

The influence of visual context and it-clefts on Norwegian children's pronoun resolution

Using eye-tracking, we investigate how ambiguous pronoun processing is influenced by visual actions and cleft sentences. We aim to reveal at which age Norwegian children learn to follow these cues in the same way as adults.

The participants were monolingual 3-, 5-, and 7-year-old children, as well as a control group of monolingual adults. They listened to subject-clefts (e.g. "It is the tiger that tickles the bear") or object-clefts (e.g. "It is the bear the tiger tickles"). It-clefts provide a good environment for testing syntactically expressed focus, and appear to be more frequent in Norwegian than e.g., English (Gundel, 2002). At the same time, the participants watched illustrations of two animals (corresponding to the subject and the object) on a screen. The animals were shown either performing the action (e.g. tickling) or not. Thereafter, the participants heard an ambiguous pronoun sentence (e.g. "He can count to ten"), and eye-gaze data were collected to determine whether they looked at the subject or object referent. In addition, offline data were collected, by asking the participants to point to the pronoun referent.

According to Järvikivi et al. (2013), German 4-year-olds and adults show a subject preference regardless of which word the it-cleft focuses on. Moreover, children seem to show a weaker subject preference than adults, maybe because they have not fully developed their ability to use the syntactic cues. We expected similar results from our data.

Hartshorne et al. (2015) discovered that 2-3-year-olds have a first-mention preference that seldom is detected because they take longer to process. We thus expected young children to show a preference for subject and/or first-mentioned character, albeit at a later time window than adults.

Bittner and Kuehnast (2011) have found that German 3-year-olds rely more on context-cues than older German children, who more often use syntax-cues. We thus expected that young children would be more influenced by the presence vs. absence of visual context, whereas older children would be more sensitive to syntactically expressed focus.

Our analyses showed that 5-year-olds looked more at the subject referent after subject-clefts than object-clefts from 500-1000 ms after pronoun onset, whereas adults did the same during the first 500 ms. The faster processing in adults supports Hartshorne et al. (2014). Moreover, adults showed a general subject preference both offline and online, except in the condition with object-cleft and no depicted action offline, probably because it leaves the subject without syntactic focus and with no visual support. Furthermore, visual action seemed to distract the adults, as the effect from syntactically expressed focus offline was present only when the action was not depicted.

First-look data (first look at subject or object referent after pronoun onset) revealed a stronger subject preference in 7-year-olds after subject-clefts than object-clefts. Older children thus seem to use syntax clues online only, whereas adults also use them offline. This supports Järvikivi et al.'s (2013) suggestion that children use the same cues as adults, but that they have not fully developed their ability to do so. In contrast to the older children, the 3-year-olds performed at chance level in all the different conditions. This may be due to what Hartshorne et al. (2014) found, namely that young children show a first-mention bias that is too slow to detect, or it may simply show that 3-year-olds are too young to comprehend cleft-sentences.

References

- Bittner, D., & Kuehnast, M. (2011). Comprehension of intersentential pronouns in child German and child Bulgarian. *First Language, 32*(1-2), 176–204. doi:10.1177/0142723711403074
- Gundel, J. K. (2002). Information structure and the use of cleft sentences in English and Norwegian. *Language and Computers, 39*(1), 113–128.
- Hartshorne, J. K., Nappa, R., & Snedeker, J. (2015). Development of the first-mention bias. *Journal of Child Language, 42*(02), 423–446. doi:10.1017/S0305000914000075
- Järvikivi, J., Pyykkönen-Klauck, P., Schimke, S., Colonna, S., & Hemforth, B. (2013). Information structure cues for 4-year-olds and adults: tracking eye movements to visually presented anaphoric referents. *Language and Cognitive Processes, 0*(0), 1–16.