

# Lexical Processing by Toddlers with ASD

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## BACKGROUND

• Few studies have examined lexical processing in young children with autism spectrum disorders (ASD) and none have directly tested whether weak central coherence can explain the early comprehension delays of toddlers with ASD.

• Applied to the context of lexical processing, the weak central coherence account (Happé & Frith, 2006) predicts that toddlers with ASD will focus more closely on lower-level perceptual details (e.g., similarity of visual referents) than their typically developing (TD) peers, potentially at the expense of higher-level, global integration (e.g., semantic relatedness of referents).

• This study focused on word-object associations to explore whether lexical processing in toddlers with ASD would be more disrupted, compared to TD peers, by perceptual similarities between pictures while being less disrupted by semantic similarities.

### Objectives:

• To use an implicit eye-gaze paradigm to assess real-time comprehension (lexical representations) in toddlers with ASD relative to neurotypical controls matched on cognition.

• To examine the role of vocabulary size in lexical processing by toddlers with ASD.

## METHOD

### Participant Characteristics

	TD (n=31; 15 females)		ASD (n=30; 6 females)	
	Mean	SD	Mean	SD
Age (months)	21.1	4.9	30.6	3.4
Bayley – Raw Score	60.4	9.6	58.6	10.1
Bayley – Composite Score	106.8	11.8	80.8	14.0
CDI – Words Understood	278.3	90.7	140.2	107.1
ADOS Autism Severity			8.4	1.9
Maternal Education (yrs)	18.1	2.9	14.0	1.9

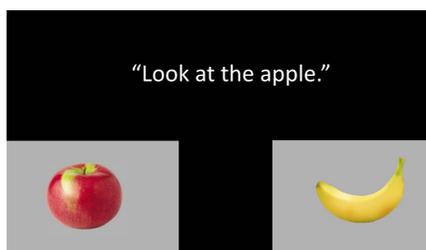
## METHOD

- Participants consisted of toddlers with and without ASD (TD n=31, ASD=30), matched on Bayley cognitive raw scores.
- An experienced psychologist made ASD diagnoses integrating results from the ADOS, ADI-R, DSM-5, and clinical expertise.
- A looking-while-listening (LWL) task (Fernald et al., 2008) was employed in which each trial presented two pictures on a screen with audio describing one of the images.
- An adaptation of the Arias-Trejos & Plunkett (2010) task was used in which the two images were unrelated (baseline condition), semantically similar or perceptually similar.
- Gaze location was hand coded from video.

### Baseline Condition



### Semantically Related Condition

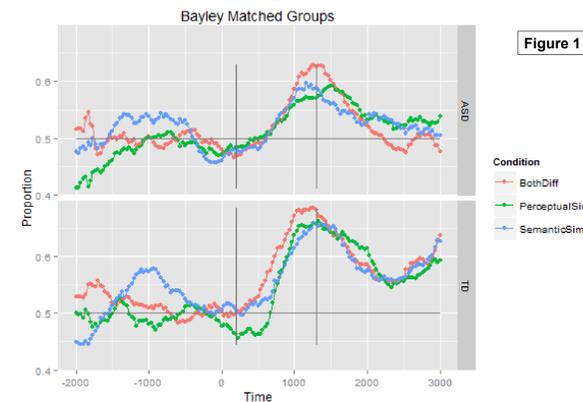


### Perceptually Related Condition

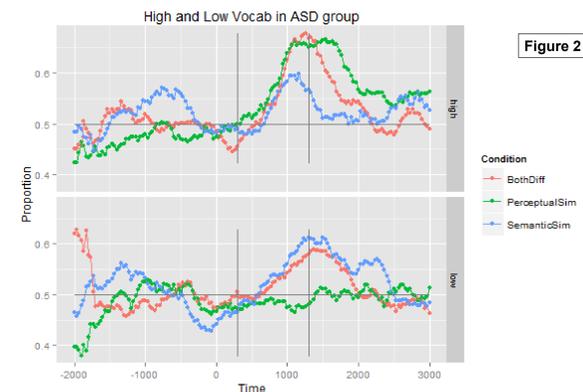


## RESULTS

- Results were analyzed using growth curve analysis (Mirman, 2014); the outcome was log odds of looking to target.
- Two models were constructed; each contained: condition, linear, quadratic, and cubic time terms as fixed effects, and participant and participant by condition random effects.
- The first model revealed that the TD group looked to the target significantly more than the ASD group overall (**Figure 1**).
- A condition effect was also found such that lexical processing accuracy was significantly better in the baseline condition (unrelated images) than the perceptually similar or semantically similar conditions.
- There were no significant group by condition interactions.



• A second model of the ASD group alone revealed a significant three-way interaction. As vocabulary size decreased, children's processing speed (i.e., linear slope) was more disrupted by perceptually-similar distracters as compared to the other conditions (illustrated as a median split in vocabulary level in **Figure 2**).



## CONCLUSIONS

• Although toddlers with ASD had lower accuracy than the cognition-matched TD toddlers, lexical processing in both groups was affected by the semantic and perceptual similarity of distracter images.

• Toddlers with ASD who had smaller receptive vocabularies were more disrupted by distracter images that looked similar to the target than images that were semantically related or unrelated.

• Overall group comparisons failed to provide evidence for the weak central coherence hypothesis. However, within-group analyses provide partial support for weak central coherence for toddlers with ASD who have small vocabularies.

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