Introduction

- Early interventions improve language outcomes for some children with autism spectrum disorder (ASD), however, 30% of children with ASD remain minimally verbal. Identifying relative strengths and weaknesses in language acquisition for children with ASD may help tailor and improve interventions.

- Children with ASD have superior performance in non-speech auditory tasks, but worse performance in language comprehension tasks. Less is known about speech perception abilities for children with ASD.

- Do toddlers with ASD have more or less detailed phonological representations of familiar words compared to typically-developing (TD) toddlers?

Method

Participants
- 64 toddlers with ASD (17 female), mean age of 30.6 months (range: 24-36)
- 31 typically-developing (TD) toddlers (13 female), mean age of 20.5 months (range: 18-24)
- Toddlers with ASD were diagnosed by an experienced psychologist who administered ADOS-2 and ADI-R

Phonological Representations
- Assessed using a looking-while-listening task
- Saw pictures of two familiar objects
- Heard a sentence labelling one object with either a Correct Pronunciation (CP) or Mispronunciation (MP)
- Eye movements video recorded and coded offline

Offline Measures
- Verbal skills using Preschool Language Scales, 4th Edition (Auditory Comprehension score) and MacArthur-Bates Communicative Development Inventories Words and Sentences (# of words says)
- Nonverbal skills using Mullen Scales of Early Learning (Visual Reception scale)

Phonological Representations in Children with Autism Spectrum Disorder

Participants compared to typically language comprehension tasks. Language acquisition for children with ASD may help some children with autism spectrum disorder (ASD),

Do toddlers with ASD have more or less detailed phonological representations of familiar words compared to typically-developing (TD) toddlers?

Results

The time courses of toddlers’ fixations to the target object were analyzed using Growth Curve Analysis (GCA). Tests of significance were performed using model comparisons (-2*log-likelihood). The sections below analyze the time course of fixations for all trials, then trials separated based on whether toddlers were fixating the target object (e.g., cow) or the distractor object (e.g., shoe) at the onset of the target word (e.g., “cow”).

Toddlers were less accurate in fixating the target object when it was labelled with a MP (e.g., “gow”) compared to a CP (e.g., “cow”).

- Significant effect of Condition on $t_0$, $t_2$, and $t_4$,
- $\chi^2(1) > 5.6$, $p < .02$

Toddlers in the ASD Group were less accurate in fixating the target compared to the TD Group.

- Significant effect of Group on $t_0$, $t_2$, and $t_4$,
- $\chi^2(1) > 10.4$, $p < .002$

The effect of Mispronunciations on accuracy was the same for toddlers in both Groups.

- Non-significant effect of Mispronunciation on $t_2$, $t_4$, and $t_6$,
- $\chi^2(1) < 2$, $p > .16$

For target-initial trials, there was a stronger effect of Mispronunciations for toddlers in the TD Group compared to ASD Group

- Significant effect of Group on $t_2$ and $t_4$,
- $\chi^2(1) > 8.6$, $p < .01$

No effect of Mispronunciations in the ASD Group

- Non-significant effect of Group on $t_2$ and $t_4$,
- $\chi^2(1) < 2.3$, $p > .13$

...but a significant effect for toddlers in the TD Group

- Significant effect of Group on $t_2$ and $t_4$,
- $\chi^2(1) > 19.9$, $p < .001$

For distractor-initial trials, the effect of Mispronunciations was the same for toddlers in both Groups

- Non-significant effect of Mispronunciation on $t_2$, $t_4$, and $t_6$,
- $\chi^2(1) < 1.4$, $p > .24$

Significant effect of Mispronunciations for toddlers in the ASD Group

- Significant effect of Group on $t_2$ and $t_4$,
- $\chi^2(1) > 7.4$, $p < .01$

...and in the TD Group

- Significant effect of Group on $t_4$,
- $\chi^2(1) > 7.4$, $p < .01$

Offline Measures

After controlling for differences in verbal skills:
- toddlers in the ASD Group were equally accurate in fixating the target object compared to the TD Group
- Non-significant effect of Group on $t_2$, $t_4$, and $t_6$, $\chi^2(1) < 1.1$, $p > .29$

- the effect of Mispronunciations was the same for toddlers in both Groups
- Non-significant effect of Group on $t_2$, $t_4$, and $t_6$, $\chi^2(1) < 1.8$, $p > .18$

After controlling for differences in nonverbal skills:
- toddlers in the ASD Group were less accurate in fixating the target object compared to the TD Group
- Significant effect of Group on $t_2$, $t_4$, and $t_6$, $\chi^2(1) > 4.8$, $p < .05$

- the effect of Mispronunciations was the same for toddlers in both Groups
- Non-significant effect of Group on $t_2$, $t_4$, and $t_6$, $\chi^2(1) < 1.3$, $p > .25$

Discussion

- When collapsing across all trials, ASD and TD toddlers were equally affected by mispronunciations, suggesting they have the same level of detail in their phonological representations of familiar words.

- When separating trials based on whether toddlers were fixating the target or the distractor object at target word onset, we find evidence that toddlers with ASD and TD may be affected differently by mispronunciations.

- Group differences in overall word recognition accuracy were related to verbal skills, but not nonverbal skills. This dissociation rules out an important alternative explanation: that toddlers who perform better on one lab task perform better on other lab tasks (regardless of the content).

Acknowledgments

The authors have no financial or non-financial conflicts of interest. This research was funded by the National Institutes of Health: NIDCD R01 DC012513, NICHD R37 HD037468, NICHD F31 HD051969, and NICHD P30 HD033522 core grant to the Wisconsin Center. This work was part of the Little Listeners Project: www.littlelisteners.wisc.edu. Contact: nap@wisc.edu

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