1. Introduction and Aim

- Attentional disengagement is a part of visual orienting, and is defined as shifting attention from an item that is being currently fixated to a different location/item.
- Dysfunctional visual disengagement in autism spectrum condition (ASC) may serve as an early marker for high-risk ASC infants (Bryson et al., 2018).
- However, recent studies have reported intact attentional disengagement in ASC, but these findings may reflect a failure of the traditional gap-overlap paradigm (GOP) to show disengagement effects.
- Our recent study (Zhou et al., 2022) used a modified-overlap (MO) task and we found no protracted disengagement in ASC children compared to typically developing (TD) peers. However, the complex stimuli in that study might have produced effects that were unrelated to basic attentional processes.
- In the current studies, simple static and dynamic geometric figures were adopted to compare disengagement in ASC and TD children, and we employed both the traditional GOP and the MO task.
- Basic eye-movement ability was evaluated first to clarify that any observed differences in disengagement resulted from genuine attentional processing differences between the ASC and TD groups, and not from differences in basic oculomotor function.

3. Results 1: Intact Basic Oculomotor Function in ASC

- **Express Saccade Rate** (saccade latency within 80-120ms), **Anticipatory Saccade Rate** (saccade latency less than 80ms) and **Gain** (the ratio of current saccade amplitude by target eccentricity)

  - No marked main effects or interactions relative to group were found.

- **The Main Sequence Effect** (a linear relationship between saccade amplitude and saccade duration or peak velocity would be expected for intact saccade generation)

  - Saccade duration increased with larger saccade amplitudes in both groups ($b = 4.64, SE = 0.09, t = 53.59, p < 0.001$).
  - Saccade peak velocity increased with larger saccade amplitudes across both groups ($b = 27.27, SE = 0.58, t = 46.90, p < 0.001$). See Figure 2.

5. Experiment 2: Disengagement from Dynamic Stimuli

- Given the prevalence of dynamic stimuli in the real world, we used similar static stimuli and investigated disengagement for two types of motion stimuli.
- It has been shown that children with ASC have a visual preference for repetitive (REP) motion compared to random (RAN) motion (Wang et al., 2018).
  - **Participants**: 26 ASC (M = 68.07 months) and 26 TD (M = 72.20 months) age-, gender, IQ-matched young children.
  - **Experimental Design**: A 2 (group: ASC, TD) * 2 (task: BA, MO) * 2 (motion type: REP, RAN) mixed design.
  - **Procedure**: See Figure 4 for details.
  - **Main Results**: ASC children showed longer disengagement latency from REP dynamic stimuli relative to RAN dynamic stimuli, and this bias was absent in the TD group. See Figure 5 for details.

6. Conclusion

- Both groups showed similar basic oculomotor function.
- ASC children showed delayed endogenous disengagement across both simple static and dynamic stimuli compared to TD children using the MO task.
- No group differences were observed using the traditional GOP, and this is because foveal stimuli have already been processed when the lateral targets are presented (Zhou et al., 2022).
- No target eccentricity effect was shown during attentional disengagement, which is also supported with evidence from the auditory domain (Keenan et al., 2019).
- Children with ASC show increased disengagement when they are processing REP (compared to RAN) motion, and this modulation effect, which is absent in the TD children, is in line with evidence based on visual preference tasks (Wang et al., 2018).

7. Discussion

- Disengagement difficulties in ASC children may limit the opportunity to attend to, and acquire, and process more meaningful social information in daily life.
- This limitation may be further increased with the bias for increased disengagement in ASC for repetitive motion, compared to random motion, and these types of motion stimuli are freely available in everyday environments. Greater fixation on rotating fan blades or spinning car wheels (repetitive movements) has been formally reported in children with ASC (Pierce et al., 2011).
- The current study advances our knowledge of the unique cognitive processing characteristics in individuals with ASC, and provides an understanding of how these might impact in the development of social cognition.