Visual Attention during Search for a Target Navigation Icon on an AAC Display

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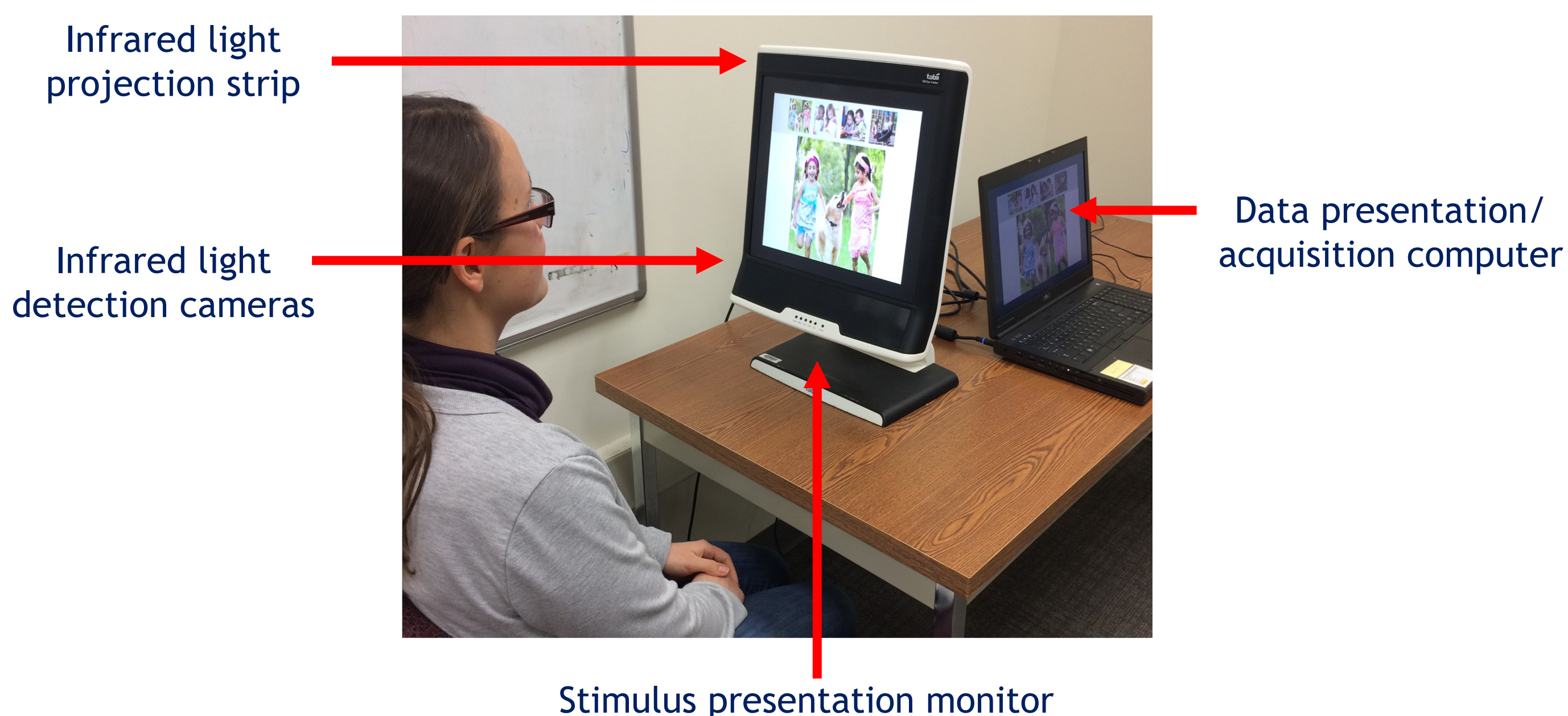
Rationale

- The design of AAC displays must be grounded in a theoretical understanding of visual cognitive processes.
- A visual scene display (VSD) is one type of AAC display that depicts meaningful events including people engaged in shared activities, with language concepts embedded as hotspots.
- Navigation between AAC VSDs is typically achieved through a bar that contains thumbnails of possible displays.
- This investigation used eye-tracking technology to examine visual attention during search for a target navigation icon (i.e., small VSD) within the bar.
- The aim was to explore the utility of using eye-tracking to gain information about comprehension of navigational tasks in individuals with significant intellectual and developmental disabilities who are challenging to assess using traditional behavioral assessments.

Research Questions

(1) What is the effect of the cue on locating a target display from the navigation bar?
(2) What is the effect of the cue on percentage of time fixating on the cued target?

Methods

Tobii T60 Eye Tracker

- Infrared light projection strip
- Infrared light detection cameras
- Data presentation/ acquisition computer
- Stimulus presentation monitor

Participants

	TD (n=20)	DS (n= 13)	ASD (n= 13)	IDD (n= 9)
Chronological age	4.1 (0.7)	16.5 (6.1)	15.7 (3.4)	15.5 (4.4)
PPVT standard score	114 (14)	46 (14)	29.5 (18)	40 (20)
PPVT age equivalent	5.1 (1.5)	5.8 (2.0)	3.5 (1.9)	4.8 (1.8)

Note. Ages and age equivalents are represented in years. ASD= autism spectrum disorder, DS= Down syndrome, IDD= intellectual/developmental disability of other origin than DS or ASD, TD= typically developing
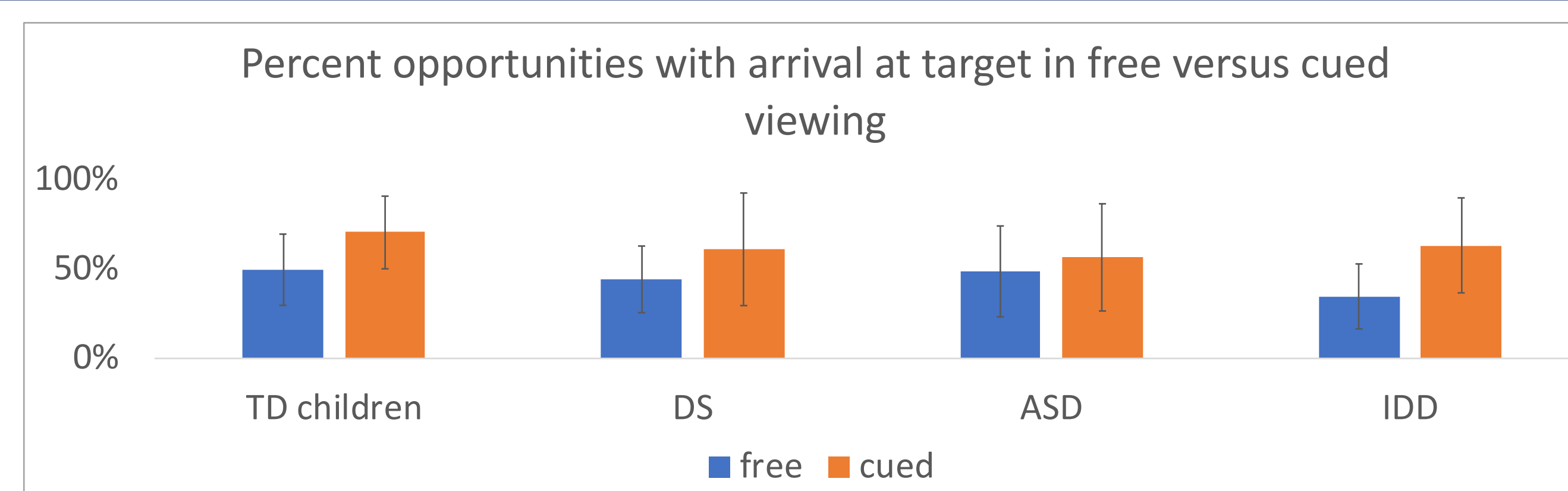
Procedures

Free viewing, 5s*
Navigation bar
Main VSD
"Look at the kids with the book"
Cued viewing, 5s

Time

*The cued viewing phase is the focus of the analyses presented here.

Results

RQ1: Effect of the Cue on Locating a Target Display in Navigation Bar

Percent opportunities with arrival at target in free versus cued viewing

■ free ■ cued

Summary of findings:
- Participants showed an **increase** in the likelihood of fixating on the target after presentation of the cue.
- There was some variation across individual participants; however, the majority of participants within each group followed the group pattern: 89% of participants with TD, 73% of participants with DS, 69% of participants with ASD, and 93% of participants with IDD.

RQ2: Effect of Cue on Percentage of Fixation Time on the Cued Target

Percent time on the target in free versus cued viewing

■ free ■ cued
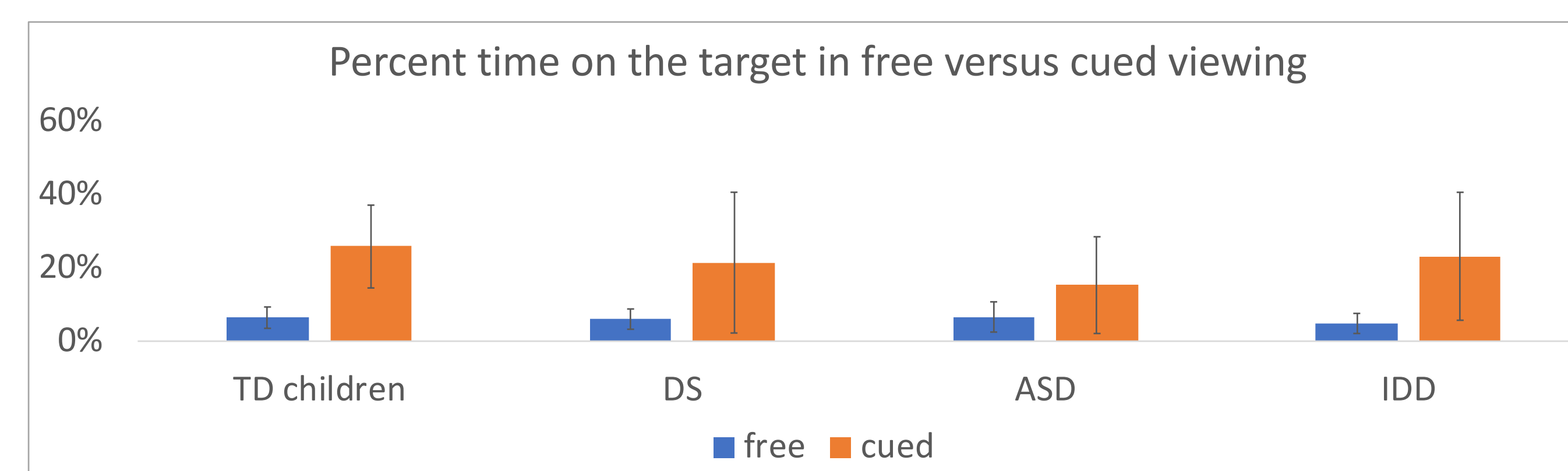
Summary of findings:
- Participants spent a **greater proportion of their fixation time** on the target in cued viewing compared to free viewing.
- There was some variation across individual participants; however, the majority of participants within each group followed the group pattern: 100% of participants with TD, 73% of participants with DS, 75% of participants with ASD, and 93% of participants with IDD.

Discussion & Implications

- Provision of a cue produced reliable changes in how participants across groups fixated on the target thumbnail VSD within the navigation bar in the two viewing phases. In the cued viewing phase compared to free viewing:
  - Participants were more likely to fixate on the target (i.e., higher accuracy)
  - Participants spent more time looking at the target (i.e., greater scrutiny)

- Overall, results suggest that individuals with ASD, IDD, and DS are to understand the demands of navigational tasks using AAC systems.
  - Additionally, results suggest that participants were able to utilize visually complex AAC displays that included a main VSD and a navigation bar.

- Eye-tracking may be a valuable methodology to gain information about comprehension of navigational task demands in individuals with significant intellectual and developmental disabilities who are challenging to assess using traditional behavioral assessments.

- This lends further support for previous research that has suggested that eye-tracking may serve as a measure of receptive vocabulary (e.g., Brady et al., 2014).

- Future research is necessary to explore the individual factors that contribute to variability within groups.

Acknowledgements