Eye Tracking Patterns and **Processing Times** of Children with and without **Language Disorder** during Sentence Comprehension

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Introduction

- **Current literature** shows that children with developmental language disorder (DLD) have difficulty processing complex sentences compared to their typically developing (TD) peers (Bishop et al. 2000; Montogomery & Evans, 2009).
- **Few studies** demonstrate how children process sentences using online processing measures, so we used eye tracking (online) measures in addition to behavioral (offline) measures
- **Research Question:** How does sentence processing of canonical and non-canonical sentences in children in the TD and DLD groups differ?
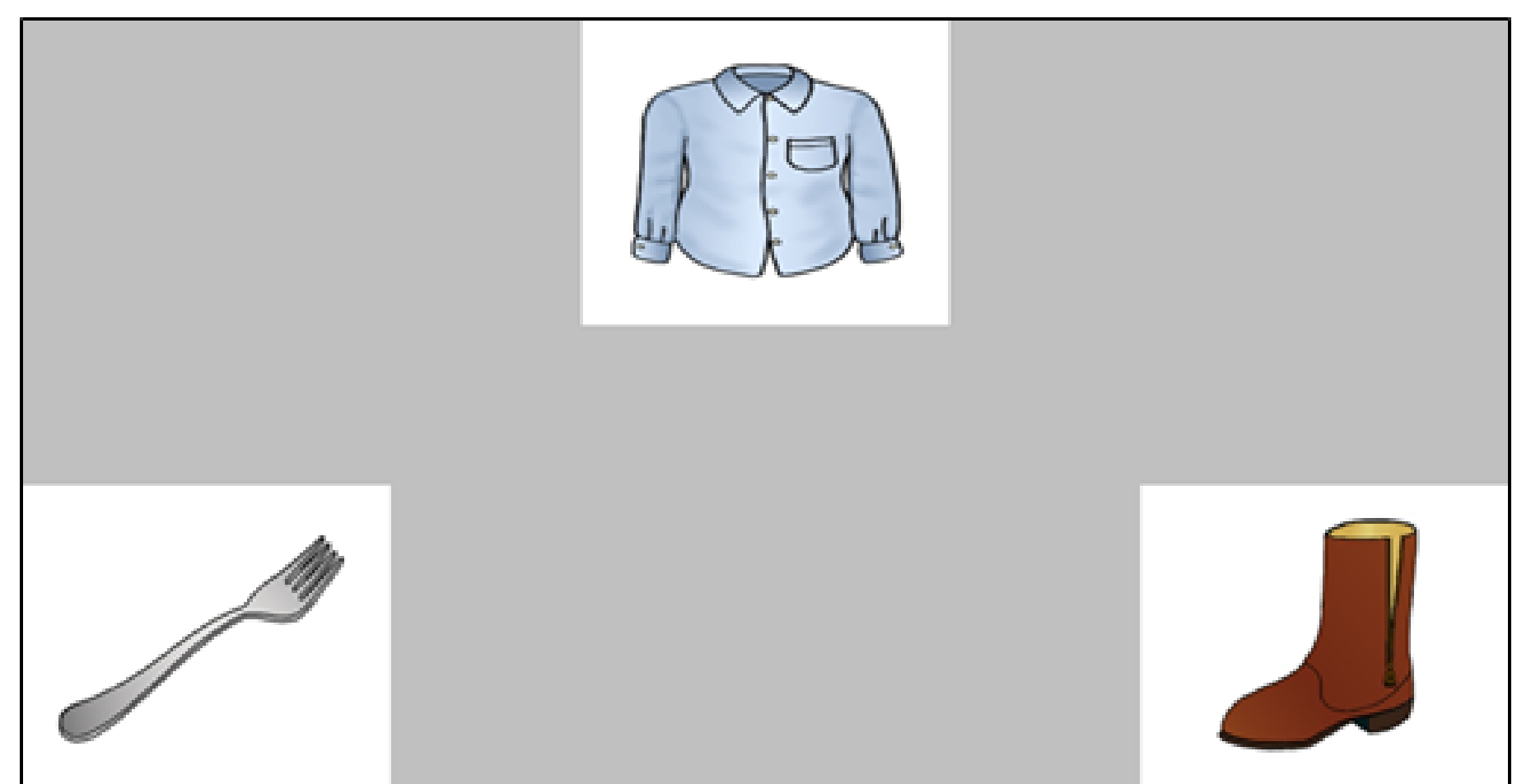
Methods

Participants: 32 children ages 9-14 (19 TD, 13 DLD)
Experimental "Whatdunit" Task: (Montogomery et al. 2016, Montgomery et al. 2017)

1. Listen to 12 subject verb object, passive, object relative, and subject relative sentences while looking at the screen

Figure 1 *- Example of Screen Display*

2. At the end of each sentence, select the picture that represented the agent or the object performing the action

Table 1 *- Example Sentences from each Category*

Subject Verb Object (SVO)
The ring moved the square behind the very bright cold bed.
Subject Relative (SR)
The broom that pulled the kite near the boot was cold.
Passive (PAS)
The bowl was touched by the truck behind the hot spoon.
Object Relative (OR)
The truck that the clock pulled near the door was bright.

Online Measures:
- Time to next fixation – time from the end of the sentence to the next fixation or look
- Response time- time from the end of the sentence to the first click or agent selection

Analysis:
- Linear mixed effects modeling with random intercepts for participants and crossed effects for stimulus items

Figure 2
Time to Next Fixation after Sentence End

When participants answered correctly, no difference in fixation times were noted between the TD and DLD groups. When incorrect, TD was slower than DLD for SR and faster for PAS.
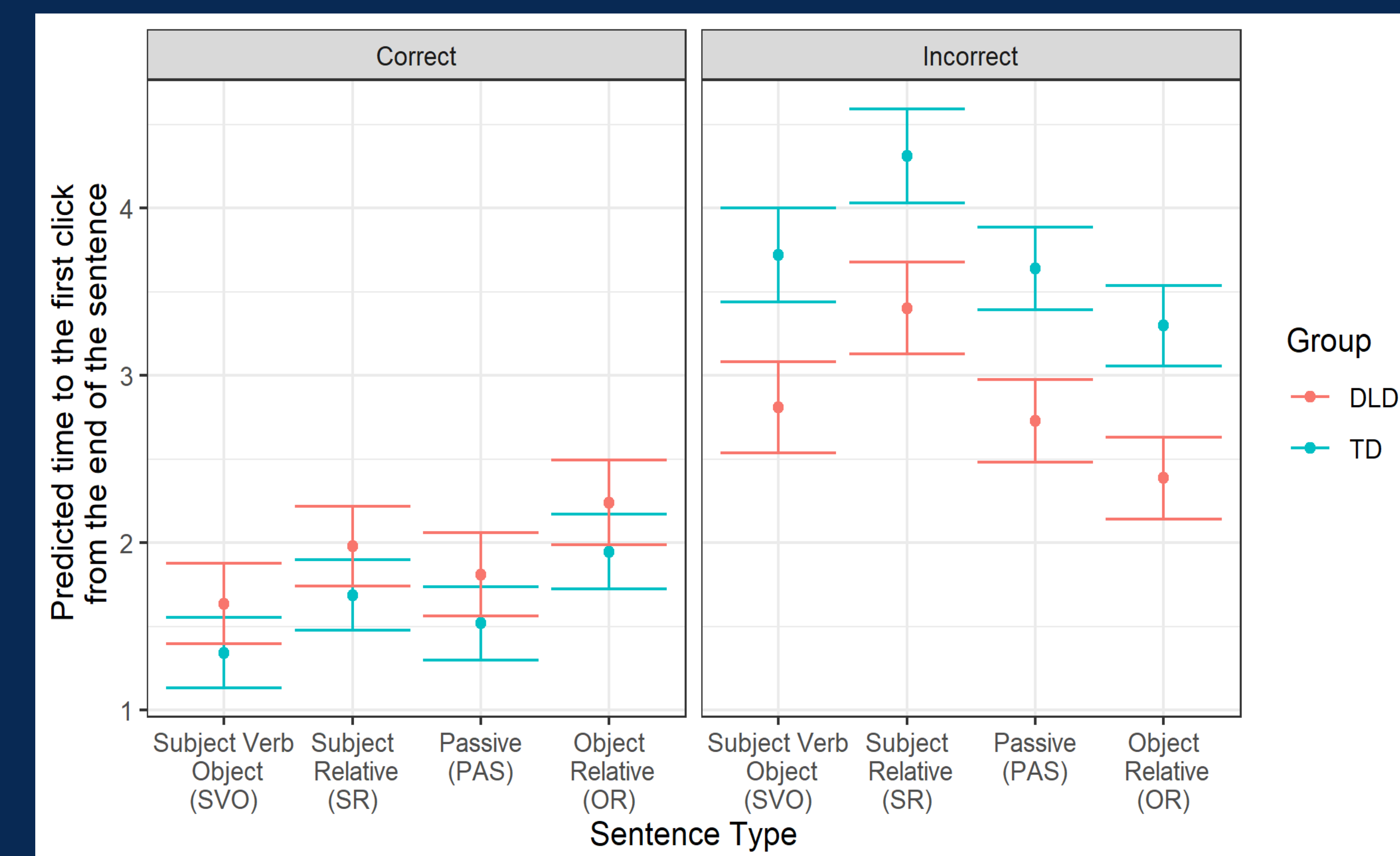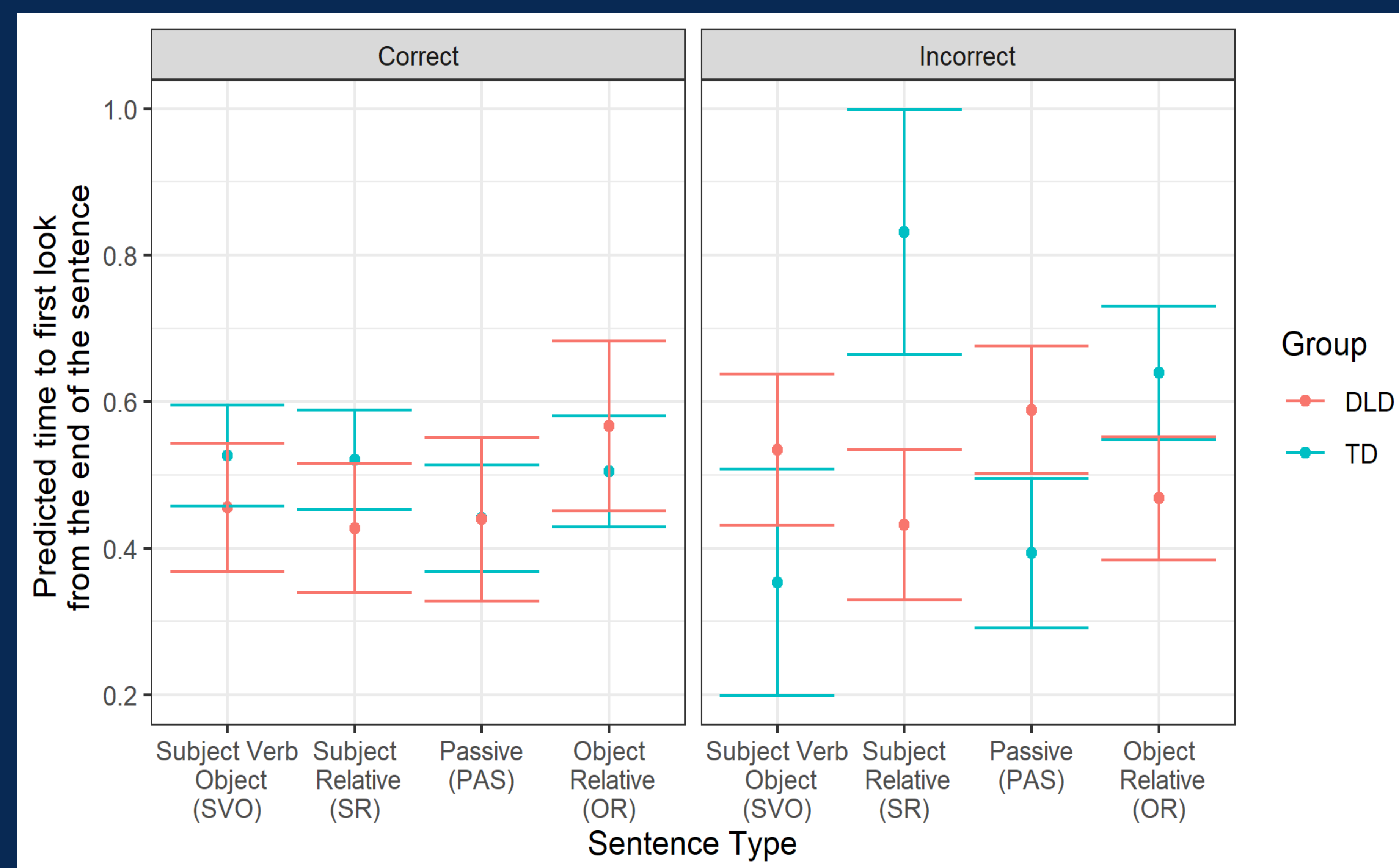

Figure 3
Response Time after Sentence End

When participants answered correctly, response times were similar between TD and DLD. When incorrect, TD participants tended to take longer to respond than DLD participants.

Results

Time to Next Fixation
- When correct, no group or sentence type differences
- When incorrect, significant group differences
  - TD were slower for SR
  - TD were faster for PAS
  - Note: Within DLD, there were no sentence type differences, whereas TD were slower for sentences with relative clauses (SR, OR)

Response Time
- When correct, no group or sentence type differences
- When incorrect, significant group differences
  - The TD group responded slower than children in the DLD group

Conclusions

- The TD group responding slower when incorrect reflects that they were spending more time to deliberate their choices, as if unsure.
- The DLD group had no difference in time, regardless of accuracy, reflecting less time spent deliberating the correct answer.
- Attentional fatigue may explain slower response times on earlier tasks compared to later tasks; SR appeared first
- Future research should continue to explore online measures accounting for differences in correct and incorrect responses.

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