

**Grammatical Roundup:**  
Teaching Children to Produce Novel Multi-Symbol Questions & Statements in a Play Context

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**Overview & Acknowledgements**

- Presentation Overview
  - Background
  - Method
  - Results
  - Discussion / Clinical Implications
- Acknowledgements
  - This study is:
    - Funded by a Clinical Research Grant from the American Speech-Language-Hearing Foundation
    - Part of a larger line of research, including a closely related study which is currently underway at the University of New Mexico (Binger) and funded by National Institute on Deafness and Other Communication Disorders, NIH

**Defining the Problem**

Language-learning expectations often are set too low for children who require AAC

Acquisition of generative, rule-based language is just as important for children who use AAC as for speaking children

Many young children with AAC needs have profiles that indicate the potential to use generative language

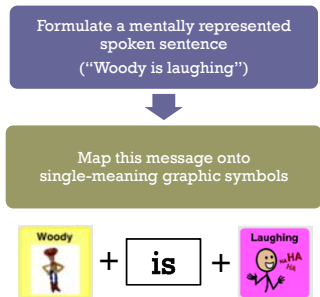
Even these children frequently have poor expressive language outcomes (Binger & Light, 2008)

**How Children Learn to use Graphic Symbols for Communication: The Translation Hypothesis**

Formulate a mentally represented spoken sentence ("Woody is laughing")

Map this message onto single-meaning graphic symbols

Woody + is + Laughing



**Can We Teach Young Children to Map Messages onto Graphic Symbols?**


- This task is neither intuitive nor transparent
  - Even young typically-developing children make lots of errors (Sutton et al., 2010)
- But some young children who require AAC rapidly learn to create message combinations (Binger, Kent-Walsh, et al., 2008; 2010; Binger & Light, 2007; Kent-Walsh et al., 2010)

**The Burning Question**

Can we efficiently and effectively *teach* children to map rule-based linguistic structures using graphic symbols?

Or

Are the meta-linguistic demands too high?



### + Aims

Evaluate Impact of Aided AAC Modeling Intervention on:

**Aim 1**

Productive Use of "To be" Declaratives & "Yes-No" Questions (focus of intervention)

*\*WOODY IS LAUGHING  
\*IS WOODY LAUGHING?*

**Aim 2**

Generalized Productive Use of Simple Declaratives & "Yes-No" Questions Containing Copulas (related structure)

*\*WOODY IS HAPPY & IS WOODY HAPPY?*

**Aim 3**

Generalized Productive Use of S-V-O Declaratives with Reversible Verbs (unrelated structure)

*\*WOODY IS PUSHING HULLSEYE  
\*HULLSEYE IS PUSHING WOODY*

### + Intervention Approach

**Intervention techniques**

- Contrastive targets
- Aided AAC models

**Intervention highlights**

- The necessity of producing each word in a sentence
- The importance of word order

### + Method – Research Design

Single Subject Experimental Study

Multiple Probe Across Subjects

**Preliminary Results**  
 • Detailed Findings for 1 Participant

### + Method – Participation Criteria

- Participants meet the following criteria:
  - 4 – 6 years of age with motor speech impairment
  - less than 50% comprehensible speech on "No Context" Condition of Dowden's (1997) *Index of Augmented Speech Comprehensibility in Children*
  - Previous AAC app use (via iPad) & evidence of grammatically incorrect productions.
  - Expressive Vocabulary of at least 50 words.
  - Hearing/Vision/Fine Motor Skills (corrected) within normal limits.
  - Demonstrated comprehension of targeted structures (assessment procedures adapted from Miller & Paul, 1995)
  - Raw Score >6 on Elaborated Sentences and Phrases subtest of TACL-3 (equivalent to 16th percentile/standard score of 7 for a child aged 3;0)

### + Method - Participants

4;10 Year Old Male with Developmental Apraxia of Speech		
Description/Test	Subtest	Standard Score
PPVT-4 Score		SS 113 (81%ile)
TACL-3 Score	Vocabulary	SS 11 (65%ile)
	Grammatical Morphemes	SS 11 (65%ile)
	Elaborated Phrases & Sentences	SS 11 (65%ile)
	Quotient	SS 11 (65%ile)
I-ABCC	No Context Condition	38% Intelligible
	Semantic Context Condition	61% Intelligible
AAC Use		Various AAC apps trained; Protocols2Go selected – 6 Months
6;02 Year Old Female with Down syndrome		
4;09 Year Old Male with Developmental Apraxia of Speech & Unidentified Developmental Delay		

### + Intervention (Play ☺) Material Examples

## + Method – Intervention Sessions

- Length**
  - Minimum 25 minutes in length
  - Range 26 – 29 min
- Aided AAC Modeling**
  - Minimum 20 aided models of Dep Var 1 & Dep Var 2
  - Range 26 – 35 models
- Child Productions**
  - Elicitation of minimum of 10 participant attempts to produce structures for Dep Var 1 & Dep Var 2

## + Proloquo2Go Display: Intervention

Mickey Mouse Clubhouse Characters

## + Results – Dependent Measures

- **Probes**
  - **Productions Relating to the Focus of the Intervention**
    - Dep Var 1 - Productions of Simple Auxiliary 'to be' Declaratives
    - Dep Var 2 - Productions of Yes-No Questions
  - **Productions of Related Grammatical Structures**
    - Gen Var 1 - Productions of Simple Auxiliary 'to be' Declaratives Containing Copulas
    - Gen Var 2 - Productions of Yes-No Questions containing Copulas
  - **Productions of Unrelated Grammatical Structures**
    - Gen Var 3 - Productions of S-V-O Declaratives with Reversible Verbs

## + Dependent Variables 1 & 2 Stimulus Examples

## + Proloquo2Go Display: Probes

Toy Story Characters

## + Generalization Variables 1 & 2 Stimulus Examples

**Dependent Variables 1 & 2  
Stimulus Examples**

Buzz is pulling Bullseye.

Bullseye is pushing Buzz.

**Results**

- **Summary of Findings**
  - **Productions Relating to the Focus of the Intervention**
    - Dep Var 1 - Mastery
    - Dep Var 2 - Mastery
  - **Productions of Related Grammatical Structures**
    - Gen Var 1 - Generalized
    - Gen Var 2 - Generalized
  - **Productions of Unrelated Grammatical Structures**
    - Gen Var 3 - Generalized

**Discussion:  
Predictions Relating to Ongoing Findings**

- (#1) Those with relatively strong receptive language skills should master the linguistic structures taught
- (#2) They may produce all sentence elements within highly related linguistic structures
- (#3) Some may generalize to unrelated structures

**Discussion:  
Theoretical Implications &  
Future Directions**

- Teaching children to map rule-based linguistic structures using graphic symbols
  - The child presented today from this study evidenced clear and consistent signs of mastery
  - Need replication with additional participants following completion of this study
- We are just starting to look at additional linguistic structures
  - E.g., Rowe et al., 2012
  - NIDCD-Funded Study - Aims are similar to the current study
  - To be continued....

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