

## EFFECT OF A PARENT TRAINING ON VOCABULARY USE FOR BEGINNING COMMUNICATORS WITH AUTISM SPECTRUM DISORDER

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## Agenda

- Background and Research Questions
- Methods
  - Design
  - Participants and Setting
  - Materials
  - Procedures
  - Parent-child Interactions
  - Parent training
  - Measurement and Analysis
- Challenges and Questions

## Background

- Vocabulary knowledge is a critical competency to be developed in the "first words" stage of language acquisition
  - A large and diverse expressive vocabulary sets the stage for word combinations and, later, more complex syntax (e.g., Hohenberger & Peltzer-Karpf, 2009; Fenson et al., 1994)
- Responsive, child-focused interactions support early vocabulary development
  - Parents model language based on child's interests and focus of attention (e.g., Hoff & Naigles, 2002)
  - Children use words that parents model frequently (Goodman, Dale, & Li, 2008) and that pertain to objects, events, and actions that are particularly salient in the moment (Fenson et al., 1994)
  - Parents repeat and expand on child initiations to introduce new concepts (Masur & Olson, 2008)
  - Parent responsiveness predicts later child language outcomes (e.g., Tamis-LeMonda, Bornstein, & Baumwell, 2001)

## Background

- Challenges with vocabulary acquisition in ASD
  - 25-30% of children with ASD use little or no speech by the time they enter kindergarten (Kasari et al., 2014)
  - Without access to speech, they are unable to participate in naturalistic exchanges with parents that support early language learning
  - They are at significant risk for failure to develop an initial lexicon that is large and diverse enough to support further language development

## Background

- AAC can provide access to expressive language, facilitating participation and communication for children with ASD (e.g., Ganz, 2015; Light, McNaughton, & Caron, 2019)
- Traditional AAC systems have limitations that can impact vocabulary development (Light, et al., 2019; Caron, Light, & Drager, 2016)
  - Typically programmed in advance of an interaction
  - Contextually-relevant vocabulary may be lacking
  - Children are unable to access a sufficient number and variety of motivating, salient, contextually-relevant concepts within naturalistic interactions; they are at risk for difficulty developing an initial lexicon that is robust enough to support word combinations and further development

## Background

- Just-in-Time (JIT) programming can facilitate access to relevant vocabulary (Light, et al., 2019)
  - Allows for easy, on-the-spot addition of vocabulary
  - Provides access to relevant concepts in the moment they are needed
  - Allows children to participate and parents to respond

## Background

- Prior research on AAC systems with JIT programming
  - Novice adult programmers can **program faster** and **add more language concepts** using JIT vs. traditional systems (Caron, Light, Davidoff, & Drager, 2017; Caron, Light, & Drager, 2016; Light, Drager, & Currall, 2012)
  - JIT programming associated with **increased semantic diversity** and **increased frequency of communicative turns** for beginning communicators with CCN during interactions with researchers (Light et al., 2016; Holyfield et al., 2018; Drager et al., 2017)
  - Professionals are able to implement AAC with JIT programming given minimal training in interactions with children with typical development (Caron, Light, & Drager, 2016)

## Background

- Gaps in knowledge
  - Not known whether parents can implement AAC with JIT programming during naturalistic interactions with children with ASD
  - Impact of JIT programming on child language during parent-child interactions unknown

## Research Questions

- What is the effect of parent training in the use of an AAC app with JIT programming on the number of unique vocabulary concepts expressed by children with ASD during a naturally occurring activity?
- What is the effect of the training on the total number of vocabulary concepts expressed by the children?
- What is the effect of the training on parents' accuracy using responsive JIT programming strategies?
- What are the vocabulary concepts that parents choose to add using JIT programming?

## Design

- 2 (groups) x 3 (measurement times) switching replications experimental group design (Cook, Campbell, & Peracchio, 1990; Edmonds & Kennedy, 2016)
  - Investigation of treatment effects
  - Replication
  - Assessment of maintenance

Group	Time 1		Time 2		Time 3
1	Interaction (pre)	Training	Interaction (post)		Interaction (maintenance)
2	Interaction (pre)		Interaction (pre)	Training	Interaction (post)

## Variables

- IV: AAC app with JIT programming and parent training
- Primary DV:
  - number of unique vocabulary concepts expressed by the children with ASD during a 10-min interaction
- Collateral DVs
  - total number of vocabulary concepts expressed by the children during interactions
  - parents' accuracy in implementing the JIT programming strategy
  - nature of the language concepts that parents add to AAC systems

## Participants and Setting

- Participants
  - Children age 3-6 years with moderate-severe ASD
  - Language abilities in the first words stage of language development\*
  - Parents
  - Dyads will be matched according to child language abilities\* and randomly assigned to groups
- Setting
  - Participants' homes
  - Storybook reading activity
  - Quiet location identified by parents as appropriate for reading

## Materials

- Pre-test interactions
  - *Storybooks appropriate for beginning communicators* (Justice & Kaderavek, 2002; Justice & Pullen, 2003)
    - few words per page
    - large, bold print
    - illustrations that are large and engaging
    - language and storylines appropriate for beginning communicators
    - include redundant print (some words appear repeatedly within the text)
  - *Child's existing AAC system*

## Materials

- Post-test interactions
  - *Same books used in pre-test interactions*
  - *iPad with GoVisual™ app to support JIT programming*

## Procedures: Book Reading Interactions

- Pre-test interactions
  - *Parents and children read together as they normally would for 10 min*
  - *The child's AAC system is available*
  - *No instructions or prompting are provided*
- Post-test interactions
  - *Procedures remain the same except that the GoVisual app with JIT programming is available*

## Procedures: Parent Training

- Parents will be taught to add and vocabulary to an AAC app in response to their children's interests using a responsive JIT programming strategy
- Strategy Steps (adapted from Caron et al., 2016)
  - 1) *Take a photo*
  - 2) *Add a hotspot based on child interests/focus of attention*
  - 3) *Record appropriate vocabulary*
  - 4) *Model vocabulary*
  - 5) *Wait and allow the child a chance to communicate*

## Procedures: Parent Training

- Training in use of the JIT programming strategy will follow evidence-based practices for AAC communication partner training (Kent-Walsh, Murza, Malani, and Binger, 2015)
  - Description of the strategy by the researcher
  - Demonstration of the strategy using video models
  - Guided practice and feedback
  - Independent practice and feedback
- Training will continue until parents are able to demonstrate use of strategy with 90% accuracy during interactions with the researcher

## Measurement

- **Number of unique concepts** will be determined by calculating the total number of different words produced by children during each interaction, according to the rules for counting number of words as outlined by Miller (1981).
- The **total number of concepts** will be determined by counting all of the words used by children during each storybook reading interaction, according to the rules for counting words as outlined by Miller (1981).
- A scoring rubric outlining the steps of the responsive programming and language modeling strategy (see above) will be used to code **accuracy of strategy use** by determining the number of steps completed correctly by parents
- **Words programmed by the parents** will be categorized according to the semantic-syntactic categories outlined on the MCDI (Fenson et al., 2007).
  - These categories encompass the word types used by children who are in the first words stage of language development.
  - Use of these categories will allow examination of the extent to which parent-selected vocabulary for AAC technology for their children with early language skills aligns with the types of words commonly produced by young children who are in the early stages of expressive language development.

## Analysis

- Primary DV:
  - a **planned independent sample t-test** will be used to compare gains in the number of unique vocabulary concepts expressed by the children from Time 1 to Time 2 (Time 2-Time 1) for **group 1** (that completed the training) to **group 2** (that did not yet complete the training).
  - A **paired sample t-test** will be used to compare gains in the number of unique vocabulary concepts expressed by the children for **group 2** from Time 1 to Time 2 (Time 2-Time 1) to the gains in the number of unique vocabulary concepts from Time 2 to Time 3 (Time 3-Time 2)
  - In order to assess **maintenance** of the intervention effect, a **paired sample t-test** will be used to compare gains in the number of unique vocabulary concepts expressed by the children for **group 1** from Time 1 to Time 2 (Time 2-Time 1) to the gains in the number of unique vocabulary concepts from Time 2 to Time 3 (Time 3-Time 2)

## Analysis

- Collateral DVs
  - To determine the effect of the training on the total number of vocabulary concepts used by the children, similar t-tests will be conducted to compare gain in total number of concepts expressed by the children from pre-test to post-test for both groups
  - Parent implementation of the JIT programming and modeling strategy - ?
  - Nature of concepts added to AAC systems by parents - ?

## Research Challenges and Questions

- Participants
  - Include just children in the "first words" stage? (Tager-Flusberg et al. 2009)
    - Intentional/Presymbolic: <17 words used by boys, <26 words used by girls
    - **First words:** 17-252 words produced by boys, 26-346 words used by girls
    - Word combinations: 252-520 words produced by boys, 346-582 words used by girls
- Characterizing child language abilities
  - Is it necessary to collect a natural language sample in addition to the MCDI?
    - Context?
    - Procedures?
  - Is it possible/desirable to adapt the Tager-Flusberg et al. benchmarks for spoken language development in ASD to include aided communication, if the child uses it? Should I do this?

Table 1. Expressive language benchmarks for children with ASD.

Lang. phase	Lang. domain	Measure(s)	Variables	Range in typical development	Examples	Minimum criteria
First Words 12-18 months	Phonology	NLS	CV combinations	CV-CVC	Hi, Mommy	CV
		NLS	Consonant inventory	2-8 different consonants	m, b, y, n, w, d, p, h (Early 8)	4 consonants
	Vocabulary	NLS	# different words used referentially in 20 min	2-15 words	Mom, bubble, go, open, ball	3 types and 20 tokens
		Parent report	# different word roots	(range for 13-18 months)	MCDI	AE for 15 months
	Direct assessment	Confrontation naming	(range for 13-18 months)	Mullen; Reynell	AE for 15 months	
Pragmatics	NLS	# different communicative functions	2-5 functions	Comments, request	Comments + 1 other	
Word Combinations 18-30 months	Phonology	NLS	# communication functions	(range for 13-18 months)	CSBS	AE for 15 months
		NLS	CV combinations	CV-CCVC	Go, drink	Classed syllables
	Vocabulary	NLS	Word structures	1- to 3-syllable words		CVC and 2-syllable words
		Parent report	% fully intelligible	40%-80%		50% intelligible
	Direct assessment	# consonants	8-18 consonants	Early 8 + t, ng, k, g, f, w, dh, }	10 consonants	
	Grammar	NLS	# different words used referentially in 20 min	10-50 words		30 words
		Parent report	# different words	(range for 21-27 months)	MCDI; LDS	24-month AE
	Direct assessment	Confrontation naming	(see report)	21-27 months	EOWPVT-R	24-month AE
	Pragmatics	NLS	MLU	MLU: 1.1-2.4 (in morphemes)		MLU = 1.8
		Parent report	Mean length in words of 3 longest utterances	(range for 21-27 months; on MCDI: 2.6-5.5)	MCDI	MCDI: 3.8
Direct assessment		# different communicative functions	3-6 functions	See article text	24-month AE	
Parent report		Proportional use of JA + Social/Total Comm acts	3-7	Comments, request; turn-taking	Comments, request; turn-taking	
Pragmatics	NLS	Conversational functions	Responds and initiates	Answers/asks question	2 initiations + 2 responses	
	Parent report	Inventory of child's communicative use	21-27 months (age range)	UII	24-month AE	

Tager-Flusberg et al., 2009

## Research Challenges and Questions

- Matching for participant dyads
  - Based on number of words produced?
  - Other options?

## Research Challenges and Questions

- Pre-test interactions
  - Child's existing AAC system will be available - what if the child does not have an existing AAC system?
    - Provide something? What?
    - Provide nothing?
- Post-test interactions
  - Parents will take a picture of book pages "on the spot" using the tablet
    - Logistical challenges with managing both the book and the tablet? E.g., keeping the book open to the correct page while programming

## Research Challenges and Questions

- Timing of the parent training – when should it be administered?
  - Immediately following the pre-test, then there is a break between training and the post-test visit?
  - Immediately before the post-test, during the same visit?
  - Introduce following pre-test, they have a week for self-paced training, they demonstrate proficiency during post-test visit (and address questions) followed by actual post-test?
    - Would I need to also quantify engagement with the training? How?
    - I do not have enough tablets to leave them with the families

## Research Challenges and Questions

- Parent training procedures
  - How much coaching should I provide as to the types of hotspots/words that should be added?
- Steps of the responsive JIT programming and modeling intervention
  - Should the final step include expansion of the child's utterance, or is this unnecessary?
  - If not included, would it be worthwhile to do a post-hoc analysis to see whether parents do this naturally?

## Research Challenges and Questions

- Analysis
  - Parent implementation of the JIT programming strategy based on scoring rubric
  - Types of concepts added by parents

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