Children with Autism Treat Nonwords and Mispronunciations Differently

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BACKGROUND

We know very little about the lexical representations of children with ASD. In particular, we know little about their *phonological* representations.

- Toddlers with typical language development (TLD) are sensitive to mispronunciations of familiar words and treat them differently than both familiar and unfamiliar words (White & Morgan, 2008).
- There is some evidence that children with ASD have enhanced low-level perceptual skills, so they may be even more sensitive to mispronunciations.

Child-levels factors and lexical processing

- Studies have consistently shown processing efficiency for familiar words is related to vocabulary size (Fernald et al., 2006; Law et al., 2016).
- Law and Edwards (2015) found vocabulary size also predicted children's sensitivity to mispronunciations and their looks to unfamiliar objects when hearing a nonword.
- Is a similar pattern observed for children with ASD?

Current Study

- Do children with ASD differentiate between nonwords and mispronunciations of familiar words?
- Is their performance related to nonverbal IQ?
- Is their performance related to language comprehension?

METHOD

Participants: 18 children with ASD. Additional 2 lacked sufficient eye-tracking data.

Standardized tests

- Nonverbal Ratio IQ: from *Mullen Scales of Early Learning.*
- Autism severity: from *Autism Diagnostic Observation Schedule, 2nd edition.*
- Auditory Comprehension and Expressive Communication: from *Preschool Language Scale, 5th edition.*

	Mean (SD)	Range
Age (months)	56 (4)	49 – 62
Autism Severity	8 (2)	4 – 10
Nonverbal Ratio IQ	77 (27)	39 – 108
Aud. Comp. Standard Score	77 (24)	50 – 118
Expr. Comm. Standard Score	68 (16)	50 – 95

PROCEDURE

- Looking-while-listening task (Fernald, et al., 2008).
- Children saw an familiar object and an unfamiliar object.
- Children heard a correct production of a familiar word, a mispronunciation of a familiar word, or a nonword.
- Looks to each image were manually coded from video-recordings of participants.
- Two blocks of trials, administered over two visits.
- In a visit, children heard the familiar word and the nonword, or heard the mispronunciation. Children never heard a familiar word and its mispronunciation on same visit.

Block A
Real: "Find the shoes"
Novel: "Find the dazz"

Block B
MP: "Find the sooze"

(Block order randomized over visits)

GROWTH CURVE ANALYSIS

- Mixed effects logistic regression modeled the probability of looking at familiar object over the time course of the trial
- **Predictors**: orthogonal $Time^1$, $Time^2$ and $Time^3$ values, experimental condition, child-level scores, and interactions.
- **Outcome**: log-odds looking to familiar vs. unfamiliar object
- Models allowed randomly varying Time effects by participant and participant-by-condition.

RESULTS

- Auditory comprehension and nonverbal IQ were highly correlated, $r = .86$, for $n = 15$ children with both scores.
- Comprehension did not relate to looking patterns, $p = .52$, over and above nonverbal IQ.
- On average, children looked to unfamiliar objects when they heard nonwords as much as they looked to familiar objects when they heard real words, $p = .12$.
- Nonverbal IQ moderated looking behavior in real and novel word conditions. An SD increase in IQ predicted an increase in proportion looks to familiar object by .1 for real words.
- Children with low IQ did not show an increase in looks to the familiar object after hearing real words.

Child heard: Real word · Mispronunciation · Nonword
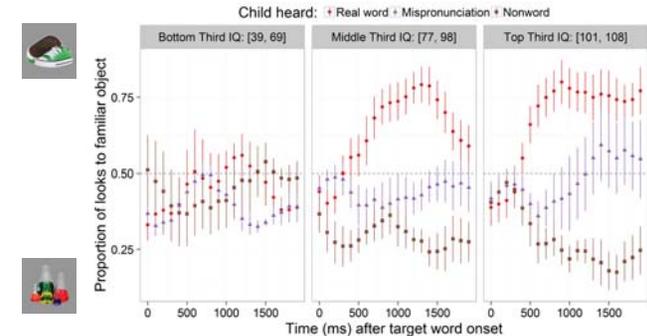
Child-level factors significantly moderate looking patterns. Mean ± SE proportion of looks to familiar object by condition and by nonverbal IQ level (tertile split).
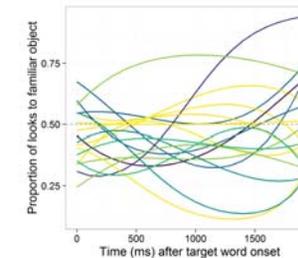
Individual differences in the mispronunciation condition.

Model-estimated proportion of looks to familiar object for mispronunciations by child.

Some children treat MPs like real words, others treat them like nonwords, but most are indecisive, looking to both images.

None of the child-level measures (nonverbal IQ, auditory comprehension, autism severity, age) predicted differential looking patterns to mispronunciations.

CONCLUSIONS

- While eye-tracking tasks are considered to have low task demands and work well with very young listeners, we found that the children with ASD with low nonverbal IQ (< 70) did not show reliable looking behavior on this particular task.
- Children with ASD above this threshold reliably mapped nonwords to novel objects and real words to familiar objects,
- Like their TD peers, most children with ASD were sensitive to one-feature mispronunciations of familiar words, indicating that they have detailed phonological representations.
- Autism severity and other child-level measures were not associated with responses to mispronunciations within this sample.