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# Ambiguous pronouns and visual context

## A crosslinguistic comparison

# Discourse reference and situation models in situated child language comprehension

## Basic question

How do extra-linguistic sensory affordances, such as visual actions, interact with event and information structure, e.g. linguistic focus, affect the real time comprehension of ambiguous discourse reference, e.g. ambiguous pronouns?



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# Clarification of key terms

## What is ambiguous discourse reference?

- Peter and Paul are playing in the park while he sings a song.
- Who is he? Is it Peter or Paul?

## What is (contrastive) linguistic focus?

- Mary watches the news. → canonical word order
- It is Mary who watches the news. → it-cleft, puts Mary into the focus of attention



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# Experiment 1

- Ambiguous personal pronouns
- Visual actions
- Linguistic contrastive focus
- Imageability
- Theory of Mind
- Working memory



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# Experiment 1

## Participants

- 3 to 6 year old German children

## Methodology

- Eyetracking with the help of a Tobii eyetrackers in connection with Eprime  
→ **Auditory and visual stimuli**



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# Experiment 1

- **Comprehension question** after every item
- **Auditory working memory test:** Word List Recall
- **Visual working memory test:** Maze Memory
  - How much information can be held accessible?
- **Theory of Mind task**
  - Can they see something from somebody else's perspective and predict actions?



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# Previous research

## **Bittner and Kuehnast (2011)**

- Significant difference in the processing of personal and demonstrative pronouns in three and five year old children.
- Three year old children mainly use discourse- and context-based cues
- Five year old children employ syntax and discourse cues.



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# Previous research

## **Cowles et al. (2007)**

- Contrastive focus influences anaphora processing
- Makes referent more prominent
- More clearly when contrastive intonation is present
- Intonation enhances effect of contrastive focus



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# Previous research

## Revised Coordinate Interplay Account by **Knoeferle and Crocker (2007)**

- Depicted events had a strong influence on the processing of sentences
- The working memory representations of the events can experience decay when they are invisible or perceived as completed
- Emphasize the importance of working memory on language processing



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# Predictions

- On the one hand young children at the age of three or four will primarily rely on contextual and pragmatic cues and not on syntactic ones when resolving the ambiguous pronoun.
- On the other hand this behavior will presumably be different for the five to six year old children since by then their grammar will have become more robust so that they will use syntactic cues to resolve ambiguity.



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# The role of grammar factors and visual context in language acquisition

## Basic questions

- How do 3 to 7 year-old Norwegian children process pronouns online and how is their understanding of the target event, their situation model, modulated by linguistic factors, referent's syntactic position and syntactically and prosodically expressed focus?
- How do these linguistic factors interact with sensory affordances?



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# Experiment 2

## **Ambiguous pronouns and their interaction with:**

- Clefting with agent focus (agent-clefts)
- Clefting with patient focus (patient-clefts)
- Visual action
- Verb imageability
- Working memory
- Theory of Mind



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# Experiment 2

## Agent-cleft

- It is Kari who hugs Ola

## Patient-cleft

- It is Ola who Kari hugs



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# Experiment 2

## Participants

- Norwegian 3, 5 and 7 year-old children

## Methodology and pretests

- Similar to Friederike's experiment



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# Previous research

## Comprehension of clefts

- In English, patient-clefts are comprehended more slowly and less accurately than agent-clefts (Ferreira, 2003)

## Clefts and ambiguous pronouns

- In German, agent-clefts make the agent more prominent than it is in a non-clefted sentence (for children, but not for adults) (Järvikivi et al., 2013)
- Patient-clefts make both the patient and the agent more prominent (Engelkamp & Zimmer; 1982, Järvikivi et al., 2013)



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# Previous research

- German and English children and adults show an agent-preference in both agent- and patient-clefts (Järvikivi et al., 2013; Kaiser, 2011)
- However: Children show a patient-preference in a short time-window right after pronoun onset (Järvikivi et al., 2013)
  - Suggests that the agent-preference is not yet stabilized in four-year-olds
- Conflict between first-mention cue and agent cue in the patient-cleft?



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# Predictions

- The different age groups will be equally proficient when the cleft-sentence has agent focus
- When the cleft-sentence has patient focus, the older children will be more proficient than the younger ones, because they move towards adult competence
- The children will perform better when the action is visible than when it is not, specifically in the complex patient-clefts
- The younger children will rely more on visual context than the older children, because the older children are more proficient in using syntactic cues



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# Experimental design

- 32 animals
- Each animal appears once in subject and once in object position (once as male once as female)
- 32 verbs
  - German verbs: all in accusative case, no phrasal verb (e.g. auslachen)
  - Imageability rating, age of acquisition, frequency



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# Experimental design

Conditions Norwegian version		
1	Clefting with agent focus	No visual action
2	Clefting with agent focus	Visual action
3	Clefting with patient focus	No visual action
4	Clefting with patient focus	Visual action

Conditions German version		
1	No focus	No visual action
2	No focus	Visual action
3	Focus	No visual action
4	Focus	Visual action



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# Experimental design

- **Introductory sentence:**  
Her er en hund og her er en tiger.  
→ image of both animals
  - **Experimental sentence condition 2:**  
Det er hunden som børster tigersen.  
→ image of the dog combing the tiger
  - **Ambiguous pronouns sentence:**  
Han vil gå en tur i skogen.
- **Introductory sentence:**  
Da sind Herr Hund und Herr Tiger  
→ image of both animals
  - **Experimental sentence condition 2:**  
Herr Hund kämmt Herrn Tiger.  
→ image of the dog combing the tiger
  - **Ambiguous pronouns sentence:**  
Er hat viele Streifen.



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# Experimental design

## Counterbalancing

- Ordering in the introductory sentence
  - Active, passive
  - Position on screen
- E.g. each character is once active and once passive, the passive character is half of the time on the right and the other half on the left side of the screen



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