Predicting who he will be: The effect of narrator eye gaze
Anja Arnhold¹, Kara Hawthorne¹, Lauren Rudat¹, Emily Sullivan² & Juhani Järvikivi¹
arnhold, khawthor, lrudat @ualberta.ca; esull006@uottawa.ca; jarvikiv@ualberta.ca
¹University of Alberta, ²University of Ottawa

We used visual-world eye-tracking to study how a narrator’s eye gaze affects adults and child listeners’ assumptions of which referent will be the pronominal topic of a following sentence. While it is well-known that linguistic and cognitive properties influence pronoun resolution, recent studies also show that adult language comprehension is immediately affected by the hearer’s extra-linguistic environment, namely the visual context and other cues to shared attention. Recently, Nappa and Arnold (2014) showed participants videos in which a narrator told a short story like *Puppy is having some pizza with Panda Bear. He wants the pepperoni slice*. The narrator turned her head and looked at one of the two possible referents (e.g., *puppy* or *panda bear*) while the participants heard the pronoun (*he*). They found that if the narrator gazed at the second-mentioned antecedent, it increased the selection of this antecedent significantly compared to neutral gaze or gaze at the first-mentioned antecedent. In the present study, we manipulated a narrator’s eye gaze not during the pronoun, but during the preceding sentence describing an action involving two referents. We therefore examined the effect of cues to shared attention on listeners’ discourse expectations.

Participants listened to mini-stories like *There are the tiger and the monkey. The tiger kisses the monkey near the bridge. He wants to stay home from school today* while their eye movements to visually presented animal characters were tracked. Crucially, during the action (e.g., *The tiger kisses the monkey*), but not during the pronoun, an on-screen narrator (a hedgehog) looked at either the subject or the object character. After each story, the participant was asked to answer a prompt question requiring pronoun resolution, e.g., *Who wants to stay home from school today?*

We analysed results from 86 native English-speaking adults, using linear mixed-effects modelling. As expected, participants displayed an overall subject/first-mentioned bias, increasingly looking at the subject character after the pronoun onset and choosing the subject in response to the prompt question; however, this trend was modulated in interesting ways. When the participant had looked at the narrator during the narrator-gaze portion of the story (i.e., when the narrator’s gaze was on one of the animal characters), the increase in looks to the subject character was significantly delayed. Instead, participants continued looking at the narrator later in the trial, even after hearing the pronoun. For the first 900ms after the pronoun onset, the narrator’s previous gaze towards subject vs. object character had no significant effect. However, during the next 300ms, the proportion of looks to the subject was significantly lower when the participant had earlier paid attention to the narrator while the narrator had gazed towards the object. Similarly, participants more frequently chose the object as the pronoun referent if they had fixated the narrator while the narrator had looked at the object during the action (13% vs. 2-3% object choices in all other conditions).

This suggests that even for adults, the well-established preference for first-mentioned subjects/agents can be modulated by visual/social cues. Extending findings by Nappa & Arnold (2014), we showed that narrator eye gaze has an effect even when it is not concomitant with the pronoun. We will analyse data from our child participants for presentation at the conference. Our hypothesis is that their predictions for the upcoming discourse will be affected by visual cues even more strongly and that the reliance on linguistic and cognitive principles like subjecthood/first mention effect will be less stable than for adults.
References

Nappa, R. & Arnold, J. E. (2014). The road to understanding is paved with the speaker’s intentions: Cues to the speaker’s attention and intentions affect pronoun comprehension. *Cognitive psychology, 70,* 58-81.