Relative clause development in SLI

- Specific Language Impairment (SLI) is a condition in which the age-appropriate development of expressive and/or receptive language is affected, in absence of sensory, mental and socio-emotional impairments [e.g. Leonard 2014]
- Severe difficulties documented cross-linguistically make relative clauses a likely clinical marker of SLI [e.g. Frizelle & Fletcher 2014]
- German-speaking children with SLI produce fewer fully-fledged relative clauses than their typically developing controls [Adani et al. 2016]

Background

- Both Structural Intervention [Belletti et al. 2012] and Discourse-based [Mak et al. 2008] accounts of relative clause comprehension predict Object Relative clause (OR) with an embedded pronoun (pro) to be processed at less cost/faster than OR with an embedded full noun phrase (NP).
- These accounts make contrasting predictions in the case of Subject Relative clauses (SR):
  - The Structural intervention approach predicts SR_pro > SR_NP;
  - The Discourse-based approach predicts SR NP > SR pro, whereby “>” means more accurate and/or processed faster

Research questions

- Are children with SLI able to process relative clauses in a qualitatively similar way as typically developing children do, when an implicit receptive measure (eye-gazes) is employed?

Method

Participants

<table>
<thead>
<tr>
<th>Language-match controls (LM)</th>
<th>Specific Language Impairment (SLI)</th>
<th>Age-matched controls (AM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>27</td>
<td>15</td>
</tr>
<tr>
<td>Age in y.m (SD)</td>
<td>6.9 (1.2)</td>
<td>7.3 (1.2)</td>
</tr>
<tr>
<td>TSVK sum score (SD)</td>
<td>51 (4)</td>
<td>49 (4)</td>
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</tbody>
</table>

Trial structure

- SMI RED 250
- Eye-tracker
- 22” monitor
- Sampling rate: 60 Hz
- Position cross

- Introduction
- Hari et. al.
- Herat zu einer Irrlicht (She has to a firefly)
- Question: Was der Irrlicht?
- Relative clauses (RC):
  - “Der innere Irrlicht”

Experimental Design & Statistics

- We fitted Bayesian linear mixed models, estimating a posterior probability for each model parameter (Vasishth & Nicenboim 2016)
- Informative priors were defined based on Haendler et al. (2013) and Adani et al. (under review)

Results

- Effects for which we find reliable evidence are those where the posterior’s 95% credible intervals (CrI) do not contain zero, the point of “no difference” (all variables were centered around zero).

Eye-gaze Data

- LM: elog|weights((1|weights) ~ (time1+time2)*sli_lm+am_sli) + (rc+dp|subject) + (rc|item)
- Effects with reliable evidence (“>” more accurate than):
  - SR > OR (mean of β̂ = 1.61, 95% CrI [−2.01, −1.17])
  - NP > pro (mean of β̂ = 0.25, 95% CrI = [0.04, 0.47])
  - AM > SLI (mean of β̂ = 2.64, 95% CrI [1.65, 3.69])
  - Interaction: OR NP; pro NR pro; SR NP; SR pro (mean of β̂ = .32, 95% CrI [−.53, −.12])

Discussion & Conclusion

- Embedded 3rd person pronouns do not appear to generally facilitate the comprehension and/or processing of ORs in 7-year-old speakers of German, whether they are language impaired or not. In SRs, we observe a disadvantage for the condition with embedded 3rd person pronouns compared to NPs, an effect present in all groups but which is stronger in the age-matched control group.
- The Discourse-based approach predicts the difficulty in interpreting an-pronoun as a direct object/patient in SRs because pronouns are typically used to refer to given entities, hence privileging a subject interpretation.
- Children with SLI do not reveal an atypical trajectory of SR and OR comprehension and processing, rather their performance is mostly in line with that of language-matched children. Despite the low OR accuracy in the SLI group, their eye-gazes do not reveal a pronoun facilitation, which was to some extent detected in the LM group.

Selected References