicked the baby?  
A: And Bill was blicking the duck.  
B: Yeah, he was blicking the duck.

Condition Intransitive  
A: Guess what? Jane blicked!  
B: Hmm, she blicked?  
A: And Bill was blicking.  
B: Yeah, he was blicking.

28-month-olds built a partial representation of the verb’s meaning based on the number of NPs in the sentence.  
⇒ Representational bias:  
**each NP = a participant-role in the sentence**
Setting the stage

Structural information
The nb of NPs is not necessarily equal to the number of arguments of the verb.

⇒ Could some other cues help children to constrain the verb’s argument structure?

Prosodic information
Prosody is highly correlated with syntactic structure, detected early on in language development and used in language processing.

⇒ Potential cue in sentence syntactic analysis.

In some cases, prosody guide the structural representation of sentences:

Right-dislocated sentences prosody:

- An intonational phrase boundary
- The intonational contour of the dislocated NP makes it as dependent on the rest of the utterance.

Prosody -> intransitive use of the verb

Right-dislocated sentences

Il va manger, le mouton

2 NPs
1 participant

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Pre-requisites

- Toddlers should be able to detect prosodic patterns.

[Gerken et al., 1994]
Evidence from the literature shows that toddlers are sensitive to prosodic phrase boundaries very early on.

- Toddlers must get a sufficient number of dislocated sentences in the input to learn how to process this type of sentences.

Analyses of corpora of child-directed speech (CHILDES)

- 5% of sentences are dislocated 2 corpora, 33 000 sentences
- Non-ambiguous use salient linguistic or visual context
- Children of 2-3 years of age use right dislocations 3 corpora

Conclusion

Children of 2 1/2 years should understand right-dislocated sentences.
Motivation

Could children use the prosody of right-dislocated sentences to interpret the syntactic properties of a novel verb ('daser')?

Experiment 1

Testing 28-month-olds' interpretation of a novel verb in dislocated sentences.

Experiment 1 - bis

Pre-testing adults with the stimuli used in Exp1.

Acoustic Analysis

Acoustic analysis of the stimuli of Exp1.

Experiment 1 - ter

Testing 4-year-olds comprehension of the stimuli of Exp1.
Experiment 1 - Preferential looking

Participants
64 children of 28 months
(16 /condition)

Mesures (Camera + eyetracker)
Looking time to the videos during the testing phase

(1) Transitive Condition
A: Hey il va daser le bébé!
B: Ah bon, il va daser le bébé?
A: Oui, et en plus ils ont dasé les canards
B: C’est vrai, ils ont dasé les canards

(2) Dislocated Condition
A: Hey il va daser, le bébé!
B: Ah bon, il va daser, le bébé?
A: Oui, et en plus ils ont dasé, les canards
B: C’est vrai, ils ont dasé, les canards

(3) Intransitive Condition
A: Hey il va daser!
B: Ah bon, il va daser?
A: Oui, et en plus ils ont dasé
B: C’est vrai, ils ont dasé

(4) Control Condition
Pas de dialogue

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Experiment 1 - Preferential looking

**Participants**
64 children of 28 months (16/condition)

**Mesures (Camera + eyetracker)**
Looking time to the videos during the testing phase

**1-participant action**
Hey elle dase ! Tu la vois qui dase ? Regarde celle qui dase ! Elle est où celle qui dase ?

**2-participant action**
Hey she is dasing ! Do you see her dasing ? Look to the one dasing ! Where is the one dasing ?

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Results

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![Results diagram showing the comparison of 2-participant video, 1-participant video, and Away conditions across different verb types: Transitive (1) "il dase le bébé", Dislocated (2) "il dase, le bébé", Intransitive (3) "il dase", and Control (4).](image)
Hypotheses

(2) Dislocated Condition
A: Hey il va daser, le bébé!
B: Ah bon, il va daser, le bébé?
A: Oui, et en plus ils ont dase, les canards
B: C’est vrai, ils ont dase, les canards

Stop at prosodic phrase boundary
Daser(\textit{il})
Daser(\textit{ils})
Daser = 1-participant action
\textit{cf Intransitive}

Coreference
\textit{il} = le bébé
Daser = 1-participant action
\textit{cf Intransitive}

\textit{Daser(\textit{il} ; le bébé)}
\textit{Daser(\textit{ils} ; les canards)}
Daser = 2-participant relation
\textit{cf Transitive}

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Experiment 2 - Method and preliminary results

**Transitive Condition**
'il va manger le canard !

**Dislocated Condition**
'il va manger, le canard !

Preliminary results

- 17 28-month-olds (9 in transitive condition and 8 in dislocated condition)
- 4 known verbs: manger, pousser, porter and taper (eat, push, carry and hit)
What it means for Experiment 1

Results from Exp2 suggest that children know how to interpret right-dislocated sentences but they adopt a different strategy to interpret sentences in Exp1.

What kind of strategy?

Relying on the nb of NPs is an active strategy to interpret novel verbs Yuan & Fisher (2009):

NP = a participant-role in the relation expressed by the verb

But not only: Gertner et al (2012) - 21 mois:

(1) The girl is gorping the boy \rightarrow \text{The girl} = \text{agent}
(2) The girl and the boy are gorping \rightarrow \text{The boy} = \text{patient}
(3) The boy and the girl are gorping (\Rightarrow \text{The boy} = \text{agent})
(first NP = agent & second NP = patient).

Interpretation

Prototypical transitive sentence: NP-verb-NP = agent-action-patient

In Experiment 1:

(1) Transitive: il va daser le bébé \rightarrow NP-verb-NP order
(2) Dislocated: il va daser , le bébé \rightarrow agent-action-patient bias
novel verb interpretative strategy ≠ known verb interpretative strategy

**Experiment 1**

+ structural cue (agent-patient)
− prosodic cue

**Task:** Dialogue then testing phase
⇒ Abstract semantic representation

**Experiment 2**

− structural cue (agent-patient)
+ prosodic cue

**Task:** Online interpretation
⇒ knowing who is the agent

**General conclusion**

Experiment 1 requires a more complex processing
⇒ Children look for the less costly interpretative strategy

The interpretation of dislocated sentences is based on a simple *structural bias:*  
NP-verb-NP = agent-action-patient

Even if children have more language specific knowledge such as right-dislocated sentences.
Adults and preschoolers studies

Material
Sentences from dialogues in Exp1: 8 transitive and 8 dislocated sentences

Experiment 1bis - adults
20 monolingual adults
Task: Forced choice: pick the correct agent of the sentence heard

Experiment 1ter - 4-year-olds
13 monolingual children of 4-5 years
Task: Forced choice: pick the correct situational picture corresponding to the sentence heard
Only matching the number of NPs?

Transitive Condition
She is flomming her

Intransitive Condition
She is flomming

Yuan et al. (submitted)

21-month-olds did not simply match the number of NPs to the number of actors in the videos but they actually interpreted the verb as referring to a relational event with two core participant-roles.