



The Effects of Voice Output on Spontaneous Social Spoken Communication in Minimally Verbal Children with ASD



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Introduction

- 30% of children with autism spectrum disorders (ASD) continue to be minimally verbal after age 5 (Anderson, 2007)
- Language in and intervention practices for minimally-verbal children with ASD are poorly understood (Kasari & Target-Flusberg, 2013)
- Joint Attention, Structured Play, Engagement and Regulation (JASPER) is an evidence based intervention targeting joint attention, spontaneous play and emotional regulation in young children with autism (Kasari, Freeman, & Paparella, 2006).
- Enhanced Milieu Teaching (EMT) is a naturalistic language intervention with over 20 years of research to support its effectiveness for children with autism and other developmental disabilities (Kaiser & Roberts, 2013)
- The development of an innovative naturalistic intervention combining these two interventions was examined in a randomized trial (Kasari et al., 2014).
- The addition of a voice-output augmentative and alternative communication (AAC) system to determine if this augmentative mode could increase expressive language for children that are minimally verbal.
- It has been suggested that AAC digital models may increase spoken language because of the consistency of the model (Ronski & Sevcik, 1996).

Research Questions

- Is JASP-EMT with AAC use effective for improving spoken and AAC social communication during individual intervention sessions?
 - Hypothesis: Adult AAC use will predict child AAC use and spoken language within intervention sessions.
- Does adult AAC modeling have an immediate effect on child's spoken communication?
 - Hypothesis: Adult AAC models will result in more frequent child spoken language than adult spoken language models alone.

Method

Study 1

- 15 minimally verbal children with autism
 - 5-8 years old
 - Kasari et al. JASP-EMT RCT (2014).
- Session data that included adult models on AAC device
 - 20% of AAC intervention sessions
 - 236 total transcripts
- Intervention
 - Two 45-minute clinic sessions per week, totaled 48-56 sessions
 - Teach, Model, Coach, and Review procedures used each week to teach parents specific strategies for teaching language
 - Direct intervention from an EMT therapist each session

Study 2

- A sequential analysis was used with event recorded transcripts from 20% of AAC intervention sessions
- 118 transcripts were included (this smaller sample is due to low rates of behaviors and could not estimate Yule's Q)

Procedures and Measures

- Session data were transcribed and coded for outcome language variables and therapist strategies
- Sequential relationships were coded and compared between conditions (AAC or spoken)

	Child speech			Child speech	
Adult AAC	+	-	Adult Speech (No AAC)	+	-
	A	B		A	B
	-	C		-	D

Measure	Adult session level variable
T-NDW	Adult use of number of different words
T-AAC	Adult AAC models
Expansions	Repeating the child and adding 1-2 words
T-MLU	Therapist mean length of utterance
MT	Adult matched turns to child utterances
Child session and language sample variables	
NDW	Child use of number of different words
S-SCU	Child social communicative spoken utterances
SCU	Child social communicative utterances
Child pre-assessment variables	
PPVT	Receptive language

Results

Study 1 Results

- A multi-level model estimation was used to account for nested session data within participants
- Build up model selection procedure was used in the 2-level model estimation (Sniders & Bosker, 2012)
- Level 1: Session level variables
- Prior session performance to account for auto-correlation

	B	SE	p
Intercept	-17.821	5.147	.003
T-NDW	.235	.031	.000
Expansions	.401	.052	.000
SGD model	-.008	.049	.866
PPVT	.279	.088	.006

- All predictors were estimated as fixed due to small sample
- The following variables were explored but removed from the final model due to low significance and poor model fit: prior session performance, cognition, and matched turns
- The final model demonstrated improved model fit over the null model:
 - Final model AIC: 883.995
 - Null model AIC: 1004.251
- Residual estimate: 26.702 (SE=3.58, p=0.000)
- Intercept variance estimate: 13.250 (SE=6.930, p=.056)

Study 2 Results

- Yule's Q estimates were calculated for each transcript: $Yule's\ Q = (AD-BC)/(AD+BC)$
- A t-test was used to test the differences between the AAC models and spoken model conditions
- Spoken model's demonstrated a "moderate effect" (Rosenthal, 1994)

	AAC	Spoken
Mean	.1326	.4662
SD	.3535	.2927
t		-7.8615
df		224.197
p		.000

Discussion

- Controlling for receptive language ability, AAC models did not prove to be a predictor of child language diversity during intervention sessions
- Effectiveness of the strategy might be less immediate and more cumulative over time (Given Kasari et al., 2014 results)
- EMT strategy of expanding and adult diversity of language are important predictors of a child's immediate language use
- Sequential analysis results also indicate that adult spoken models are more powerful than AAC models in the *short-term*
- Limitations: This study looks at session level summary variables, which does not consider long term benefits of an AAC intervention
- An important implication for practice is the importance of using expansions with minimally-verbal children with ASD

Conclusion

- SGD models do not appear to have an immediate effect on language diversity in minimally verbal children with ASD
- SGD use in intervention sessions may have a more cumulative effect rather than an immediate effect
- Expansions and language diversity are important strategies for immediately improving child communication
- Differential results should be examined for children who cannot imitate speech

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