How Does the ProxTalker Speech-Generating Device Compare to PECS?

Implications for selecting Augmentative & Alternative Communication (AAC) strategies

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Today’s Agenda

• Brief Overview of PECS and SGDs
• Purpose of the Study
• Methods
• Video Examples
• Results
• Conclusion
• Problem Behaviors Encountered
• Study Limitations
• Future Research Directions
• Q & A

Autism

• Hallmark characteristics:
  – delay in, or total lack of the development of spoken language
  – restricted repetitive, & stereotyped patterns of behavior, interests, & activities
  – impairments of social interactions (DSM-IV-TR, 2000)
• 1 in 88 children are diagnosed with ASD (CDC, 2012)
• Autism prototype – about 50% have limited or no functional speech (Charlop & Haymes, 1994; Peeters & Gillberg, 1999)
The Picture Exchange Communication System (PECS)

- Structured behavioral intervention program to teach use of visual-graphic symbols for communication
- 6-phase exchanged-based graphic symbol strategy:
  - initially teaches to make requests by handing/exchanging symbols for desired items
  - later targets more spontaneous communicative acts
  (Bondy & Frost, 1994)

PECS (cont.)

- Primarily for learners with autism who have little or nor functional speech
- It requires very few prerequisites
  - only prerequisite is that the individual can clearly indicate what he or she wants
Speech-Generating Devices (SGDs)

• Portable, computerized devices producing synthetic/digitized speech output when activated
• Graphic symbols are used to represent messages, activated by selecting a symbol from the display via:
  – Finger
  – Switch
  – headstick, etc.

SGDs (cont.)

• Advantages over non-electronic systems due to providing additional auditory stimuli for the learner via speech output:
  – SGD may allow more independent form of communication (voice output understood by variety of familiar and unfamiliar comm. partners)
M. Boesch, 4th Annual Adventures in Autism Conference

Research Questions

• Can you start directly teaching the ProxTalker (or similar SGD) within a modified PECS protocol?
• What is the relative effectiveness of PECS vs. ProxTalker in increasing:
  – requesting (primary measure)
  – social-communicative behavior
  – natural speech production

<table>
<thead>
<tr>
<th>Participant</th>
<th>Age</th>
<th>Gender</th>
<th>DX</th>
<th>Communication Skills</th>
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</thead>
<tbody>
<tr>
<td>Christian</td>
<td>6</td>
<td>male</td>
<td>severe autism</td>
<td>very limited speech (less than 5 word approximations); some picture symbol exposure; few gestures</td>
</tr>
<tr>
<td>Nadia</td>
<td>7</td>
<td>female</td>
<td>severe autism</td>
<td>nonverbal; some picture symbol exposure; some gestures</td>
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<tr>
<td>Zeth</td>
<td>10</td>
<td>male</td>
<td>severe autism</td>
<td>nonverbal; no picture symbol exposure; some gestures; few manual signs</td>
</tr>
</tbody>
</table>
Methods (cont.)

• Design
  – multiple baseline across participants with an embedded alternating treatments design
  – Counterbalancing of treatment conditions
  – Treatment order was randomly selected

• Setting
  – university-based therapy room (Nadia & Zeth)
  – home (Christian)

Methods (cont.)

• Materials
  – PECS book with PCS (picture cards)
  – ProxTalker SGD with same picture cards as PECS
Methods (cont.)

- Dependent Variables
  - Requesting:
    - picture exchange (PECS)
    - button activation (SGD)
  - Social-communicative behavior:
    - eye contact
    - physical orientation
    - positive affect (smiling)
  - Speech:
    - verbalizations/speech approximations

Methods (cont.)

- Preference Assessment
  1. Parent interview
    - Identify potential reinforcers (foods only)
  2. Trial-based assessment
    - Single-item presentation; 80% consumed = selected as a reinforcer
  3. Forced-choice assessment
    - Paired presentation
    - 2 lists of similarly motivating reinforcers were created
      (Pace et al., 1985)
Intervention Protocol

- **Baseline**:  
  - Both modalities were available

- **Phase 1**:  
  - Child picks up picture card & gives to trainer 1 (or activates card on SGD)

- **Phase 2**:  
  - Child picks up card/SGD, walks to trainer, & exchanges for reinforcer

  (Frost & Bondy, 2002)

Intervention Protocol (cont.)

- **Phase 3**:  
  - Child discriminates between pictures then request items
    - distracter
    - non-preferred
    - 2 preferred
    - 3+ preferred

- **Phase 3-modified**:  
  - Child discriminates between 2 picture cards

  (Frost & Bondy, 2002)
Intervention Protocol (cont.)

- **Follow up:**
  - Continuation of phase & treatment with best results

- **Maintenance:**
  - Skill reassessed following 8-wk treatment break

- **Each Session:**
  - 20 trials per session

- **Overall phase criterion:**
  - 80% (16/20 trials) correct for 2 consecutive sessions across 2 communicative partners and 3 reinforcers

Reliability Analyses

- **Inter-rater reliability**
  - 2nd, independent observer scoring across all sessions (>33%):
    - Requesting: M = 99%
    - Social-Communicative Behavior: M = 95%
    - Speech: M = 100%

- **Treatment integrity (TI)**
  - TI conducted on >33% of total treatment sessions
    - Trainer 1: M = 98% / Mean agreement = 99%
    - Trainer 2: M = 94% / Mean Agreement = 98%
Phase 1: Physical Exchange

Phase 2: Expanding Spontaneity
Phase 3: Picture Discrimination

Effects on Requesting Skills*

*No statistically significant differences between AAC strategies in any phase for all participants.
Effects on Social-Comm. Behavior*

*No statistically significant differences between AAC strategies in any phase for all participants.

Effects on Emerging Speech*

*No statistically significant differences between AAC strategies in any phase for all participants.
Effect Size

- Non-overlap of All Pairs (NAP)
  - Calculates the # of comparison pairs that do not overlap & divides it by the total # of comparisons
    - 0-65% = weak effects
    - 66-92% = medium effects
    - 93-100% = strong effects
  (Parker & Vannest, 2009)

### Phase 1 Phase 2 Phase 3 Follow Maint.

<table>
<thead>
<tr>
<th>Request</th>
<th>PECS</th>
<th>SGD</th>
<th>PECS</th>
<th>SGD</th>
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<td>63%</td>
<td>100%</td>
<td>100%</td>
<td>90%</td>
<td>74%</td>
<td>100% m</td>
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<tr>
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<tr>
<td>Zeth</td>
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<td>50%</td>
<td>50%</td>
<td>54%</td>
<td>50%</td>
<td>50%</td>
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<td>74%</td>
<td>100% m</td>
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<tr>
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<td>33%</td>
<td>91%</td>
<td>91%</td>
<td>58%</td>
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<tr>
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<td>39%</td>
<td>96%</td>
<td>93%</td>
<td>49%</td>
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<th>Speech</th>
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Note: S = SGD; P = PECS; m = modified protocol
Number of Sessions to Reach Mastery

<table>
<thead>
<tr>
<th></th>
<th>Phase 1</th>
<th>Phase 2</th>
<th>Phase 3</th>
<th>Phase 3 (2 sym.)</th>
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<tr>
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<td>SGD</td>
<td>PECS</td>
<td>SGD</td>
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<tr>
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<td>3</td>
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<td>4</td>
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<tr>
<td>Zeth</td>
<td>6</td>
<td>4</td>
<td>9</td>
<td>12</td>
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</table>

--- = not mastered
NA = not applicable

Conclusions

• Children can master both AAC strategies
  – contribution of modified protocol
• Interest in device features may have contributed to less S-C behavior (eye contact)
  – more S-C behavior in phase 2 because of demands to locate trainer, thus increasing eye contact & proximity
Conclusions (cont.)

- Picture Discrimination cumbersome (phase 3)
  - may need to remain at 2-symbols level for some time
- No speech gains
  - practitioners need to have realistic expectations of speech development
- Requesting skills maintained at treatment levels
  - social-communicative behavior & speech declined

AAC Strategy Comparisons

<table>
<thead>
<tr>
<th></th>
<th>PROS</th>
<th>CONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>PECS</td>
<td>+ Affordable</td>
<td>- No voice output - comm. partner needs to be w/in arm’s reach</td>
</tr>
<tr>
<td></td>
<td>+ Can be used as a backup when SGD fails</td>
<td></td>
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<tr>
<td></td>
<td>+ Lightweight &amp; portable</td>
<td>- May not be as motivating for tech lovers</td>
</tr>
<tr>
<td></td>
<td>+ Easy to create</td>
<td></td>
</tr>
<tr>
<td>ProxTalker</td>
<td>+ Voice output – comm. partner can be outside arm’s reach</td>
<td>- Cost</td>
</tr>
<tr>
<td></td>
<td>+ Durable</td>
<td>- SGD is heavy for younger children</td>
</tr>
<tr>
<td></td>
<td>+ Motivational value</td>
<td>- Cannot be used in some situations (e.g., swimming)</td>
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Problem Behaviors

- Escaping
  - Minimized open area
  - Removed distracter items
  - Provided breaks
  - Adjusted seating arrangement

- Carrying the SGD
  - Provided physical assistance

- Transitioning
  - Gradually moved from large classroom to therapy room

- Lost interest in previously identified food reinforcers
  - Reassessed reinforcers frequently
  - Included more reinforcers
  - Ensured freshness
  - Provided small quantities

- Difficulty pressing SGD buttons
  - Provided physical assistance

Problem Behaviors (cont.)

- Meltdowns
  - Lessened task demands
  - Determined root of behavior & addressed
  - Provided frequent breaks
  - Reassessed reinforcers

- Excessive Stimming
  - Removed/minimized distracter items
  - Provided redirection

- 3-Symbol Discrimination
  - Increased distance b/n symbol
  - Reassessed symbol iconicity
  - Checked for symbol similarities
  - Revisited the 2-symbol phase

- Confusion between treatment strategies
  - Provided physical assistance
  - Provided sufficient wait time
Study Limitations

- Generalization to other settings was not investigated
- Only used food as reinforcers
- Symbol iconicity was not evaluated prior to intervention
- Limited number of participants
- Phases 4-6 not assessed

Future Research Directions

- Study replication:
  - Various settings; w/ younger participants; CLD learners
- Does symbol iconicity impacts picture discrimination?
- Ongoing transition to PECS phases 4 through 6
- What type of participant is a good candidate for transition, which one is not?
Future Research Directions

- Once a “mid technology” device such as the ProxTalker is mastered, what comes next?
  - Potential trajectory of moving along an intervention spectrum:
    - Low-tech (PECS)
    - Mid-tech (Proxtalker)
    - High-tech (iPad)

Questions / Comments
Acknowledgements

• This project was supported by:
  – A Project Development Team within the ICTSI NIH/NCRR Grant Number RR025761
  – Midwest Crossroads Alliance for Graduate Education and the Professoriate
  – Purdue Bilsland Dissertation Fellowship
• Thanks to ProxTalker.com, LLC for loaning devices
• Thanks to the families who agreed to participate in our research

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References