Teaching Prelinguistic Communication Skills to Nonverbal School-Age Children With Autism

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What is Prelinguistic Communication?

• Non-verbal means of communication
  • Gestures, vocalizations, eye-gaze, expressions
• Develops prior to linguistic communication
• Meaningful and purposeful, yet not a symbolic system (language)
• Typical development around 9-15 months
Why should we teach prelinguistic communication?

• Prelinguistic communication establishes the foundation for language development.
• Prelinguistic communication fosters social and emotional development.
• Use of prelinguistic means of communication, such as eyegaze and gestures persists into advanced symbolic language.
Who should be taught prelinguistic communication means?

- Children who are developmentally at the 9-15 month language level

- This group might include preschool-aged children with developmental delays and school-aged children with more severe communication deficits.
How can we teach prelinguistic communication?

- Hanen Intervention
  Girolametto, 1988

- Picture Exchange Communication (PECS)
  Bondy & Frost, 1994

- Communication Repair
  Brady, McLean, McLean, & Lee, 1995

- Functional Communication Training (FCT)
  Carr & Durand, 1985

- Prelinguistic Milieu Teaching (PMT)
  Yoder & Warren, 1998
Prelinguistic Milieu Teaching (PMT; Yoder & Warren, 1998)

- Established research database with very young children (ages 2-5) with developmental delays in expressive and receptive language

- Theoretical basis is the transactional theory (Sameroff, 1975)

- Target early intentional communication in the form of gesture, eye-gaze, & vocalizations
Intervention Principles

• Create an enabling context
  • Arrange environment
  • Follow child’s attentional lead
  • Build social routines

• Teaching Episodes
  • Prompts
  • Models
  • Natural consequences
## Intervention Procedures

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Technique</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Prompts</strong></td>
<td><strong>Physical cue</strong></td>
<td>Adult moves the child’s hand to form a gesture, such as a point, to request a toy out of reach.</td>
</tr>
<tr>
<td></td>
<td><strong>Verbal cue</strong></td>
<td>Adult asks, “What do you want?”</td>
</tr>
<tr>
<td></td>
<td><strong>Gestural cue</strong></td>
<td>Adult opens and raises hands quizzically when the child attends to a toy nearby.</td>
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<tr>
<td></td>
<td><strong>Time delay</strong></td>
<td>Adult waits expectantly for the child to make eye-contact after a series of tosses into the air.</td>
</tr>
<tr>
<td><strong>Models</strong></td>
<td><strong>Gesture model</strong></td>
<td>Adult models a point to a bottle of bubbles on a shelf.</td>
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<tr>
<td></td>
<td><strong>Vocal model</strong></td>
<td>Adult models the sound “m” while waving a blanket over the child’s head.</td>
</tr>
<tr>
<td><strong>Natural Consequences</strong></td>
<td><strong>Compliance</strong></td>
<td>Adult delivers a cup that the child indicated by pointing to it.</td>
</tr>
<tr>
<td></td>
<td><strong>Imitation</strong></td>
<td>Adult immediately echoes the sound “b” that the child made during vocal play.</td>
</tr>
<tr>
<td></td>
<td><strong>Recast</strong></td>
<td>Adult says “ball” when the child points to it.</td>
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</tbody>
</table>
PMT-Ultimate Goal

• The ultimate goal of PMT:

Frequent and Clear Communication

“Intentional Communication Acts”

(Warren et al., 2006)
PMT Intervention Goals

1. Develop social routines
2. Increase vocalizations
3. Increase eye gaze
4. Increase gestures
5. Combine components of communication
PMT-Possible Goals

• Many other goals to consider increasing:
  • Requesting
  • Commenting
  • Eye contact
  • Gestures
  • Turn taking
  • Vocal Imitation
  • Motor Imitation
  • Sound repertoire
Summary of Literature-PMT

- 12 studies, N= 1-58, mean of 35
- Age= 18-60 months in age, 80% under age 32 months.
- Down syndrome, prematurity, failure to thrive, autism spectrum disorders, cerebral palsy, Angelman’s syndrome, Fragile X, and fetal alcohol syndrome, frequently unspecified
- 3 single subject designs and 9 randomized group design, 5 group designs compared PMT to another intervention, such as PECS (Bondy & Frost, 1994) or RSG (Wilcox, 1992)
Studies support PMT for teaching:

- *turn-taking* to young children, ages 3-5, with autism who have at least some joint attention skills and parents with higher education levels (Yoder & Stone, 2006a, 2006b).

- *intentional communication acts* to young children, ages 3-5, with Down syndrome who have parents with high levels of responsivity (Fey et al., 2006).

- *turn-taking, requesting, and commenting* to young children, ages 1-3, with Down syndrome or developmental delay (Warren et al., 1993, 1994)
Summary of Current Study

**Purpose:** to investigate the effects of Prelinguistic Milieu Teaching (PMT)
- school-age children
- severe autism diagnosis
- functioning at a pre-linguistic level

**Hypothesis:** implementation of PMT will result in increases in *frequency*, *clarity*, and *maintenance* of communication exchanges.
Rationale for the Study

1. Prelinguistic communication provides the foundation for the development of future linguistic communication

2. Prelinguistic communication provides a consistent and clear means of communication and intent

3. No studies investigating the use of PMT with older, more severely impaired children
Research Questions

1. What is the effect of PMT on the frequency of the child’s communication?
   measurement: rate of child-initiated communication acts

2. What is the effect of PMT on the clarity of child’s communication
   measurement: consistency of use of combined means of communication

3. What is the effect of PMT on the maintenance of child-adult interactions within an activity?
   measurement: number of child communication turns
<table>
<thead>
<tr>
<th>Child</th>
<th>Age</th>
<th>Ethnicity</th>
<th>Language Level</th>
<th>CARS score</th>
<th>Communication Means</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adam</td>
<td>5;9</td>
<td>Asian-American</td>
<td>9 months</td>
<td>40</td>
<td>Hand leading, sounds or parts of words</td>
</tr>
<tr>
<td>Cody</td>
<td>5;4</td>
<td>Hispanic, monolingual</td>
<td>7-12 months</td>
<td>38</td>
<td>Hand leading, manual signs, sounds</td>
</tr>
<tr>
<td>Ben</td>
<td>5;1</td>
<td>Hispanic, bilingual</td>
<td>5-6 months</td>
<td>46</td>
<td>Pulling/hand leading</td>
</tr>
<tr>
<td>Sam</td>
<td>7;5</td>
<td>White, non-Hispanic</td>
<td>8 months</td>
<td>40</td>
<td>Pulling/hand leading or handing items to adult</td>
</tr>
<tr>
<td>Lily</td>
<td>7;6</td>
<td>Asian-American</td>
<td>8 months</td>
<td>49</td>
<td>Pulling/hand leading</td>
</tr>
<tr>
<td>Chad</td>
<td>8;3</td>
<td>White, Pacific-</td>
<td>5-6 months</td>
<td>48</td>
<td>Handing leading or handing</td>
</tr>
</tbody>
</table>
Study Design

• **Assessment**
  • Parent interview, Communication sample, REEL-3, CARS

• **Baseline**
  • Natural interactions, 30-minutes, 1-2 times per week
  • 3-10 sessions

• **Intervention (PMT)**
  • 30-minutes, 1-2 times per week
  • 15 sessions

• **Follow-up**
  • 1 month after intervention phase ended
  • PMT; 30-minutes, 1 per week
  • 2-3 sessions
Data Collection

• All sessions were
  • Implemented by 1st author
  • Conducted in each child’s home
  • Video-taped
Video Examples

- Baseline Session compared to Intervention Session
Coding

- **Maintenance**: Number of turns within each activity or routine. Calculated average for session.

- **Frequency**: Rate of child-initiated communication per session.

- **Clarity**: Number of unprompted means (gesture, vocalization, or eye gaze) combined during each communication attempt. Calculated in terms of total number of attempts using 1, 2, or 3 means per session.
Data Analysis

• Multiple baseline across participants
• Visual analysis for trend and level changes
• Separate analysis for each dependent variable
  • Maintenance
  • Frequency
  • Clarity
• Additional analysis
  • Reliability
  • Fidelity
  • Social Validity
Results - Maintenance

Significant increase in all participants

Adam, Sam & Cody demonstrated much steeper upward trends
- Significant increase in all participants
- Adam, Sam & Cody demonstrated twice the increase compared to others.
Results - Clarity

- Adam, Sam, & Cody combined all 3 means consistently
- Lily, Chad, & Ben increased in combined 2-3 means, but were less consistent
Overall Findings

• All participants made significant gains in all three areas of prelinguistic communication

• Cody, Adam, and Sam made almost twice the progress as the other three participants

• The best three responders (Cody, Adam, Sam) showed the most positive response to PMT intervention across all three variables.
Individual Variables

- Characteristics of best performers:
  - Lower autistic severity ratings
  - Higher developmental language ages
  - High rates of toy play or approach behaviors

- Characteristics that did not differentiate among children:
  - Chronological age
  - Parent responsivity
Discussion

• Adam, Cody, and Sam
  • May be following a more “typical” order of delayed development
  • Prelinguistic communication skills develop simultaneously and lead to future linguistic forms of communication.

• Lily, Chad, and Ben
  • May be following a more “disordered” developmental path
  • Their goal would be to develop a more consistent and clear form of communication.
Limitations

- Implementation with only a small number of participants.
- Conducted only in the child’s home precluding evaluation of generalization
  - Across settings
  - Across communication partners.
Future Research

• More participants
• Broader age ranges
• Diversity of cultural groups
• Varied study designs,
  • Include studies with calculation of effect size.
• Generalization of communication skills
  • Across settings
  • Across communicative partners.
Conclusions

• PMT was an appropriate intervention for increasing frequency, clarity, and maintenance of communication in 5-8 year old children with autism who remained nonverbal into their early school-age years.

• All participants made significant gains during intervention.

• Variations in the overall trends and levels of increases across participants may be due to individual differences.