Factors influencing Vocabulary size in Children with Developmental Disabilities

The impact of AAC and Conversational Turn-Taking

Syrina Merilan; Rose Sevcik, PhD; Maryann Romski, PhD

Georgia State University, Developmental Psychology

Research reported in this presentation was supported by the National Institutes of Health Grant DC-03799. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

AGENDA

- Background on factors affecting Language acquisition
- The current study
- The results and Implications
- Discussion Questions

Background

What Factors Effect Vocabulary Learning in Children with Communicative Challenges?

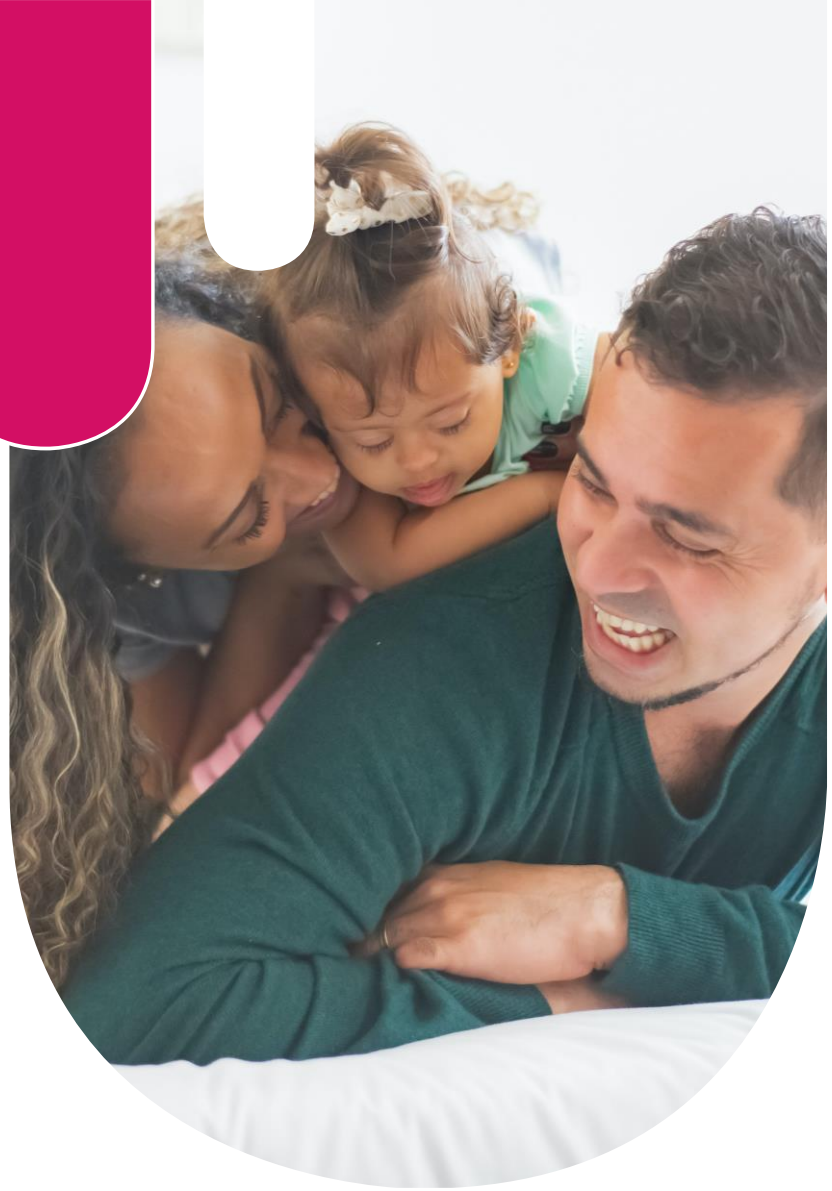
Factors

Augmentative and Alternative communication (AAC)

- AAC facilities greater vocabulary size in children with developmental disabilities (Romski et al., 2010).
- The current literature on this population favors language intervention facilitated through (AAC) over typically spoken intervention (Romski et al., 2010; Wright et al., 2013; Yoder and Stone, 2006).

Quality of Input

- Larger vocabulary size relates to overall more parent-talk that is more diverse and complex with limited directive utterances (Rowe, 2008).
- At 24 months quality of communication interactions (connected communication) accounted for 27% of variance in expressive language one year later (Hirsh-Pasek et al. 2015).



Quality of Input

This study advocates for conversational turn-taking as an indicator of input quantity and *quality*:

- **Connectedness**: Each speaker tunes into what the other is saying during conversational turns (Dunn & Brophy, 2005).
- Larger amounts of conversational turns in families has shown to produce children with stronger social and cognitive skills (Dunn & Brophy, 2005).
- Intervention targeted to increase parent-child turn-taking is correlated with enhanced growth in child vocalizations between 6 and 18 months (Ramirez et al., 2020).
- Conversational turn-taking between 18 and 24 months accounted for 14% to 27% in receptive and/or expressive vocabulary scores 10 years later after controlling for SES (Gilkerson et al., 2018).

Current Study

How does Augmentative and Alternative Communication and Conversational Turn-Taking Impact Vocabulary Size and Word Learning?

Research Question

Three question were asked to evaluate the relationship between AAC, vocabulary size and word mastery:

1. To what extent does conversational turn-taking predict the vocabulary size in children with developmental disabilities?

   Hypothesis: Increasing the amount of conversational turn-taking will predict increased vocabulary size in children with developmental disabilities.

2. Does the effect of total conversational turns vary based on AAC exposure when predicting vocabulary size after controlling for race and parent education?

   Hypothesis: The effect of conversational turn taking on vocabulary size will be more powerful in children who were exposed to AAC.

3. To what extent does conversational turn-taking and AAC exposure predict the word mastery in children with developmental disabilities?

   Hypothesis: Increases in conversational turn-taking and exposure to AAC will predict increased target word mastery in children with developmental disabilities.

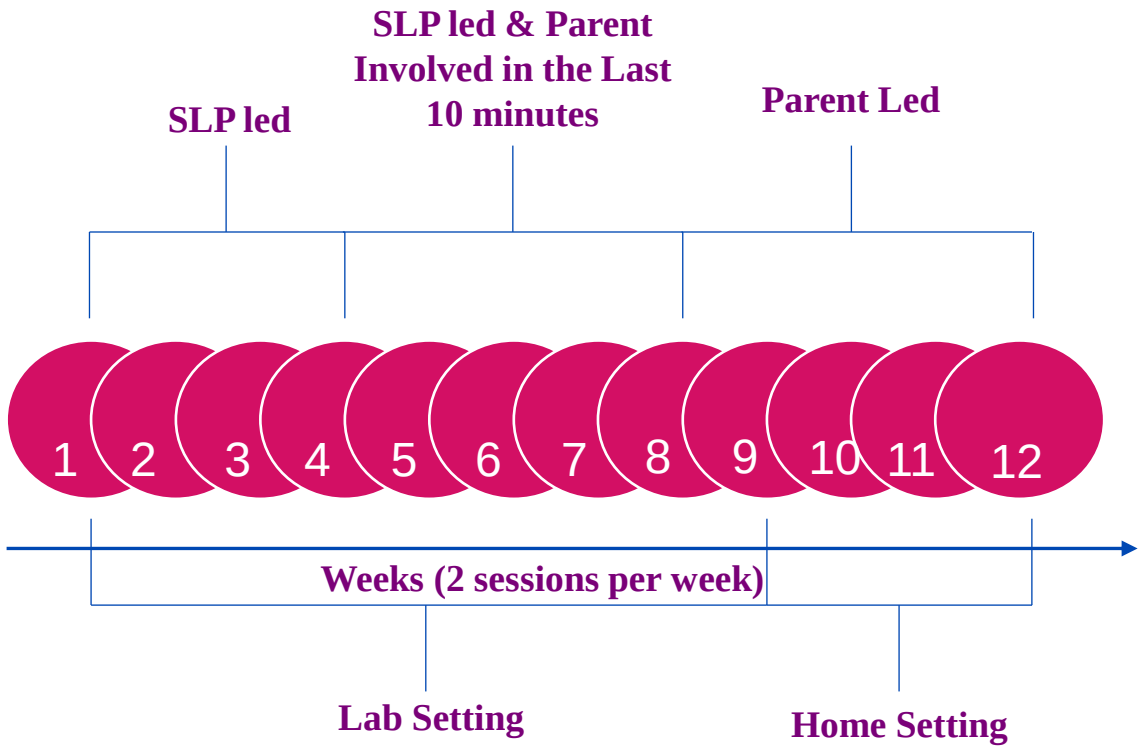
Variables

- **Total conversational turns***:* The total turns were taken by children and adults in the language sample.
- **Intervention groups**: AAC or Speech Only groups
- **Vocabulary size**: Combination of augmented and spoken words during session 24
- **Target Word Mastery**: The ratio of total target words to the unique occurrences of target vocabulary words during session 24

Archival Data (Romski et al., 2010)

Procedure

- These data were collected as part of a larger study about the effectiveness of a 24-session (12 week) language and communication intervention.
- Parent-child dyads were randomly assigned to either AAC-Input, AAC-Output, or a spoken communication (SC).
- The sessions consisted of three 10-minute activities (playing with blocks, book reading, and snack)
- Each child had an individualized list of target words categorized as unfamiliar to the child, motivating to learning, and useful during home routines.
- After the majority mastery of vocabulary items, additional terms were included.



Participants

62 parent-child dyads were recruited from 45 different sources in the metropolitan Atlanta area, such as pediatric offices and early intervention services

- Age ranging between 24-36 months (M= 29.60 months)
- Less than 10 spoken words, a score of fewer than 12 months on the Expressive Language Scale of the Mullen Scales of Early Learning
- Motor capabilities to use an SGD
- Excluded primary diagnosis of delayed speech and language impairment, deafness/hearing impairment, or autism.
- A range of diagnoses, including down syndromes, seizure disorders, cerebral palsy, or an unknown condition.

Materials

- *Mullen Scales of Early Learning* (MSEL) (Mullen, 1995): provided a MSEL composite score and preliminary scores on visual reception, fine motor skills, and receptive and expressive language.
- *The Sequenced Inventory of Communication Development* (Hendrick et al. 1984: quantified receptive and expressive language age in months.
- *MacArthur Communicative Development Inventories* (Fenson et al., 1993): evaluated the receptive and expressive vocabulary size.
- *Systematic Analysis of Language Transcripts* (SALT) (Miller & Chapman, 1985) program was used to transcribe and analyze all session transcripts.

Results

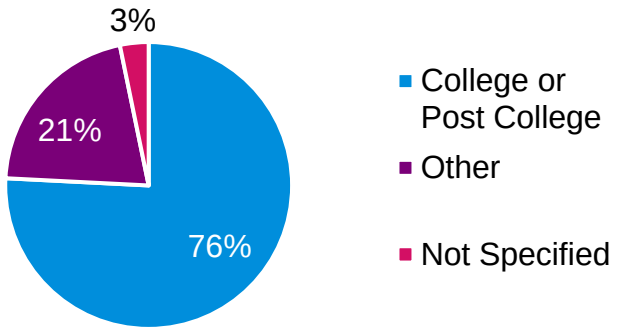
Descriptive Statistics

- Two participants were excluded from the analyses, because they did not specify their race or parent education.
- Total turns in session 24 were correlated with vocabulary size (r= .40, p<.01), but not vocabulary word mastery (r= .19, p>.05).

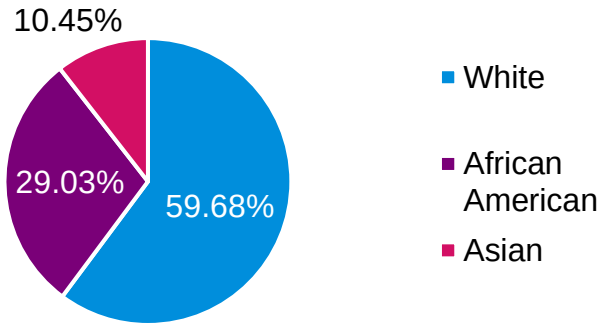
Table 1. Descriptive Statistics including mean, sample size, and standard deviation

	Intervention Group	
Variable	**SC**	**AAC**
N	21	41
Total Turns (24)	254.80 (169.00)	268.37 (139.13)
Vocabulary size	.76 (1.64)	14.10 (11.71)
Mastery	.05 (.10)	.65 (.31)
In parenthesis is the standard deviation.		

Parent Education



Race



***Per these findings, the parent education and race were used as covariates.**

Multivariate Analysis

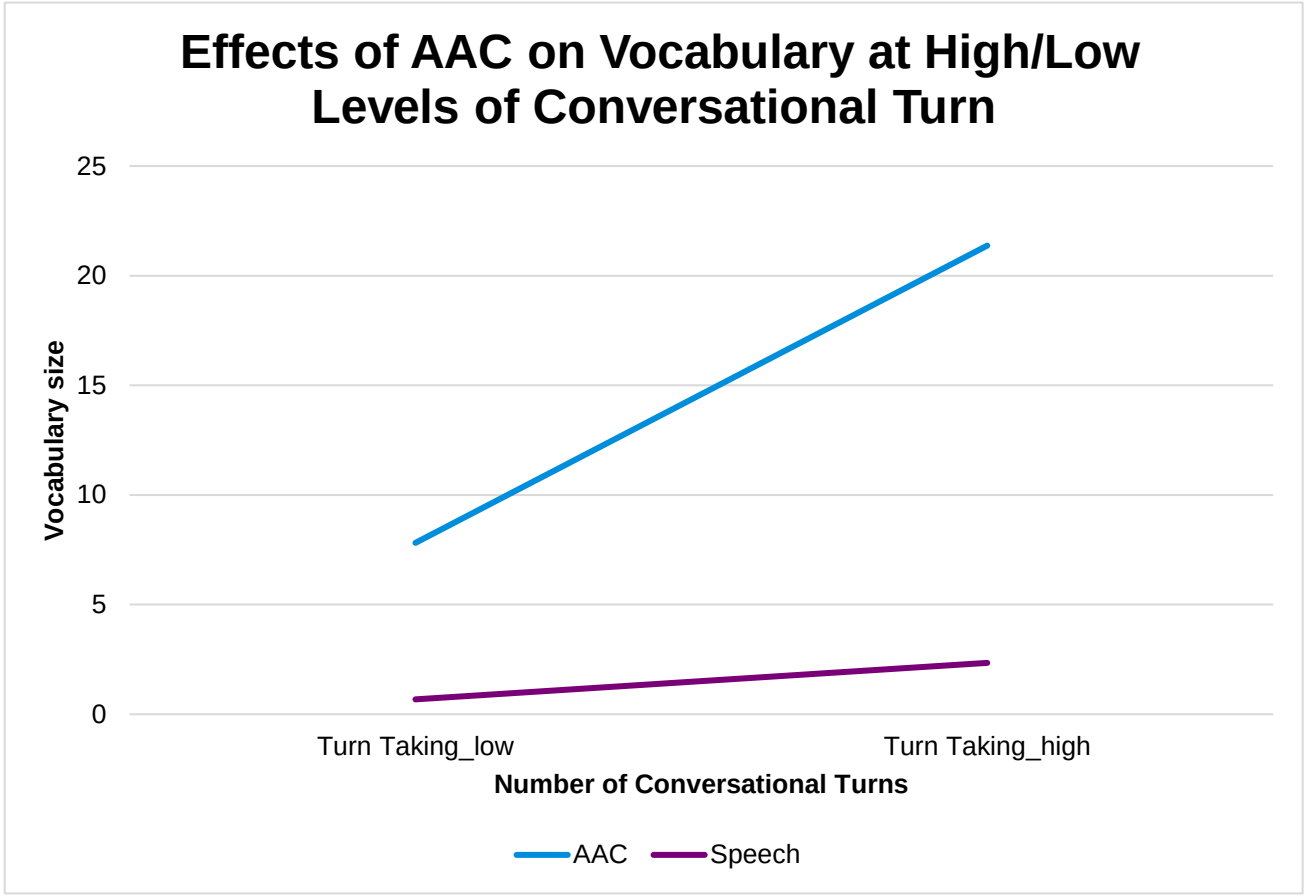
- Two multivariate linear regressions were conducted to evaluate the impact of conversational turns and AAC on vocabulary size and word mastery.
- In Model 1 indicates that there is an interaction between AAC exposure and conversational turns such that the increase in vocabulary size predicted by increased conversational turns is only present in children using AAC F(5,54) =11.36 p< 0.001, R^2= .51.
- Model 2 significantly predicted vocabulary word mastery in session 24, F(4,55)=20.507 p<0.001, R^2 = .60. However, AAC exposure is the only factor to significantly predict target word mastery. The ratio of mastered words in those who were exposed to AAC was .17 standard deviations higher than those in the speech only condition p<.001, η_p^2 = .54.

Predictor	Standardized Coefficient	Unique R^2	p
Model 1	*Vocabulary Size*	0.51	<.001
Race	-1.65 (2.23)	0.01	.46
Parent Education	1.99 (2.66)	0.01	.46
AAC	13.09 (2.34)***	0.28	<.001
Total Turns	.03 (0.01)***	0.17	<.001
AAC X Total Turns	.04 (.02)**	.06	.01
Model 2	*Word Mastery*	0.60	.01
Race	-.10	0.01	.26
Parent Education	.17	0.03	.05
AAC	.74***	0.54	<.001
Total Turns	.17	0.03	.05

In parenthesis is the standard error. ***p<.001, **p<.01, *p<.05.

The Interaction

- There is an interaction between AAC exposure and conversational turns such that the increase in vocabulary size predicted by increased conversational turns is only present in children using AAC F (5,54) =11.362 p< 0.001, R^2 = .51.
- In the AAC condition for everyone unit increase in total conversational turns vocabulary size increase by 0.05 words p<.001, unique R^2= 0.20.



Discussion

How does Augmentative and Alternative Communication and Conversational Turn-Taking Impact Vocabulary Size and Word Learning?

Implications

- These findings suggest that in addition to using AAC as a tool to learn words, an increase in conversational turns also predicts larger vocabulary size.
- By contrast, the findings also suggest that increasing conversational turns with children in speech only conditions did not impact vocabulary learning.
- One possible explanation of these results is that using AAC, which includes visual symbols, limits the strain on the brain and aids memory for the target vocabulary.
- The AAC device may permit children more chances to use a set list of words, which in turn facilitates development of the novel words meaning.

Limitations & Future Directions

- Causal claims cannot be made on the effect of conversational turns because the number of turns was not manipulated.
- Future analyses should manipulate the number of turns by encouraging a subset of parents to take more turns.
- These results cannot be generalized to all children with developmental disabilities as the inclusion criteria was highly specified.
- Replication studies should be conducted on more specific diagnoses to see the effects on each group.
- Future studies should assess what cues children with developmental disabilities attend to when anticipating a conversation turn.
- These findings have implications for the importance of conversational turns in future AAC interventions.

Discussion Questions

1. One outstanding challenge is how to recruit participants. Much of the work using AAC is catered toward those with developmental disabilities, and it is significantly harder to recruit from this population. Therefore, many of the sample sizes are quite low. How can we better recruit this niche population?
2. The second challenge is keeping these individuals within the study. AAC research studies benefit most when they are longitudinal to see the effect of the intervention (i.e., maintenance and generalization of communicative skills) over time. However, it is not surprising when participants drop out of studies, or we are unable to contact them for post-intervention testing. How can we sustain these connections with this population and keep them engaged with the interventions over time?
3. What might be other indicators of quality of input and out using AAC? Additionally, How may we incorporate these indicators in our research?

References

Dunn, J., & Brophy, M. (2005). Communication, relationships, and individual differences in children's understanding of mind. In Astington, J. & Baird, J. (Eds.), Why language matters for theory of mind. New York: Oxford University Press.

Ramírez, N. F., Lytle, S. R., & Kuhl, P. K. (2020). Parent coaching increases conversational turns and advances infant language development. Proceedings of the National Academy of Sciences, 117(7), 3484-3491. doi:10.1073/pnas.1921653117

Romski M, Sevcik RA, Adamson LB, Cheslock M, Smith A, Barker RM, & Bakeman R. (2010). Randomized comparison of augmented and nonaugmented language interventions for toddlers with developmental delays and their parents. Journal of Speech, Language & Hearing Research, 53(2), 350–364. https://doi.org/10.1044/1092-4388(2009/08-0156)

Gilkerson, J., Richards, J. A., Warren, S. F., Oller, D. K., Russo, R., & Vohr, B. (2018). Language experience in the second year of life and language outcomes in late childhood. Pediatrics, 142(4). doi:10.1542/peds.2017-4276

Wright, C. A., Kaiser, A. P., Reikowsky, D. I., & Roberts, M. Y. (2013). Effects of a naturalistic sign intervention on expressive language of toddlers with Down syndrome. Journal of Speech, Language, and Hearing Research, 56, 994 – 1008. doi:10.1044/1092-4388(2012/12-0060).

Yoder, P., & Stone, W. L. (2006). A randomized comparison of the effect of two prelinguistic communication interventions on the acquisition of spoken communication in preschoolers with ASD. Journal of Speech, Language, and Hearing Research, 49, 698 – 711. doi:10.1044/1092-4388(2006/051)

THANK YOU!

Syrina Merilan

Email:
smerilan1@gsu.edu